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ABOUT THE JOURNAL

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2. Manuscript of an article should have a cover page that provides the title of the paper, name(s), address, phone numbers and e-mail address of all authors and acknowledgments, if any.
3. Abstract should be in fully justified setting and on 11 point font size. It must not exceed 250 words. A maximum of 6 keywords, listed alphabetically is recommended.
4. The body of the paper following the abstract should be single-space, and both left and right sides justified. First-level headings should be centered, boldfaced with the “SIZE14” (Following the abstract, include a first level heading before the first paragraph of the body of the paper to clearly separate the two).
5. Figures, tables and equations should be simple, centered, separately numbered and self-explanatory, and titles must be above the tables/figures. Sources of data should be mentioned below the table/figure. It should be ensured that tables/figures are referred to from the main text.
6. References should be listed on a separate page at the end of the paper. A line must be skipped between references. The approved referencing style is the 6th edition APA .
7. If an article is accepted for publication, the corrected version should be resubmitted as an e-mail attachment along with the scanned teller for payment to the Editorial Assistant at gjch@brainspecresearch.com

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A CRITIQUE OF PRESIDENT MUHAMMADU BUHARI'S OCTOBER 22, 2020 #ENDSARS ADDRESS AND ITS CONFORMITY TO RHETORIC CANONS AND PROOFS OF COMMUNICATION

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Abstract

Speeches by presidents are powerful as they not only carry the weight of policy statement or direction but possess the ability to inspire, uplift, motivate, unite, show empathy, be sensitive to the mood of the moment, or incite, arouse, mobilize, rally and galvanize a people towards an intended outcome. Whoever is giving the speech should oversee not just its creation but also its execution, because the speaker's method of delivery can have just as much effect on the audience's reception as the rhetoric it contains. This paper takes a critique at President Muhammadu Buhari's October 22, 2020 #EndSARS speech in the wake of the nationwide protest by Nigerian youths over police brutality and reforms and juxtapose it with the five Rhetorical canons; - inventio, dispositio, elucutio, memoria and delivery as well as the Rhetorical proofs; Ethos, Pathos and Logos as theorized by Aristotle and recommend that Presidential speech writers should consider the importance of adopting the rhetoric canons in future speech writing to aid delivery of speeches that will inspire, arouse and appeal to emotions while efforts should be intensified to ensure the use of the rhetorical skills in future speeches delivery to reduce over dependence on the script or teleprompter to achieve maximum rhetorical effect.

keywords: Critique, #Ends Address, Rhetoric Canons, Rhetoric Proofs, Communication

1 Introduction

Ideally, presidential speeches the world over are meant to inspire, uplift, motivate, unite, show empathy, be sensitive to the mood of the moment and presidential in nature.

Speech delivery is important. Whoever is giving the speech should oversee not just its creation but also its execution, because the speaker's method of delivery can have just as much effect on the audience's reception as the rhetoric it contains.

The writing and execution of political speeches require numerous elements of political communication. Although there is much debate about which parts of this process are the most essential, there is no doubt that its organization should place as much emphasis as possible on every detail, including composition and delivery.

Noermanzah (2018), quoting O'Sullivant *et al.* (in Alo) describe rhetoric as the practice in the use of the language of influencing others to achieve planned goals characterized by certain credibility (ethos), the ability to manage listener emotions (pathos), and the use of logic (logos). Similarly, Larson (in Altikriti) describes rhetoric as the intelligent ability to use the means of language in the process of persuasion, which can be done using ethics (ethos), emotional appeal (pathos), or reason (logos). Winkler and McCuen assert that rhetoric is a technique used by speakers or writers as an attempt to communicate with listeners or readers. He further explained that rhetoric is more the art of using linguistics or linguistic tools effectively through the choice of appropriate and effective words and the ability to manage the grammatical arrangement of sentences so as to deliver a message to the listener or writer as the speaker or author wishes. In this case, rhetoric can be interpreted as ability in the process of language tailored to the expectations of the listener or reader. Processing language, in this case, is explained by Rinaldi as the ability to effectively select and use language in certain situations with a specific purpose.

2 President Muhammadu Buhari's #Endsars Address and its Conformity to the Rhetoric Canons of Communication: An Overview

According to Esuh (2006) Classical traditions (based on Aristotle's *ad herennium*), all rhetoric is divided into five (5) parts- *inventio*, *dispositio*, *elucutio*, *memoria* and *delivery*. Each of these parts have its distinctive functions in rhetorical communication. They form part of oratorical order as well as forms for critical analysis and evaluation.

Pudewa (2016), states that Rhetoric to most modern minds, the word smacks of cunning—the empty polemic or self-aggrandizement of a political figure, or perhaps the crafty prose of a present-day sophist selling overpriced or unnecessary products to the unlearned. To those who have delved a bit into classical education, rhetoric is the third liberal art, the top of the trivium, the noble art of persuasion, a skill in the tradition of Plato and Paul, Cicero and Augustine, which since ancient times has been practiced and applied for noble (as well as ignoble) purposes.

While Walton, (2000) defines the five canons of rhetoric as invention, arrangement, style, memory and delivery.

The five canons of rhetoric are a classical approach to understanding effective communication. Invention (what to say), arrangement (structure of content), style (language choices), memory (learn the presentation) and delivery (use of more than just words).

The five canons of rhetoric are simply the five skills that individuals need to have to be great at communicating. While these canons date from a long time ago, they're still relevant for anyone looking to create and deliver effective communications today.

Explaining further, Pudewa (2016) notes that, "The word "canon" is most commonly used in music to describe a piece in which a melody is introduced in different parts successively, or in an expression like "the canon of literature": a collection of books which comprise a set such as Scripture or the Great Books. A simpler definition is "a general rule, law, or principle." The Five Canons of Rhetoric give us five general principles, or divisions, which, when we come to understand and apply them, will make our communication more effective. These principles are commonly labeled: Invention, Arrangement, Elocution, Memory, and Delivery".

On their part, Brett and McKay (2020), stated that "the Five Canons of Rhetoric constitute a system and guide on crafting powerful speeches and writing. It's also a template by which to judge effective rhetoric. The Five Canons were brought together and organized by the Roman orator Cicero, in his treatise, *De Inventione*, written around 50 BC. 150 years later in 95 AD, the Roman rhetorician Quintilian explored the Five Canons in more depth in his landmark 12-volume textbook on rhetoric, *Institutio Oratoria*. His textbook, and consequently the Five Canons of Rhetoric, went on to become the backbone of rhetorical education well into the medieval period".

They defined the five Canons of Rhetoric as:

- i. **inventio (invention):** The process of developing and refining your arguments.
- ii. **dispositio (arrangement):** The process of arranging and organizing your arguments for maximum impact.
- iii. **elocutio (style):** The process of determining how you present your arguments using figures of speech and other rhetorical techniques.
- iv. **memoria (memory):** The process of learning and memorizing your

speech so you can deliver it without the use of notes. Memory-work not only consisted of memorizing the words of a specific speech, but also storing up famous quotes, literary references, and other facts that could be used in impromptu speeches.

- v. **actio (delivery):** The process of practicing how you deliver your speech using gestures, pronunciation, and tone of voice.

2.1 President Buhari's #EndSARS address and the rhetoric Canon of Inventio (Invention)

Esuh (2006) notes that "Inventio (invention) involves the attempt on the speaker to investigate the subject matter of discourse. It embraces survey and forecasting of the subject and arguments suitable for any given rhetorical effort. It involves the idea of the status and modes of persuasion- logical, emotional and ethical, which are in themselves interrelated".

Invention is the process of coming up with what you want to say to persuade your audience of your view. What are the key messages and points that will help you convince your audience of your point of view?

To do this stage well requires clarity of purpose and understanding of the subject and your audience. At this stage you also need to choose your presentation style (and now days your medium) and decide how long your presentation should be.

To Walton, (2000), invention is the process of coming up with material for a text. In writing, this is the brainstorming or prewriting stage.

On their part, Brett and McKay (2020), stated that Invention, according to Aristotle, involves "discovering the best available means of persuasion." It may sound simple, but invention is possibly the most difficult phase in crafting a speech or piece of writing as it lays the groundwork for all the other phases; you must start from nothing to build the framework of your piece. During the Invention Phase, the goal is to brainstorm ideas on what you're going to say and how you're going to say it in order to maximize persuasion. Any good orator or writer will tell you they probably spend more time in the Invention step than they do any of the others.

Pudewa (2016) describes invention as the process of coming up with what to say. Its root is the Latin word *invenio*, meaning "to find or discover." In order to write something, we must have something to write about.

However, in the ancient rhetoric exercises known as the progymnasmata, the first task was not to “think of something to say” but to “retell a fable.” Imitation is vital to the learning of a skill.

The relationship between the words shows a truth of creativity-to invent something, you have to have some stuff to begin with. Only God produces something from nothing; the rest of us are kind of stuck with what we’ve got.

One sad fact we all must face is that we can’t get something out of a mind that isn’t in there to begin with. We can’t use words we don’t know. We can’t articulate concepts we don’t understand. We can’t think a thought we’re incapable of thinking. Which is why Memory is the foundation of all.

The President's speech under review failed this first task. He started the speech with a combative mood and spiced it with a threat. His paragraphs 1 and 2 read and sounded thus;

"It has become necessary for me to address you having heard from many concerned Nigerians and having concluded a meeting with all the Security Chiefs.

2. I must warn those who have hijacked and misdirected the initial, genuine and well-intended protest of some of our youths in parts of the country, against the excesses of some members of the now disbanded Special Anti-Robbery Squad (SARS).

Beginning of the second paragraph with a commanding tone, "by warning"... "Those who have hijacked and misdirected" the protest... was saying the right thing at the wrong time. The nation was boiling, the youths were enraged, lives were lost in Lagos and across many states, words of healing, and advocacy for calm and apologizing for the failure of government to institute police reforms and create jobs for the youths would have been a better way to start.

Because to President's speech fell short of being Presidential, it failed to heal, unite, show empathy, let alone reconcile which is why it was greeted with outrage all over the country. Many saw it as empty, a waste of time and insensitive.

At the invention phase in rhetorical communication, without some direction and guidance, brainstorming can often be fruitless and frustrating. Pondering on elements such as your audience, your evidence, the means of persuasion, timing and format of argument are important and these were lacking in the

President's speech under review and using them can increase the effectiveness of your Invention sessions.

2.2 President Buhari's #EndSARS address and the rhetoric Canon of dispositio (disposition/arrangement)

According to Esuh (2006), dispositio (disposition) covers the philosophy of arrangement and orderly presentation/planning of the idea to be discussed. It assesses the selection of the subject matter into structure, determining or emphasizing how each part contributes to the unity and purpose of the speech. Classically, a speech should have the proem, the narratio and the epilogue, roughly equivalent to introduction, body and conclusion".

Walton defines arrangement as the process of deciding how to order the material in a text. In writing, this is still part of the prewriting stage. Speeches, like music, should be carefully arranged. Arrangement is the process of structuring your content. You need to put all the great things you thought of in the invention stage into a good order so that they work together and so that they help you land your message and persuade your audience.

Paragraphs 8 and 9 ought to have come much earlier in the speech where the President said;

8. "The result of this is clear to all observers: human lives have been lost; acts of sexual violence have been reported; two major correctional facilities were attacked and convicts freed; public and private properties completely destroyed or vandalized; the sanctity of the Palace of a Peace Maker, the Oba of Lagos has been violated. So-called protesters have invaded an International Airport and in the process disrupted the travel plans of fellow Nigerians and our visitors".

9. "All these executed in the name of the ENDSARS protests. I am indeed deeply pained that innocent lives have been lost. These tragedies are uncalled for and unnecessary. Certainly, there is no way whatsoever to connect these bad acts to legitimate expression of grievance of the youth of our country".

But again, the import of the message he wanted to convey, was that he missed the opportunity to emotionally connect with the pains of families who lost their loved ones and were passing through as nowhere in the paragraphs above or in their entire speech did he commiserate directly or indirectly with families that were grieving. If the President claimed he is deeply pained by the fact that

innocent lives were lost, he never showed it in his speech. He missed an opportunity to show empathy and rise to the moment as ‘Father of the nation’.

Soha (2010) captures the situation thus, "Because modern presidents display commitment and concern to a policy or issue through their public speeches—even if they are not typically successful leading public opinion—they lead by speaking about policy issues. Any variation in the level of attention through speeches, therefore, indicates that presidents are altering their leadership or governing strategies to affect their political fortunes and assist in their goal achievement.

Modern arrangement of speeches usually has three stages: introduction, body and conclusion. The classical arrangement that Cicero would have used though had five stages: *introduction, state neutral facts, make your case, refute alternative positions, and conclude your presentation*. This arrangement can still be used if you wish, though most people go with the three stage approach. It’s important to think about arrangement across all forms and mediums of communication and ensure that what is chosen is right for the audience and the chosen medium.

To Brett and McKay (2020), arrangement is simply the organization of a speech or text to ensure maximum persuasion. Classical rhetoricians divided a speech into six different parts. They are: Introduction (exordium), Statement of Facts (narratio), Division (partitio), Proof (confirmatio), Refutation (refutatio), Conclusion (peroratio)

2.3 President Buhari's #EndSARS address and the rhetoric Canon of Elocutio (Elocution/style)

Soha (2010) states that, "Presidents themselves believe that ineffective communication contributes to a failure of governance. Both Presidents Clinton and Reagan, for instance, lamented that their inability to lead the public was failure to communicate policy initiatives clearly. As others have argued, moreover, it is through devoting commitment and concern to a policy that demonstrates presidential leadership".

Esuh (2006) defines "Elocutio (Elocution) simply as, "styles or the concept of expression in language, resulting from the choice of words or the arrangement of the composition. Style is usually classified as plain, moderate, elated or grand".

Walton on his part defines style as the process of coming up with the actual words that will be used in a text. In writing, this Canon is first approached in the drafting stage and continues in the rewriting stage.

To Pudewa (2016), elocution basically means the way something is said. The vocabulary, sentence structure, and expressions used will affect the reader's perception of the ideas. Again, Memory is critical because the power of expressive language will be a function of the great database of language in the brain.

Style is the process of choosing language and constructing your presentation so as to create an emotional response. Eloquence and structuring help achieve this outcome, as can the skilled use of emotive language and rhetorical devices such as analogy, allusion and alliteration.

To Brett and McKay (2020), when people write memos or give persuasive speeches, the focus is usually on what they're going to write or say. While it's important that you have something substantive to say, it's also important how you present your ideas. The canon of style will help you present your ideas and arguments so people will want to listen to you.

Coming back to President Buhari's speech under review, he lost the Rhetoric Canon of style when paragraphs 12, 13, 14 amounted to self-praise in a manner that made no emotional appeal to the angry youths, majority of whom remain jobless. No protesting youth wanted to hear about his plans to "lift 100 million Nigerians out of poverty in the next 10 years; the creation of N75 billion National Youth Investment Fund to provide opportunities for the youths and the Micro, Small and Medium Enterprises (MSME) Survival Fund", etc. Buhari's mention of Farmermoni, Tradermoni, Marketmoni, N-Power, N-Tech and N-Agro" as massive youth empowerment schemes his government has put in place for the youths because they were perceived as insulting and mere tokens compared to what the youths expected from their country and President.

He worsened the situation by using paragraph 14 for self-praise and glorification when he stated that "No Nigerian Government in the past has methodically and seriously approached poverty-alleviation like we have done".

2.4 President Buhari's #EndSARS address and the rhetoric Canon of Memoria (Memory)

According to Esuh (2006), "Memoria (Memory) refers to the speaker's mastery

of key elements of not all of his material in sequential order associated with memorization".

Walton, (2000) defines memory as the process of committing a text to memory. Although this Canon is not as applicable to writing as it is to oratory, there are still occasions when writers must memorize their texts in order to make the delivery more effective.

On his part, Pudewa (2016) states that memory, of course, is where it all begins and ends. If, as was most often done in ancient times, one's rhetoric was spoken rather than written, it was critical that such speeches be well memorized and practiced for a powerful delivery. However, the function of memory as a component of rhetoric goes far beyond just memorizing a speech. The modern educationists who condemn memorization as useless, boring, rote, tedious, and harmful to children, fail to notice that if we hadn't memorized anything, we wouldn't know anything...The ancients called memory "the furnishing of the mind."

Memory relates to remembering enough so that you can present fully and fluently, without notes. This was essential in the Roman era when the canons were written and orators needed to speak for hours at a time. While it's perhaps slightly less important now, it's still a very useful skill.

Many great speakers visualize their presentations in advance, do "dress rehearsals", explore their environments and understand multiple layers of their presentations (from full text to a few key bullet points).

The rhetorical Canon of memory was the worst victim in this speech. Agreed President Buhari has never been a good orator but nowhere from start to finish of his address did he showed mastery of any key element of his speech. All through, he was glued to his script. Memorization became a victim of his inadequate rhetorical skill.

2.5 President Buhari's #EndSARS address and the rhetoric Canon of Delivery

Delivery, according to Esuh (2006) involves the skill of maximizing the vocal elements in relation to the bodily actions to achieve effective delivery.

Walton, (2000) defines delivery as the process of presenting a text to an audience. Like memory, delivery is less prominent in writing than in oratory;

however, there are many occasions when writers must think of how best to deliver their texts.

Delivery is the last of the five canons of rhetoric. It involves using all the tools available to you to effectively communicate. Emphasis, tone of voice, change of pace, pauses, volume, gesticulation, body language, positioning and props are all tools to help effectively deliver your arguments.

To Soha (2010), "speeches are a primary tool available to modern presidents to alter their current political situation and help them to govern. As such, presidents should anticipate when delivering more (or fewer) speeches is most likely to benefit them in goal achievement, whether by improving their public standing or achieving legislative policy goals. After all, presidents typically receive a bump in the polls after delivering a nationally televised address and increase their legislative success rate by speaking publicly".

While to Pudewa (2016), delivery pertains to the mechanics presenting the created speech or composition. If speaking, then memory and preparation play a large part in a speaker's confidence and mastery, and such things as vocal modulation, projection, eye contact, and gestures can be practiced and executed. It has been said that "drama is the capstone of rhetoric" for this very reason—that the final polish can make the good speech better and the better speech superb.

The delivery of President Buhari's EndSARS speech was generally poor. But his poor delivery is also influenced by his mother tongue. Not only did the body language, gesture and mien failed to "connect", but nothing indicated the President was feeling remorseful about governments failure to her youths who were demanding for better police reforms, creation of jobs and the government to fashion it's economic policy in a manner that will guarantee a country that works for all. According to Brett and McKay (2020), like the canon of style, the canon of delivery is concerned with how something is said and not just being forced to the script.

While the canon of style focuses primarily on what sort of language you use, delivery focuses on the mechanics of how you impart your message. For ancient orators, delivery meant how a speaker used his body language and hand gestures and how he changed his tone of voice during his oration.

Mastering the canon of delivery can help a speaker establish ethos with his audience. Delivery can also help an orator use pathos, or emotion, to persuade. A well placed pause or a slammed fist can elicit a desired emotion from your audience in order to make your point.

The most disappointing aspect of the speech was the fact that all through the entire delivery process, from paragraph 1 to 27, not once did the President made even a passing comment nor acknowledged what happened at Lekki Toll Gate, the citadel of the crisis.

The president, through his speech was supposed to inspire hope and calm frayed nerves. Unfortunately this was not the case.

3 Buhari's #Endsars Address and its Conformity to Rhetorical Proofs

According to Esuh (2006) "Rhetorical proofs or supports, are of classical origin, modern rhetoric only builds on them. Aristotle had theorized that the models of persuasion depending on the effects they produce in listeners are of three kinds, consisting either in the moral character of the speaker- Ethos or ethical proof; or in the production of a certain disposition in the audience - Pathos or pathetic proofs; or in the speech itself by means of real or apparent demonstration - Logos or logical proofs.

Ethos is appeal based on the character of the speaker. An ethos-driven document relies on the reputation of the author. As Esuh (2006) stated, 'Ethical proof concerns the speaker's credibility and the extent to which he is held by his audience. Aristotle stated that "good character, good sense, and concern for the welfare of the audience are the three constituents of ethical appeal". Ethos deals with the credibility of the speaker (trust).

Initial ethos (credibility held of the speaker by the audience before the speech); desired ethos- based on the speech itself and post ethos- ethos perceived after the message. The three major constituents of ethos are: sagacity or good sense, good moral character and goodwill (the three Gs).

Pathos is appeal based on emotion. Advertisements tend to be pathos-driven. According to Esuh (2006), Pathetic Proof "is the simplest way of understanding the tenets of pathos. Without the audience, there is no speech. The speech situation is a third-dimensional transaction and the audience disposition is as valid as other components- the speaker and the speech itself. It is inferred that the audience is the most important element in the speech situation and that if the speaker is to be effective, he must adjust himself and his

ideas to it. Pathetic proof is also called emotional proof. It must be designed and used to put the audience in a frame of mind to react favorably and comfortably to the purpose of the speech situation. If by any means the audience is not put in a favorable frame to be moved, the speech will lose its potency".

Logos is appeal based on logic or reason. Documents distributed by companies or corporations are logos-driven. Scholarly documents are also often logos-driven. As Esuh (2006) stated, "Logical Proof refers to the basic elements of the speech itself which the speaker employs to alter the consciousness of his audience. The two main elements of logical proofs, he notes are:

1. **Evidence** - Inartistic proof are existent proofs which are not created by the speaker, the raw materials used to establish an issue. It includes testimony of people, exhibits, witnesses, oaths, statistics, photographs/illustration, oral and video recording and other 'factual' matters capable of inducing agreement or belief.
2. **Argument** - Artistic proof is the ability of the speaker to create line of argument out of existing evidence. Evidence without creativity may lack the potency to bite.

Buhari's speech in question lacked ethos needed under the circumstance. Ethos suffered tremendously in this speech. His viewers and listeners had many reasons not to trust whatever he was saying. The speech itself was made worse by lacking the desired ethos it ought to have come with. From start to finish, either deliberately or by error, the address made no single reference to the Lekki Toll Gate crisis. An opportunity to evoke emotional appeal that connects with sensitivity and empathy was lost. This explains why outrage, frustration, disappointment grew higher after the speech than before the speech.

The speech visibly lacked Pathos. Even though the address in question was a national broadcast, his major audience was the youths who were in this instance, angry, furious, and frustrated, on rampage protesting, disrupting law and order leading to death and unimaginable destruction of public properties. A Presidential speech at this time would have centered on calming tempers, appealing for calm and most significantly, apologizing.

The mention of Farmermoni, Tradermoni, Marketmoni, N-Power, N-Tech and N-Agro in paragraphs 13 and his comment in paragraph 14 that ... "No Nigerian Government in the past has methodically and seriously approached poverty-alleviation like we have done", were perceived as mere tokenism that was meant to humiliate than empower, enslave than liberate and demobilize than

energize. Therefore, not only was logos lacking in the speech but he failed to utilize the few data and facts he had and to deliver same in a manner that advanced his course and believability. His attempt to showcase the numerous social intervention programmes of his administration as achievement of what he has done to Nigerian youths, lacked the artistic proof capable of making any emotional impact on the youths.

4 Conclusion

Speech is two-way face-to-face communication, in this case, the speech is the result of the process of thinking by a person who poured in the activities of speaking to the general public by providing a sequence of exposure in the form of a systematic in the form of a topic of information with the purpose of listeners understanding and following the communicator's intentions. Thus, rhetoric can be regarded as the ability to process various means of language in certain situations and certain purposes in the activities of communicating.

The President's speech in the aftermath of the EndSARS protest, failed the test of leadership, of being Presidential and of being sober. If there is one speech which further plummeted the President's approval rating and showed him as a leader who has lost torch and got disconnected with the reality of life, this was one as it never inspired, consoled, comforted, gave neither hope nor solace but dampened patriotism and pride in Nationhood.

Priority must therefore be made to ensure that the rhetorical canons are strictly adhered to in future presidential speeches especially in moment of crisis as almost all crisis Communication Management techniques are embedded in the rhetorical canons.

5 Recommendations

Based on the findings of the study, it is hereby recommended that:

Presidential speech writers should consider the importance of adopting the five rhetoric canons- invention, dispositio, elucutio, memorial and delivery in future speech writing aid delivery of speeches that will inspire, arouse and appeal to emotions.

That efforts should be made to tutor the president on the need to improve on his elocution while making future speeches.

That future presidential speeches should consider the sensitivity of issues at stake, the mood of the nation and evoke rhetorical skills that will appeal more

to emotions and connect the President with the people rather than make him look distant and disconnected from the people or from reality as the EndSARS speech indicated.

That the power of silence or pause in delivery should be adopted in future Presidential speeches in a manner that allows body language and gestures to communicate his association with the feelings of the audience.

That efforts be intensified to prove the president's ability to use the rhetorical skill of memory in future speeches thus reducing his over dependence of the script.

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MONEY SUPPLY AND INFLATION NEXUS IN NIGERIA: THE ROLE OF EXPECTATIONS AND FISCAL OPERATIONS

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Abstract

Here, the inspiration of ‘money supply on inflation in Nigeria’ was studied by making reference to the sway of expectations and fiscal operations of the government. The paper put to use data that considered thirty-five (35) years data point ranging from 1986 through 2020. The study utilized the ‘autoregressive distributed lag’ (ARDL) technique and ‘Granger Causality’ test in analysing the data. Given the ARDL result, we observed that expectation has a substantial sway on the present inflation. Further, the F-Bounds test result reported that cointegration exist, leading to the estimation of the short-run dynamic ‘error correction model’ and the long run estimates. In the short-run, it was observed that changes in money supply wielded no significant influence on the variations in the rate of inflation; while output growth and fiscal depth wielded a negative and significant sway. In the long-run, it was discovered that broad money supply wielded a positive and substantial influence while output growth put forth a negative and significant effect. The fiscal depth of the government was observed to wield a positive though an insignificant long-run influence on the rate of inflation. The result from the Granger causality test supported that growth in money supply causes inflation. It follows from the findings that for inflation to be tackled successfully, there is need to maintain a stable level of money supply along with maintaining a substantial growth in output, while maintaining the fiscal depth within the 25% as suggested in the critical limit hypothesis.

Keywords: Critical Limit Hypothesis, Adaptive Expectation, Rational Expectation, Inflation, Fiscal Depth.

1 Introduction

The persistent rise in the price level of commodities is what has been generally accepted to be described as inflation. With different choice of words though linking up to the same idea, scholars have attempted to proffer different definitions to the issue of inflation. Inflation, in the view of Pigou (1947), is the continuous or ongoing tendency for the price level to surge. Therefore, a

consistent and noticeable rise in the overall level of prices can also be referred to as inflation. Amadeo (2012) described it as “when the prices of the majority of products and services continue to creep upward”, resulting in a fall in the quality of living. The hint that inflation is a monetary phenomenon, making monetary policy mainly responsible for its abatement has come to be the most recognized view.

In line with the above line of thinking, which is centred on the “quantity theory” of money, the only factor affecting inflation is the change in the relative supply of commodities and money (Ofori, Danquah and Zhang, 2017). To Christiano and Fitzgerald (2003), when the rate of inflation is gentle enough, households and firms do not need to consider price variations while making daily decisions. Each piece of money buys less commodities when the overall price level surges. So, inflation indicates a diminution in buying power per the piece of money, or a loss of real value in the economy's medium of exchange and unit of account (Ofori *et al.*, 2017).

The argument behind the “quantity theory” as summarized in the “equation of exchange” is that the price level, P , is proportional to the changes in the quantity of money, M , given that the velocity (V) is constant along with the total output (Y or T in the case of transaction). The implication here is that if money supply intensifies, the price level will respond in a similar manner. This comes to be the monetarist view of inflation. Apart from money supply being attributed to be the driving force of inflation, the Keynesian economists have brought up the argument that if aggregate demand falls short of aggregate supply, the economy will likely experience an inflationary gap which can be corrected via a contractionary fiscal measures of reducing the government spending or increasing taxation plus a combination of both measures if desirable. These two views therefore point to the fact that inflationary pressures in the economy needs both monetary and fiscal measures to be tackled.

To present a threshold for the government spending level in the economy that will not intensify inflation in the economy, a threshold of 25% of the overall economic activity is expected to be maintained by the government while deciding on her expenditure decisions. This came to be known as the “critical limit hypothesis” which was put forth by Collin Clerk. As such, even if the government maintains a balanced budget and spend beyond this critical limit, inflation will occur (Atan and Effiong, 2021). This points to the fact that the fiscal depth of the government is of immense importance in ensuring price stability in the domestic economy. In the case of Nigeria, this limit has not been

reached as the fiscal depth of the government was 0.10% in 1986 but grew steadily up to 14.52% in 2020. In line with this hypothesis, the rising trend poses an impending inflationary pressures if the 25% level is reached and exceeded. This rising trend is an outcome of the high fiscal deficit that is being maintained by the government in recent times.

The use of monetary and fiscal policy stance in combating inflation has been a complicated issue in deriving the desired level of inflation. Apart from money supply and government revenue and expenditure tools, inflation is also being influenced by structural issues like market anomalies, structural rigidities, social tension, foreign exchange, political instability, inelasticity of food supply, and decline in export earnings (Ezirim, *et al.*, 2012). These aforementioned issues cannot be duly tackled with monetary and fiscal policies, and they create a mismatch between demand and supply thereby intensifying the inflationary pressures in the economy.

Inflation is being noted as one of the chief defies confronting emerging countries, including Nigeria, that must be addressed (Olaere, 2019). For years, the inflationary strain has risen, having a deleterious sway on the Nigerian economy through the amplification of commodity prices. Against this backdrop, Nigeria's monetary authority has implemented a variety of monetary policy tools with the primary goal of keeping inflation under control. Despite this, inflation in Nigeria has been steadily rising in the considered era.

The rate of inflation, money supply growth, and fiscal depth of the government has been exhibiting some changes over the years. Table 1 captures the value of these variables for some chosen years.

Table 1: Inflation, money supply growth, and fiscal depth in Nigeria for selected years

Year	Inflation (%)	Growth Rate of Broad Money Supply (%)	Fiscal Depth (%)
1986	13.70	4.23	0.10
1990	3.60	45.92	0.28
1995	51.60	19.41	1.15
2000	14.50	48.07	2.79
2005	11.60	24.35	5.00
2010	11.80	6.91	7.68
2015	9.60	6.06	7.23
2019	11.98	9.16	13.61
2020	15.75	30.57	14.52

Source: Central Bank of Nigeria statistical bulletin, 2020.

The rate of inflation as at 1986 was 13.70% given the money supply growth rate of 4.23% and fiscal depth of 0.10%. As the money supply grew by 45.92% in 1990 with a fiscal depth of 0.28%, a tremendous increase in inflation from 3.60% in 1990 to 51.60% in 1995 was recorded. To curtain this, the monetary authority reduced the supply of money as indicated by the growth rate of 19.41% in 1995, leading the price level to decline to 14.50%. Over the years, the fiscal depth of the government has been rising steadily but what is common is that it has not reached the critical limit of 25% set by Colin Clerk. We cannot therefore say that fiscal depth has been inflationary. Meanwhile, changes in money supply could be said to be a driver of the changes in the rate of inflation as it seems to portray some similar movement over the years. Figure 1 captures these movements where both the growth in money supply and inflation exhibited high degree of volatility.

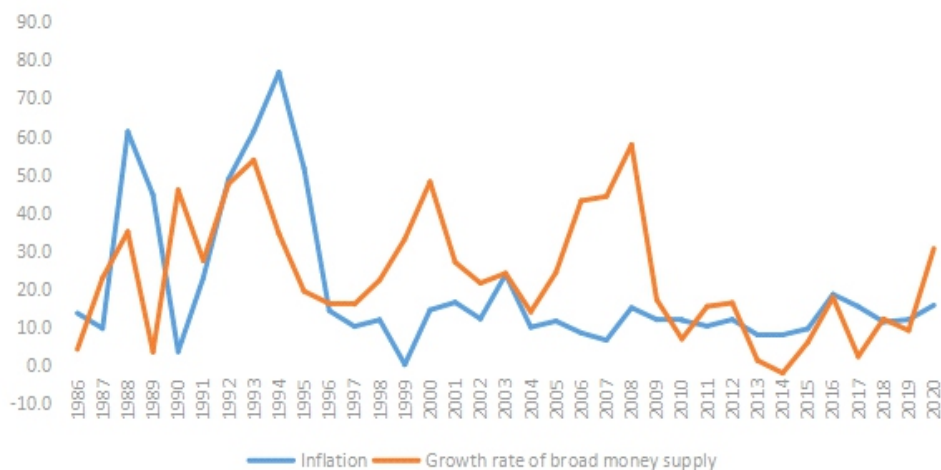


Figure 1: Trend in money supply growth and inflation in Nigeria, 1986 – 2020

With the growing volatility in the growth rate of money supply in the 1980s and early 1990s, it is observed that the rate of inflation was also largely volatile as it portrays series of oscillations within that time. This similar behaviour replicated on the opposite direction in the late 1990s and 2000s where despite the volatility in money supply, the rate of inflation has been a bit stable. The statistic of 2019 and 2020 are of concern as they portrayed a rising money supply growth from 9.16% to 30.57% respectively; followed by a rising inflation from 11.98% in 2019 to 15.75% in 2020.

Given this behaviour, could it be that rising money supply growth could intensify the rate of inflation in Nigeria as projected by the quantity theory of money? This forms the basis in which this paper seeks to study the influence of

money supply growth on inflation in Nigeria from 1986 via 2020 with special consideration of expectations and fiscal depth of the government. The paper also aims at examining the pattern of the causal relationship concerning the rate of inflation and the growth rate of money supply in Nigeria.

2 LITERATURE REVIEW

2.1 Theoretical Literature

The theoretical literature that are of relevance to this study are the quantity theory of money, demand-pull and cost-push theories of inflation, structuralist theory of inflation, expectation theory, and the critical limit hypothesis. The summary of these theories are given as follows:

2.1.1 The Quantity Theory of Money

The ‘quantity theory of money’ (QTM) entails the monetarist view of inflation as encapsulated by Friedman (1989). Based on the theory, “inflation is nothing but the pecuniary incident which is emerged by the monetary expansion” (Sultana *et al.*, 2018). The QTM with Milton Friedman leading holds that inflation is every time and universally a monetary incident that stem from from a speedy increase in the quantity of money than in total output (Friedman, 1989). Thus, it presupposes a direct proportional link concerning money supply and the price level. Using the “Fisher Equation of Exchange” (FEX), the theory bases its argument.

The FEX is demonstrated using the equations below:

$$MV = PY \quad (2.1)$$

In which M = money supply, V = velocity of circulation of money (the number of times which money changes in hand), P = price level, and Y = level of output. With the assumption that V and Y are constant, then P varies with M in a proportional manner and M does not affect Y as stipulated in the neutrality of money argument (Ebipre and Amaegberi, 2020).

It therefore follows from the above argument that,

$$P = f(M) \quad (2.2)$$

Indicating that the price level (inflation), P, changes in proportionality with the volume of money supply, M, in circulation. The QTM therefore relates a rise in money supply with attendant decline in the value of money, implying that growth in money supply cause inflation. This made the monetarists to believe that “only money matters”, consequently monetary policy is more powerful in economic stabilization compared to fiscal Policy (Ebipre and Amaegberi, 2020). As Ebipre and Amaegberi (2020) puts, the monetarists view money

supply as the “dominate, though not exclusive” determinant of both the level of output and prices.

2.1.2 Demand-Pull Theory of Inflation

Keynes (1936) is of the opinion that demand-pull inflation is an aftermath of an upturn in aggregate demand which comprises investment, consumption, and government spending. This kind of inflation emerges when aggregate demand fall short of aggregate supply, thereby creating an inflationary gap in the economy. As enunciated by Ebipre and Amaegberi (2020), the more the gap between aggregate demand and aggregate supply, the more will be the rise in the rate of inflation. The demand intensifying factors include government expenditure, exports, taxation, debt repayment, private expenditures, and shortage of goods (Joshi, 2021). This hue of inflation is attributed to the Keynesian economists and they portray that aggregate demand-inhibiting factors such as reduction in government spending, tax increase and money supply control individually or collectively can be effective in curtailing effective demand and then controlling inflation.

2.1.3 Cost-Push Theory of Inflation

The cost-push inflation emanates from factors like increase in wages, increase in profit margin, international reasons, war, natural calamities, hoarding, and scarcity of inputs for production (Joshi, 2021), and entails a socio-political interpretation (Alpanda *et al.*, 2010). This view of inflation is attributed to a couple of non-monetary supply shock factors which are foreseeable to escalate costs and consequently the prices in the economy (Ebipre and Amaegberi, 2020).

2.1.4 Structuralist Theory of Inflation

This theory relates inflation as an outcome of market imperfections and structural imbalances prevalent in some sectors of developing economies, which creates the mismatch between the demand and supply thereby leading to rising inflation (Sultana *et al.*, 2018). Other structural factors as put forth by Ezirim, *et al.* (2012) include “social tension, decline in export earnings, rise in demand for food, relative inelasticity of food supply, industrialization, foreign exchange, and political instabilities” (Ebipre and Amaegberi, 2020). In this light, the structuralist theory of inflation portrays that the aforementioned issues cannot be rectified via monetary and fiscal actions.

2.1.5 The Theory of Expectations

Clark and Davig (2009) has earlier opined that expectations are an essential force in inflation dynamics. To this, shocks in long-term inflationary expectations are keen to propel tenacious rise in inflation; while shocks to the short-term expectations are viewed to be highly transitory. The inflation expectations react to an array of variables, mainly past inflation (adaptive expectation), plus the situation of the economy along with monetary and fiscal policy actions.

Going by adaptive expectation where expectation is based on the past inflation, the model can be expressed as:

$$P_e = \beta P_{t-1} + \varepsilon_t \quad (2.3)$$

Where P_e is next year's inflation that is being currently expected, P_{t-1} is the current year's inflation that was expected the previous year, β captures the slope coefficient, and ε_t is the error term which is stochastic. If $\beta = 1$, then next year's inflation will simply be the same as the current year's inflation and this is in line with the prediction of the adaptive expectation hypothesis.

Meanwhile, inflation expectation can also be rational where the economic agent incorporates all available information in forecasting the rate of inflation. In this case, the expected rate of inflation is achieved not only through the use of the past value, but by monitoring the policy stance of the government at both the monetary and fiscal level. It is worthy of note that the potency of such policy actions will depend on whether they are anticipated or unanticipated. In forming expectations, allowing for an explicit time variation in long-term is of great importance (Bernanke, 2007).

Assuming that the current rate of inflation, P_t , can be influenced by an exogenous shock, it can be expressed as:

$$P_t = P^* + \sigma_1 P_{t+1e} - P^* + \sigma_2 U_{pt} + \sigma_3 U_{yt} \quad (2.4)$$

P_{t+1e} is the expected inflation, P^* is the target inflation, U_p is the price shock, U_y is the demand shock, σ_1 to σ_3 are the parameters. It follows from Equation (2.4) that present inflation deviates from its target in part to the deviancy of expected inflation from the target (Bonatti et al., 2022). Given this, the core issue could be on how to form the expectation. This steers to the issue of anchored expectation and unanchored expectation.

In anchored expectation, the expectation is formed using target inflation and are unresponsive to transitory shocks. Thus by assuming that $P_{t+1e} = P^*$,

$$P_t = P^* + \sigma_2 U_{pt} + \sigma_3 U_{yt} \quad (2.5)$$

Due to the aftermaths of the shocks, Equation (2.5) portrays that the current rate of inflation drifts around its targets.

For the unanchored expectation, “they are not kept in line the central bank's target, the reason being that they result to be sensitive to shocks, or better to the consequent evolution of the actual inflation” (Bonatti et al., 2022). The starting point for this is derived from the rational expectations (RE). The RE of inflation is derived by taking the expected value of the evolution of actual inflation given in Equation (2.4) as $E(P_{t+1})$,

$$P^e_{t+1} = EP_{t+1} = P^* + \sigma_1(E(P_{t+1}) - P^*) + \sigma_2(E(U_{pt+1}) + \sigma_3(E(U_{yt+1})) - - \quad (2.6)$$

There are two key insinuations from Equation (2.6): (i) RE demands understanding of the statistical link of future values of U_p and U_y with their current values; (ii) RE do maintain the likelihood of being self-fulfilling, nevertheless they also have the necessary attribute that they calibrate themselves with actual inflation and the inflation target if the central bank check inflation appropriately (Bonatti et al., 2022). This is observable under one of the utmost general hypotheses about shocks – that U_p and U_y chart a random walk, suggesting that they enclose no facts about their future values. Consequently, $E(u_{pt+1})(E(U_{yt+1}))=0$ Then the result of Equation (2.6) requires that $E(p_{t+1})=P^*$ returning to Equation (2.4) of ‘anchored expectations’.

2.1.6 Critical Limit Hypothesis

Using inter-war data of numerous Western countries, Collin Clerk put forth the “Critical Limit Hypothesis” as a macro model of public expenditure. As portrayed in the hypothesis, inflation will occur even under a balanced budget if the share of the government sector goes beyond 25% of aggregate economic activities. When it exceeds 25%, the implication will be that income earners will face reduced incentives to work because of the implied high incidence of tax, causing their productivity to plunge. Due to the declining productivity by the income earners, the resultant effect will be that aggregate output will also plummet. Since exceeding the 25% implies more government spending, the effect of such spending will be that the intensity of demand will be aggravated. This pushes up prices even at a balanced budget. The implication of this is that if a nation desires to keep inflation at the least possible level, the 25% limit must be observed. This hypothesis therefore captures the effect of fiscal depth on inflation within an economy.

2.2 Empirical Literature

Scholars have delved into diverse studies on the money supply, expectations, fiscal policy actions, and inflation in different countries and using different approaches and time frame. A study by Clark and Davig (2009) was geared towards establishing empirical evidence concerning inflation and expectation. Their observation was that “expectations are driving force in inflation

dynamics, with long-run expectations, which are indistinguishable to trend inflation, highly central than short-run expectations". Inflation expectations react to a wide array of variables, largely past inflation, but also to the economic circumstance cum monetary policy stance.

Sola and Peter (2013) used data from 1970 through 2008 to study the money supply and inflation connection for Nigeria by putting the OLS and VAR approaches to use. The causality test results reported indication of a one-way causality gushing from money supply to inflation; while the OLS result supported a positive influence of money supply on inflation, where such an effect was also seen to be significant. The causality test indicated a one-way causality flowing from money supply to inflation, making the paper to recommend the need to use inflation as a guide towards measuring the potency of monetary policy in the economy.

The study of Sabade (2014) for India was to check the cogency of the QTM and to provide an alternative postulation on the rapport concerning money supply and inflation. The study reported that the $MV = PT$ identity is true. However, the functional rapport concerning M and P expressed as $P = f(M)$ does not hold in respect to the Indian economy due to constancy assumption of V and T. To check inflation in the Indian economy, the study recommended that agricultural productivity should be boosted along with warehousing and supply-chain management.

At the fiscal policy realm as it affects inflation, Otto and Ukpere (2015) used Nigeria data spanning from 1989 through 2011. By making use of the OLS cointegration and Granger causality approach, the result indicated that government spending do not wield any substantial inspiration on the rate of inflation. While the cointegration test supported evidence of long-run effect of fiscal policy and inflation; the Granger causality test upheld a bidirectional causality concerning the two variables.

Tule et al. (2015) examined the money/inflation dynamics in Nigeria as it affects the accomplishment of monetary policy stance from the first quarter of 1982 to the fourth quarter of 2012. The technique follows the VAR and different variants of the OLS – ordinary least squares, fully modified, and dynamic OLS. The effect of money supply on inflation was reported to be positive and momentous in the diverse variants of OLS, pointing that money supply and inflation has a long-run connection. By splitting the data point two – 1982Q1 to 1996Q4 and 1996Q1 to 2012Q4, the money supply coefficient

remained significant in 1982Q1 to 1996Q4 but became insignificant for 1996Q1 to 2012Q4 thus pointing out the weakening money/inflation association in recent times.

Still in Nigeria, Egbulonu and Wobilor (2016) used data from 1970 through 2013 to analyse the link concerning fiscal policy and inflation; with OLS, cointegration and error correction mechanism serving as the analysis technique. While a long-run equilibrium relationship was reported concerning the two variables, a positive effect of government expenditure and tax on inflation which was also insignificant was recorded.

For the era 1967 through 2015, Ofori et al. (2017) studied the sway of money supply on Ghana's inflation making use of the OLS estimation method. The outcome is of the support that a long-run link exist concerning money supply and inflation, which is positive and noteworthy.

In the study by Sultana et al. (2018) for Bangladesh, the cointegration and VECM approach were applied to monthly data from March 2010 through December 2017 to discover the rapport concerning money supply and inflation. The result revealed that money supply failed to wield any short-run weight on inflation but a two-way directional causality concerning the two variables were established in the long-term.

Olalere (2019) in the quest to study the money supply and inflation rapport in Nigeria made use of data from 1980 through 2009. With the aid of the VECM, the study unveils that the long-run rapport concerning inflation and money supply is a positive one, which is also significant. The adoption of policy measures that could plummet the volume of money in circulation in the country by the monetary authority was the chief recommendation of the study.

Ebipre and Amaegberi (2020) took their turn to the Nigeria case by studying the liaison concerning money supply and inflation from 1971 through 2015 with the use of the OLS approach which the study reported to be inappropriate. Result pointed out that the both money supply and deficit financing put forth a positive weight on inflation in Nigeria. Further findings x-ray the importance of productivity growth in reducing inflation in the long-run.

Sanusi (2020) strived at estimating the extent of fiscal supremacy in Nigeria along with South Africa by examining extent of fiscal cum monetary policies complementarity. The outcome pointed out that the extent of fiscal supremacy

was 0.16 and 0.33 for Nigeria and South Africa respectively derived from the fiscal and monetary policy interdependence coefficient of 0.84 and 0.67, indicating lower level of fiscal supremacy though that of South Africa is greater than Nigeria. This implies that CBN has larger autonomy to combat inflation. Yet, the Nigeria still records higher inflation likened to South Africa, making the study to conclude that the two countries should endeavour more to sustain the current level of their autonomy given their higher degree of fiscal and monetary policies interdependence.

Okon et al. (2021) inquired into whether the problem of inflation is unsolvable in the Nigerian case. By putting to use data from 1970 through 2018 which were analysed using the OLS approach and Granger causality test, it was captured that government expenditure, money supply, and interest rate put forth positive effects on inflation, with the effects being significant.

In Nepal, Joshi (2021) was recently concerned with establishing the short-run cum long-run link concerning inflation and money supply for 1964/1965 through 2018/2019 based on the ARDL bounds test for cointegration. Result from the analysis portrayed existence of cointegration and the error correction term was reported to be involved in correcting about 98% of the overall discrepancies in the short-run to establish a long-run equilibrium in the model.

Atan and Effiong (2021) took their turn to test the validity if the critical limit hypothesis by studying the influence of fiscal policy on inflation in Nigeria. The study engage data from 1991 through 2019 which was analysed exploiting the ARDL approach. In the long-run and short-run estimates, it was observed that government activities (fiscal depth) do not wield any significant influence on inflation since the economy has not yet reached the 25% critical limit.

3 Methodology

3.1 The Model

Given the goal of detecting the inspiration of money supply on inflation in the midst of expectation and fiscal depth, our model is specified by modifying that of Atan and Effiong (2021) and is specified thus;

$$INF_t = f(INF_{t-1}, MSS_t, GDP_t, GXGD_t, IMP_t) \quad (3.1)$$

Where INF_t is the current rate of inflation, INF_{t-1} is the previous year's rate of inflation which measures expectation, MSS is the growth rate of broad money supply, GDP_t is output growth, $GXGD_t$ is the ratio of total government expenditure to GDP which measures fiscal depth of the government, and

IMP_t is the import volume index.

By transforming Equation (3.1), an econometric form is obtained below which is amendable to estimation.

$$INF_t = \gamma_0 + \gamma_1 INF_{t-1} + \gamma_2 MSS_t + \gamma_3 GDP_t + \gamma_4 GXGD_t + \gamma_5 IMP_t + \mu_t \quad (3.2)$$

It is clear that our specified econometric model includes the constant, γ_0 , which portrays that we are operation a regression model which is not through the origin; the parameters to be estimated are captured by γ_0 , to γ_5 ; while is the error term. Given the parameters, it is expected that γ_1 , γ_2 and γ_3 , γ_2 should be positive; while γ_3 and γ_4 , should be negative.

3.2 Measurement of Variables

The rate of inflation is measured in percentages as the annual changes in the consumer prices, which reflects the changes in the price level of goods and services in the economy. The growth rate in broad money supply is also measured in percentages to capture the changes in the money supply in the economy. Such changes gives are based on the monetary policy stance of the monetary authority and gives signal on what will happen to the price level. GDP is measured in percentages as the annual growth in the gross domestic product of the country which is an indicator of economic growth. GXGD is measured in percentages as the ratio of total government expenditure to GDP, and measures the financial depth of the government in the economy. Lastly, IMP is the import volume index where 2,000 = 100. This index gives us the intensity of importation in the country and could be a key driver of foreign exchange pressure which could have a substantial weigh on domestic prices.

3.3 Nature Sources of Data

For this study, data spanning from 1986 to 2020 are utilized which reflect a period of thirty-five (35) years. The duration so selected is long enough to capture some dynamics in the economic variable of interest, along with changes in money supply and fiscal depth of the government. The Central Bank of Nigeria, CBN, (2021) annual statistical bulletin and the World Bank (2021) publication on “World Development Indicators” served as the sources of our data. For the CBN, the variables so obtained from include the rate of inflation, growth rate of broad money supply, output growth, and fiscal depth; while import volume index was gotten from the World Bank database.

3.4 Technique of Analysis

The study is conducted using the autoregressive distributed lag (ARDL) method. This method is selected based on the time series properties of our

variables. Also, we utilized the Granger Causality test to detect the direction of the rapport between money supply and inflation.

3.4.1 Unit Root Test

To define the time series properties of our variables, the Augmented Dickey-Fuller (ADF) test for stationarity of the variables is being put to use. The test equation follows the constant and trend assumption as is specified as follows:

$$\Delta R_t = \phi + \theta t + \beta_1 R_{t-1} + \sum_{i=1}^n \beta_i R_{t-i} + \varepsilon_t \quad - \quad - \quad - \quad - \quad - \quad (3.3)$$

In Equation (3.3), R is the time series variable to be tested for unit root; ϕ is the constant and θt captures the trend component; the summation aspect reflects the augmented aspect of the model to correct for serial correlation; R_{t-1} captures the previous value of R; i is the number of lag which is selected automatically by the Akaike Information Criterion (AIC); ε_t is the error term; β_1 and is the coefficient to be tested for unit root. For the test, the 'null hypothesis' is that R contains a unit root expressed as $\beta_1 = 1$. The test is accomplished at the 5% level where it is expected that the ADF statistic must be more negative than the 5% critical value before the 'null hypothesis' is overruled.

3.4.2 Bounds Test for Cointegration

The use of the ARDL approach facilitates the use of the F-Bounds test for levels relationship. The test aids in detecting if the variables in the model exhibits any long-run relationship given that they are not all integrated of order one. The test is conducted at the 1% level where it is expected that for cointegration to exist, the F-statistic must lie within the I(0) and I(1) critical bounds values.

3.4.3 Autoregressive Distributed Lag (ARDL) Model

Since our analysis is based on the ARDL approach, the model is specified thus;

$$INF_t = \delta_0 + \sum_{i=0}^p \delta_1 INF_{t-i} + \sum_{i=0}^q \delta_2 MSS_{t-i} + \sum_{i=0}^r \delta_3 GDP_{t-i} + \sum_{i=0}^s \delta_4 GXGD_{t-i} + \sum_{i=0}^m \delta_5 IMP_{t-i} + \epsilon_t \quad 3.4$$

If there is cointegration, the ARDL model is transformed into a short-run error correction model which is expressed as follows.

$$\Delta INF_t = \delta_0 + \sum_{i=0}^p \delta_1 \Delta INF_{t-i} + \sum_{i=0}^q \delta_2 \Delta MSS_{t-i} + \sum_{i=0}^r \delta_3 \Delta GDP_{t-i} + \sum_{i=0}^s \delta_4 \Delta GXGD_{t-i} + \sum_{i=0}^m \delta_5 \Delta IMP_{t-i} + \phi ECM_{t-1} + \epsilon_t \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad 3.5$$

Where ϕ is the error correction mechanism which must be negative and statistically significant before the model can adjust to long-run equilibrium. The

use of the ARDL short-run error correction model helps us in estimable robust short-run dynamic coefficients along with the long-run estimates at the same time.

3.4.4 Granger Causality Test

In detecting the nature of the causal bond concerning money supply and inflation, the Granger causality test is conducted and the test equation is specified thus ;

$$INF_t = \theta + \sum_{i=1}^n \beta_i INF_{t-i} + \sum_{j=1}^m \delta_j MSS_{t-i} + \epsilon_{1t} \quad 3.6$$

And

$$MSS_t = \theta + \sum_{i=1}^n \varphi_i MSS_{t-i} + \sum_{j=1}^m \gamma_j INF_{t-i} + \epsilon_{2t} \quad 3.7$$

For Equation (3.6), it is stated that the current value of INF depends on its past values and the past values of MSS; while Equation (3.7) stipulates that the current value of MSS depends on its past values and that on the past values of INF. The coefficients δ_j and γ_j are the respective measures of the influence of MSS_{t-i} on INF_t and the influence of INF_{t-i} on MSS_t . In this way, the ‘null hypothesis’ is stated that Granger causality does not occur: $\delta_j = 0$ and $\gamma_j = 0$. The embracing of the ‘null hypothesis’ implies that the variables do not Granger cause each other. Yet, there are two other scenarios that may occur – unidirectional causality where either δ_j or γ_j is significant, and bidirectional causality where both δ_j and γ_j are significant. The test is conducted using the F-statistic.

4 EMPIRICAL RESULTS

4.1 Descriptive Statistics

The descriptive properties of our times series variables are computed and Table 2 reflects on the result.

Table 2: Descriptive properties of the variables

	INF	MSS	IMP	GDP	GXGD
Mean	19.8438	23.4092	204.0690	4.5792	4.6921
Median	12.0000	21.5500	136.3289	4.2059	3.9540
Maximum	76.7589	57.7816	437.5121	14.6044	14.5178
Minimum	0.2236	-2.0100	62.8618	-1.9200	0.0954
Std. Dev.	18.4351	15.9947	127.2274	3.8982	3.9738
Skewness	1.7584	0.4482	0.4686	0.4459	0.6735

Kurtosis	4.9421	2.3050	1.6392	2.7289	2.7192
Jarque-Bera	23.5365	1.8764	3.9817	1.2671	2.7611
(Probability)	(0.0000)***	(0.3913)	(0.1366)	(0.5307)	(0.2514)
Observations	35	35	35	35	35

Source: Researcher Computation, 2022.

Over the thirty-five (35) years data points reflected in this study, it is observed that the mean of inflation (INF) is 19.84% which is clearly on the double digit. With the standard deviation of 18.44%, the variable has a coefficient of variation amounting to 92.94% which is quite wide. For growth rate of broad money supply (MSS), it is reported that the variable averaged 23.41% with a standard deviation of 15.99% thus giving a 68.30% coefficient of variation. Import volume index (IMP) is characterised by a 204.07 mean value and a standard deviation of 127.23 giving rise to a 62.35% coefficient of variation. To output growth (GDP), the variable has a mean of 4.58% and a standard deviation of 3.90%, thus giving us a coefficient of variation of 85.15%. Lastly, the mean value for fiscal depth of the government is 4.69% while the standard deviation is reported to be 3.97%, resulting in a coefficient of variation amounting to 84.65%. It follows from the coefficient of variation that inflation in the economy exhibited a greater degree of variability compared to every other variable in the model. All the variables are also positively skewed as reflected in their coefficient of skewness being positive. They are also normally distributed, except for inflation, as their Jarque-Bera statistic are not significant at the 5% level.

4.2 Correlation Analysis

Detecting the nature of the association without implying a cause-effect relationship can conveniently be executed using the correlation analysis, of which Table 3 captures our result.

Table 3: Result of the correlation test

	INF	MSS	IMP	GDP	GXGD
INF	1.0000				
MSS	0.2765	1.0000			
IMP	-0.4331	-0.3371	1.0000		
GDP	-0.2346	0.0499	-0.0711	1.0000	
GXGD	-0.4387	-0.3133	0.9045	-0.1174	1.0000

Source: Researcher Computation, 2022.

It is clear that a variable will correlate perfectly in a positive manner with itself and this explains the positive perfect correlation coefficient of 1.0000 in the Table 3. Apart from this, it is observed that the correlation concerning MSS and INF is weak but positive given the +0.2765 correlation coefficient between them. Here, inflation rises as money supply grows and decline as money supply decreases. Other variables on the contrary exhibits weak negative correlation with inflation. the correlation between import volume index (IMP) and inflation (INF) is fairly weak and negative given the correlation coefficient of -0.4331; while that of INF and GDP is negative and very weak given the correlation coefficient of -0.2346. The correlation concerning INF and fiscal depth of the government (GXGD) is negative and fairly weak as reflected with the -0.4387 correlation coefficient. The correlation concerning the explanatory variables raise no concern as none of the variables exhibited perfect linear correlation.

4.3 Test for Stationarity

Our analysis involves time series data which must be subjected to diagnostic test to detect their time series properties. This is done using the augmented Dickey-Fuller (ADF) unit root test for stationarity. Table 4 captures the result where the test is conducted based on the assumption of constant and trend.

Table 4: Stationarity test report

Variables	ADF Statistic I(0)	ADF Statistic I(1)	5% Critical Value	Order of Integration
INF	-3.3844	-6.5264**	-3.5950	I(1)
MSS	-4.1363**	-----	-3.5485	I(0)
IMP	-2.8446	-6.2615**	-3.5530	I(1)
GDP	-2.7379	-4.8873**	-3.5629	I(1)
GXGD	-2.1107	-6.2710**	-3.5530	I(1)

Source: Researcher Computation, 2022.

It is clear from Table 4 that only MSS is reported to be stationary at level, I(0), since its ADF statistic is more negative than the 5% critical value and statistically significant at the 5% level. every other variables only became stationary after they have been subjected to differencing at the first time, I(1). Thus, our variables are integrated in mixed order comprising of level and first difference. This points to us that using a conventional OLS approach will not yield the desired result. It is in this scenario that the use of autoregressive distributed lag (ARDL) approach becomes pertinent.

4.4 ARDL Result

The ARDL approach seems suitable for the identified order of integration among our variables and also aid in the estimation of both the short-run and long-run estimates of the model with ease. For the base model, Table 5 presents the original result based on the ARDL framework.

Table 5: ARDL regression result

Dependent Variable: INF		Selected Model: ARDL(1, 3, 1, 3, 1)		
Variable	Coefficient	Std. Error	t-Statistic	Probability
INF(-1)	0.5559	0.1349	4.1202	0.0006***
MSS	0.1728	0.1458	1.1845	0.2516
MSS(-1)	0.3430	0.1455	2.3582	0.0299**
MSS(-2)	0.4414	0.1935	2.2816	0.0349**
MSS(-3)	-0.1926	0.1461	-1.3185	0.2039
GDP	-3.3513	0.7817	-4.2871	0.0004***
GDP(-1)	1.3720	0.8170	1.6793	0.1104
GXGD	-6.6609	2.8025	-2.3768	0.0288**
GXGD(-1)	3.7914	3.4800	1.0895	0.2903
GXGD(-2)	1.3492	3.7677	0.3581	0.7244
GXGD(-3)	7.3307	3.5471	2.0667	0.0535
IMP	-0.0269	0.0537	-0.5001	0.6231
IMP(-1)	-0.0859	0.0554	-1.5512	0.1382
C	3.6407	8.9255	0.4079	0.6882
R-squared	0.8298		F-statistic	6.7507
Durbin-Watson stat	1.8730		Prob(F-statistic)	0.0002***

Note: ** and *** captures significance at 5% and 1% respectively.

Source: Researcher Computation, 2022.

The base model here helps us substantially to detect the role of expectation on the current value of inflation. Given the adaptive expectation ideology, the current rate of inflation (INF) depends on the previous rate of inflation (INF(-1)). Given our result, we observed that the previous year's inflation wielded a positive influence on the current rate of inflation, and such influence is reported to be statistically significant. As portrayed by the coefficient, the previous year's rate of inflation increased the current year's rate of inflation by 0.5559% on the average, pointing to the fact that if INF(-1) was high, then INF will also be high and the reverse holds. This finding aligns with Clark and Davig (2009) who observed that "expectations are vital drive in inflation dynamics, with long-run expectations,

which are indistinguishable to trend inflation, far essential than short-run expectations.”

The growth rate of broad money supply (MSS) is observed to wield a positive but inconsequential sway on the current rate of inflation. The one-year lag and two-years lag wielded a positive influence which is also statistically significant at the 5% level. It follows that the one-year lag of MSS increased INF by 0.3430% while the two-year lag increased INF by 0.4414%. These positive effect points to the fact that if last year's MSS was high, inflation will be high and vice versa. It also points to the fact that it takes time for the growth in money supply to have effect on the price level in the economy. The third-year lag, however, is observed to wield a negative but insignificant weight on the current rate of inflation.

The growth in output is reported to wield a negative effect on the rate of inflation and such is also significant at the 1% level. This negative effect is adduced from the fact that as income grows, the growth in output will aid in curtailing demand-pull inflation which could have arisen as a result of rising aggregate demand emanating from the rise in income. Hence, a unit percent increase in GDP reduces INF by 3.3513% on the average. However, last year's GDP, GDP(-1), wielded a positive but insignificant weight on the rate of current inflation.

The fiscal depth of the government (GXGD) portrays an interesting result where it put forth a reducing effect on the current rate of inflation, where such effect is also significant. This finding was earlier put forth by Atan and Effiong (2021) while trying to validate the reality of the 'critical limit hypothesis' (CLH) in Nigeria. As argued by the CLH, if government depth exceeds 25%, the resultant effect will be rising inflation. An exploration of our data over the study horizon revealed that the fiscal depth for Nigeria has not reached the 25% limit. Consequently, we could not expect it to cause a positive influence on the current rate of inflation. As the coefficient portrays, the current rate of inflation decreases by 6.6609% on the average if fiscal depth increases by 1% ceteris paribus. However, the lags in the GXGD, GXGD(-1) to GXGD(-3), all wielded a positive sway of INF though such effect were not significant.

The import volume index (IMP) with its one-period lag are shown to put forth a negative influence on the current rate of inflation, though their effects were statistically insignificant. The constant term which is not statistically significant portrays that the current rate of inflation will be 3.6407% if all the explanatory variables are held constant.

Our model is seen to be of good fit as the R-squared (0.8293) is high, showing that the independent variables explain about 82.93% of the overall changes in the current rate of inflation. The overall model is meaningful as the F-statistic is significant at 1%; and the model is free from serial correlation as the Durbin-Watson statistic of 1.8730 is close to 2.0.

4.5 Cointegration Analysis

The reported order of integration of the time series variables was that MSS was stationary at level while other variables became stationary after first differencing. It will therefore be of utmost importance to test the existence of cointegration among the variables. Our analysis of this follows the ARDL F-Bounds test for levels relationship, where Table 6 captures the result.

Table 6: F-Bounds test result for cointegration

‘null hypothesis’: No levels relationship				
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	3.9639***	10%	2.20	3.09
k	4	5%	2.56	3.49
		1%	3.29	4.37

Source: Researcher Computation, 2022.

It is clear from the F-Bounds test result in Table 6 that the F-statistic (3.9639) lies within the 1% I(0) bound statistic of 3.29 and that of the I(1) bound of 4.37. This portrays the significance of the test, calling for the ‘null hypothesis’ of “no levels relationship” to be overruled. Consequently, cointegration exist and we proceed to estimating the short-run dynamic error correction model and the long-run estimates.

4.6 ARDL Short-Run Error Correction Model

Given the manifestation of cointegration, Table 7 captures the result of our short-run error correction model (ECM) under the ARDL framework.

Table 7: ARDL short-run ECM result

Dependent Variable: D(INF)		Selected Model: ARDL(1, 3, 1, 3, 1)		
Variable	Coefficient	Std. Error	t-Statistic	Probability
D(MSS)	0.1728	0.1005	1.7196	0.1026
D(MSS(-1))	-0.2488	0.1506	-1.6518	0.1159
D(MSS(-2))	0.1926	0.1182	1.6298	0.1205

D(GDP)	-3.3513	0.6287	-5.3305	0.0000**
D(GXGD)	-6.6609	2.0775	-3.2062	0.0049**
D(GXGD(-1))	-8.6799	2.5717	-3.3752	0.0034**
D(GXGD(-2))	-7.3307	2.6782	-2.7372	0.0135**
D(IMP)	-0.0269	0.0403	-0.6662	0.5137
ECM(-1)	-0.4441	0.0806	-5.5127	0.0000***
R-squared	0.7387		Log likelihood	-108.4717
Adjusted R-squared	0.6477		Durbin-Watson stat	1.8730

Source: ResearcherComputation, 2022.

In the short-run, our result indicates that changes in MSS and its two-period lag wielded a positive influence on changes in inflation; while the one-period lag put forth a negative influence. In all cases, the variable put forth an insignificant effect on changes in the rate of inflation. such an insignificant short-run influence tally with the findings of Sultana et al. (2018) where they reported an insignificant inspiration of money supply on inflation within the economy of Bangladesh. Output growth is captured to be a driver of lower rate of inflation by wielding a negative effect, which is also significant at the 1% level. For every 1% increase in GDP, inflation decreases by 3.3513%. This portrays exigency of output growth in curtailing Nigeria's inflation conundrum.

Variations in the fiscal depth of the government, D(GXGD), with its lags, D(GXGD(-1)) and D(GXGD(-2)), put forth negative effects on changes in the rate of inflation, with the effect being significant at the 5% level. A unit percent variation in fiscal depth of the government results in a 6.6609% decline in the variations in inflation; while the one-year lag and two-year lag of fiscal depth reduces variations in inflation by 8.6799% and 7.3307% respectively. Such negative effect aligns with the projection of the CLH that it is only when fiscal depth reaches 25% that inflation will begin to intensify. In our chosen period, none of the years reported fiscal depth of up to 25%, implying that the government can still increase its spending without intensifying the rate of inflation in the economy. Changes in import volume index is observed to wield a negative short-run effect on changes in inflation though such effect is inconsequential.

Our error correction mechanism which is expected to be negative and statistically significant adheres to the two conditions. From the coefficient, it is noted that about 44.41% of the short-run distortions in the model is corrected on a yearly basis before a long-run equilibrium is attained. The short-run model exhibits high degree of good fit as the R-squared portrays that the explanatory variables accounts for 73.87% of the total distortions in changes in the rate of inflation. With

the Durbin-Watson statistic of 1.873 which is approximately 2.0, we are sure that our short-run regression model is free from serial correlation.

4.7 Long-Run Result

In the long-run, all the distortions experienced in the short-run are corrected. Our long-run result is presented in Table 8 where we observed the stable effect of the variables in influencing the rate of inflation.

Table 8: Long-run adjusted estimates

Variable	Coefficient	Standard Error	t-Statistic	Probability
MSS	1.7214	0.6927	2.4850	0.0230**
GDP	-4.4565	1.6198	-2.7513	0.0131**
GXGD	13.0827	7.5517	1.7324	0.1003
IMP	-0.2539	0.1485	-1.7098	0.1045
C	8.1974	18.8114	0.4358	0.6682
EC = INF - (1.7214*MSS -4.4565*GDP + 13.0827*GXGD -0.2539*IMP + 8.1974				

Source: Researcher Computation, 2022.

As the long-run result in Table 8 portrays, the variables still behaves in a similar manner as it was in the short-run, except for fiscal depth of the government which now put forth a positive though an insignificant influence. The MSS still put forth a positive effect and the effect is now significant in the long-run at the 5% level of significance. This aligns with the earlier finding like Atan and Effiong (2021), Ofori et al. (2018), Sola and Peter (2013), Olalere (2019), and Ebipre and Amaegberi (2020). From the coefficient, a 1% rise in MSS will cause INF to increase by 1.7214% on the average. This positive effect proves the monetarists postulation that “inflation is a monetary phenomenon”. Amplification in money supply, consistent with the QTM, will lead to a rise in the price level at the full employment level of output. This forms the basis that the monetary authority needs to manage the magnitude of money supply in the economy to avoid incessant upswing in the price level. This role has been undertaken by the monetary policy committee (MPC) of the Central Bank of Nigeria through their adjustment of the monetary policy rate to suit the present economic situation.

Our long-run result further portrays that output growth is of great importance in fighting against inflation, as the variable wielded a negative and consequential influence on the rate of inflation. This result is in agreement with that of Ebipre

and Amaegberi (2020). A 1% rise in GDP reduces INF by 4.4565% on the average in the long-run. Boosting output growth aids in curbing demand-pull inflation that may arise from the increase in aggregate demand that may emanate from the rise in income. Import volume index is also observed to put forth a negative sway of the rate of inflation in Nigeria, though the effect is not substantial. Counter wise, fiscal depth of the government now put forth a positive effect on the rate of inflation. Though the effect is not significant, it points to the fact that over time, continuous government spending may exceed the 25% critical limit which will intensify inflation in the economy.

4.8 Post-Diagnostic Tests

Our post-diagnostic test centres on serial correlation test, heteroscedasticity test, normality test for residuals, and stability test. These tests aid in further determining the suitability of our parameter estimates for inferences.

4.8.1 Serial Correlation Test

The test for serial correlation aids in determining if the residual in one period is correlation with that of another period. The result is presented in Table 9 where the Breusch-Godfrey approach is being put to use.

Table 9: Breusch-Godfrey Serial Correlation LM Test Result

F-statistic	1.667689	Prob. F(2,16)	0.2199
Obs*R-squared	5.520042	Prob. Chi-Square(2)	0.0633

Source: Researcher Computation, 2022.

The F-statistic of 1.6677 having a probability of 0.2199 is clearly not significant at the 5% level. the ‘null hypothesis’ of no serial correlation is thus upheld and we conclude that the error terms are not prone to serial correlated.

4.8.2 Heterpskedasticity Test

Heteroscedasticity test is conducted to detect if our residuals carries a constant as required by one of the assumptions of OLS. Our test result is presented in Table 10 which is based on the Breusch-Pagan-Godfrey approach.

Table 10: Breusch-Pagan-Godfrey Heteroskedasticity Test result

F-statistic	0.854856	Prob. F(13,18)	0.6066
Obs*R-squared	12.21511	Prob. Chi-Square(13)	0.5101
Scaled explained SS	3.506947	Prob. Chi-Square(13)	0.9954

Source: Researcher Computation, 2022.

As displayed in Table 10, the F-statistic (0.8549) having a probability of 0.6066 is not significant at the 5% level. It is clear from this angle that the ‘null hypothesis’ of no heteroscedasticity is upheld. It follows that the variance of our residuals are constant, that is, they are homoscedastic.

4.8.3 Normality Test for Residuals

It is required that the μ must be normally distributed in a regression equation. This calls for the normality test for residuals using the histogram approach where the Jarque-Bera (J-B) statistic is utilized. Figure 2 captures the test where the J-B statistic is 1.0894 and having a probability of 0.5800 which is not significant at the 5% level.

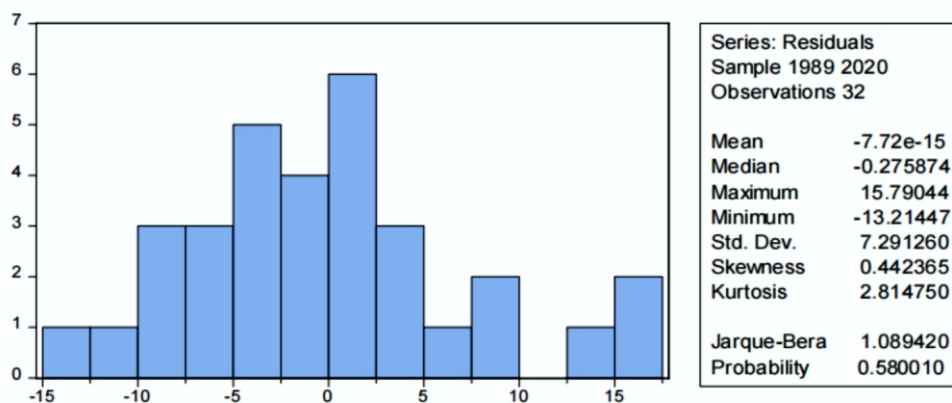


Figure 2: Histogram normality test for residuals

It follows from Figure 2 and the expressed statistics that the insignificance of the J-B statistic validates that the ‘null hypothesis’ of no serial correlation is accepted. Therefore, it can be stated categorically that the residuals were normally distributed, thus meeting the OLS assumption of normality of residuals.

4.8.4 Stability Test

The stability test aids in detecting the robustness of the parameter estimates for decision making. The cumulative sum of squares test is used in this regards, and Figure 3 portrays such.

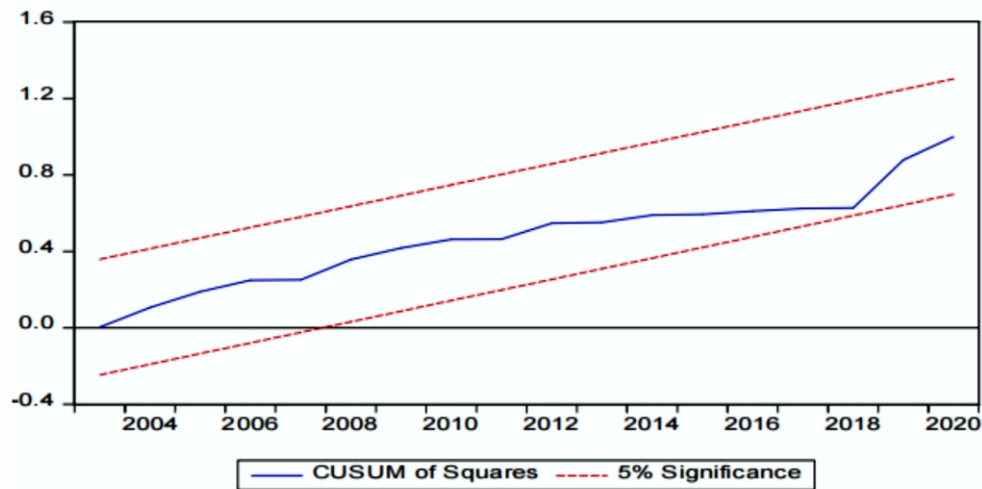


Figure 3: Cumulative sum of squares test for stability

The test requires that the CUSUM of squares line needs to be within the 5% $I(0)$ and $I(1)$ bounds. Our Figure 3 clearly shows that this condition has been met. Categorically, the parameter estimates are stable and robust.

4.9 Granger Causality Test

The Granger causality test is conducted to ascertain the direction of flow of the relationship between money supply and inflation. Table 11 presents the findings of the test.

Table 11: Granger causality test result

'null hypothesis':	Observations	F-Statistic	Probability
INF does not Granger Cause MSS	34	0.43477	0.5145
MSS does not Granger Cause INF		5.84549	0.0217**

Note: ** captures significance at the 5% level.

Source: Researcher Computation, 2022.

As Table 11 clearly shows, the 'null hypothesis' that "INF does not Granger Cause MSS" is accepted since the F-statistic is not significant at the 5% level. Conversely, the "null hypothesis" that "MSS does not Granger Cause INF" is overruled since the F-statistic is significant at the 5% level. The rejection of the 'null hypothesis' implies that MSS causes INF – growth in money supply causes inflation. This causal behaviour is unidirectional as the causation only flows from growth in money supply to inflation.

5 Conclusion

The monetarist believes that “inflation is everywhere a monetary phenomenon” and stresses the role of monetary policy in curbing inflation in an economy. Households also forms expectations based on the past value of inflation, or along with anticipated government policies. In that way, their expectations could be either adaptive or rational. Still, the Critical Limit Hypothesis has clearly stated that if fiscal depth of the government exceeds 25%, the resultant effect will be inflation even under a condition of balanced budget. Consistent with this background, our study aimed at examining the influence of money supply on inflation in the midst of expectation and fiscal depth from 1986 to 2020. We utilized the ADF test to ascertain the stationarity of the time series variables; the F-Bounds test for checking on the existence of cointegration; and the ARDL method to estimate both the short-run and long-run estimates of the model.

From the unit root test, it was reported that our variables were integrated of order zero (level) and 1 (first difference). This led to the test for cointegration where the ARDL Bounds test revealed that cointegration exists. The ARDL result revealed that expectation plays a crucial role on the current rate of inflation since the past value of inflation wielded a positive effect which was also significant on the current rate of inflation. The implication is that if the past value of inflation was high, the current rate of inflation will as well be high and vice versa. From the ARDL short-run dynamic estimates, our result portrayed that changes in money along with its lags put forth an insignificant positive short-run effect on changes in the rate of inflation. Meanwhile, changes in output growth revealed to be a key variable that can reduce inflation as it put forth a negative and noteworthy effect on changes in inflation. As output grows, inflation tends to decline since the rise in output augment for the rise in aggregate demand which could have caused demand-pull inflation. Also, changes in fiscal depth of the government was observed not to be inflationary in nature as it wielded a negative and substantial sway on the changes in the rate of inflation. The reason behind such is that the fiscal depth of the government has not yet reached the 25% critical limit. Hence, increased government spending will not be inflationary within the stipulated limit. The import volume index was noted not to wield any substantial short-run influence on the changes in the rate of inflation; while the error correction mechanism portrayed that 44.41% of the short-run errors are corrected on yearly basis.

The long-run result portrayed the significance of money supply and output growth in curbing inflation. Consistent with the result, the effect of the growth in broad money was positive and significant, showing that rising money supply will put forth an intensified rate of inflation in the economy. This agrees to the QTM where changes in money supply only has its effect on the price level and not on the level of output. The effect of output growth on inflation was negative and such negative effect was also significant; pointing that if output increases, the level of inflation will decrease to portray the erosion of demand-pull inflation within the economy. Still in the long-run, fiscal depth now put forth a positive influence, though such was insignificant; while import volume index still exhibits a negative effect which is not also significant. To further strengthen our findings, the Granger causality test revealed that a one-way causality flows from growth in money supply to inflation, indicating that growth in money supply causes inflation. It follows from the findings that for inflation to be tackled successfully, there is need to maintain a stable level of money supply along with maintaining a substantial growth in output, while maintaining the fiscal depth within the 25% as suggested in the critical limit hypothesis.

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INFRASTRUCTURE, GOVERNANCE AND INDUSTRIALIZATION IN NIGERIA

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Abstract

This study was conducted with a view to determining the relationship between industrialization, infrastructure and governance in Nigeria and to examine the relationship between infrastructure and governance in Nigeria. A correlational research approach was adopted for the study and data for the study was obtained from MO Ibrahim good governance index report, 2020 and the globaleconomy.com data base for the period 2000-2020. Industrialization was proxied by industry value added, infrastructure was taken collectively as index transport network, access to electricity, internet access and mobile communication. Data was analysed using ordinary least square (OLS) estimation technique in multiple regression form. Findings show that there is no significant relationship between industrialization and governance in Nigeria except for voice and accountability; there is no significant relationship between industrialization and infrastructure in Nigeria except for voice and accountability. The non-significance relations between governance and infrastructure and between governance and industrialization have been attributed to poor performance of governance indices in Nigeria. In view of this, the study recommended among other things that fight against corruption should be taken seriously.

Keywords: Voice and Accountability, Governance Effectiveness, Democratic Governance, Industry

1 Introduction

Infrastructure has been seen by many as a key element in driving development in any nation. The transformation of infrastructure services represents a condition sine qua non for the progressive structural change envisaged by any society (Jaimurzina and Sanchez, 2017). Contextually, infrastructure can be seen as physical and organizational structures and facilities considered crucial in ensuring the security of any nation, its public's health, safety and its

economic growth (Davies, et al, 2019). Categorically, infrastructure can be grouped into hard and soft infrastructure; hard infrastructure is the physical infrastructure of roads, sewers, highways, bridges, electricity, railroads, etc. while soft infrastructure deals with human capital and the establishments that cultivate infrastructure such as universities (Davies, et al, 2019).

The insufficient, inefficient and unsustainable provision of these infrastructure services represents one of the factors behind the structural imbalances that characterize so many regions, such as an undiversified productive structure, lagging efforts and performance in terms of innovation, high concentrations of income and wealth, and vulnerability to climate change.

The ways in which infrastructure availability and functions affect sustainable development are recognized in the 2030 Sustainable Development Agenda, and in particular in Sustainable Development Goal (SDG) 9, referring to the development of high-quality, reliable, sustainable and resilient infrastructure. SDGs 6, 7 and 11, for their part, make explicit reference to infrastructure, highlighting the need to “ensure access to water and sanitation for all”, to “ensure access to affordable, reliable, sustainable and modern energy for all” and to “make cities inclusive, safe, resilient and sustainable”. By the same token, global action programmes for the most vulnerable developing countries, such as the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2024, identify transportation, energy infrastructure and information and communication technologies as among the priorities for achieving sustainable and inclusive growth in landlocked developing countries, due to their impact on trading costs, competitiveness and integration into the world market, and on productive capacity.

When it comes to economic growth, infrastructure has a key role to play: it articulates the territory, it supports human settlement, and it lays the foundations on which the other factors of production interact. The network services of energy, transport, telecommunications and water and sanitation infrastructure constitute a central element for integration of the economic, social, and territorial system of a country, making possible transactions within a given geographic and economic space. The improvement of infrastructure and its services promotes productivity and, with it, economic development—and the lower its initial endowment the greater will be the impact of any improvement. Similarly, infrastructure reflects and conditions the productive structure of a country or a region, and it may work for or, in many cases, against structural change.

In Sub-Saharan Africa, a region that has based its development to a large extent on the export of natural resources, much of the economic infrastructure has

been designed to facilitate such exports, without much heed to the opportunities for creating productive linkages and boosting value added. Structural change will not be achieved without an improvement and overhaul of transportation, energy, water and telecommunications infrastructure, making it more feasible and more profitable for the region to process its natural resources into intermediate or final goods in the future. Similarly, a greater degree of productive specialization and the development of competitive advantages on regional and global markets will require the integration of physical infrastructure that provides the connectivity and accessibility needed to move goods and services within the required quantity, quality, safety and time benchmarks.

From the social viewpoint, infrastructure can for example enhance access for the poorest people to education and health services, facilitate the supply of drinking water and energy, or protect public health by offering greater defences against natural disasters. Moreover, it can have the indirect effects of boosting agricultural productivity, reducing transportation costs, fostering integration into global markets, and creating jobs. However, the relationship between infrastructure endowment and poverty reduction is not straight-forward. If infrastructure is not specifically designed to pursue objectives of sustainable and inclusive development in an orderly and systematic manner, it may not result in economic and social progress, and may even be regressive. There is a very complex set of variables and factors to be considered for ensuring that infrastructure development will contribute effectively to improving the well-being of the underprivileged.

Lastly, Infrastructure has a profound effect on the consumption patterns of its users: the choices as to which infrastructure facilities will be built, and the manner in which they are designed, will have a significant effect on energy consumption as well as emissions levels. For example, according priority to highway construction will favour the use of private automobiles fuelled by hydrocarbons, over the use of public transit systems, implying an enormous future demand for fossil fuels for this type of individual transportation, and hence continued growth in emissions of polluting gases. In this respect, infrastructure development that encourages the use of more environmentally-friendly modes of transport is an element that will smooth the way to an economy with lower greenhouse gas emissions. Similarly, the expansion of urban drinking water and sewage services, without a concomitant investment in wastewater treatment plants, can cause serious problems of water pollution, with negative impacts on public health and on agricultural exports.

In this regard, it is a matter of great concern that, infrastructure development in Nigeria at this time is failing to maximize support for sustainable development

in any of its substantive dimensions. Thus, beyond recognizing the link between infrastructure services and industrialization, it is essential to understand that what the country needs is a greater and better endowment of infrastructure that is specifically designed and adapted to sustainable development purposes. To achieve this transformation, there must be a profound change in the design, financing, implementation and use of infrastructure in the country, and this implies a change in the sector's governance, i.e. in all the processes involved both in taking infrastructure decisions and in implementing those decisions, in which the mechanisms, procedures and rules established formally and informally by institutions all play a role.

Governance is broadly defined as the traditions and institutions that determine how authority is exercised in a country. According to Adamu (2016), governance encompasses the form of political regime; the process by which authority is exercised in the management of a country's economic and social resources for the development; and the capacity of government to design, formulate and implement policies and discharge functions. A shift from the notion of governance to good governance introduces a normative dimension addressing the quality of governance. From this perspective, good governance could be seen as the management of public affairs in the transparent, accountable, participatory and equitable manner. Put differently, good governance entails effective participation in public policy making, the prevalence of the rule of law and an independent judiciary, institutional checks and balances through horizontal and vertical separation of power and effective oversight agencies. Thus, for the government to be successful in the implementation of the sustainable development policies, it must demonstrate good governance per the people's standards. Once the government is not thought of as credible, then it becomes damaging to the measures of sustainable development (Towah, 2019).

In Africa, good governance has been quite elusive and attaining sustainable development has remained a mirage. This is because the governments' policies have not been focused on the people as defined by the concept of sustainable development. Since the 1980s, governance has been a debatable topic and scholars, international organizations, and governments have assumed different interpretations of good governance. World Governance Indicators defined good governance as the practice and foundations by which power is exercised within a given country; the procedure by which governments are selected, held accountable, monitored, and changed; the capacity by which governments manage resources efficiently and formulate, implement, and enforce sound policies and regulation; and the respect for the institutions that govern economic and social interactions. The United Nations Development Program

defined good governance in the human development framework as democratic governance where human rights are respected and accountability and participation in the decision-making process is upheld.

Good governance also entails responsiveness and focuses on poverty eradication, inclusiveness, equity, impartiality, fairness, outpacing any discriminatory practices, taking into consideration the present and the future generations (United Nations Development Program, 2002).

The difference that good governance makes to development can never be understated. To put it into perspective, whenever government performance is poor, the resources are wasted; services remain undelivered; and citizens, particularly the poor, are denied of legal, economic, and social protection. To this end, good governance is an imperative to sustainable development and reduction of poverty.

Infrastructure is a key element of poverty alleviation. It often acts as a catalyst to development and enhances the impact of interventions to improve the poor's access to other assets, such as human, social, financial, and natural assets. Its impact is felt both on the economic and social sectors. Without roads, the poor are not able to sell their output on the market. Without electricity, the industrialization process, which provides the poor an important source of employment, is unlikely to take off. Without potable water and sanitation health is at risk. The social and economic impact often go hand in hand (Gaal and Afrah, 2017).

Poverty reduction requires economic growth which, when accompanied by sound macroeconomic management and good governance, results in sustainable and socially inclusive development. The availability of infrastructure facilities and services as well as the efficiency of such services to a large extent determine the success or otherwise of all other production endeavour. Lack of basic infrastructure makes it difficult for poor people to access markets and services. Therefore, investments in infrastructures such as energy, water, transportation and communication technologies promote economic growth and help to alleviate poverty and improve living conditions through industrialization.

An inter-sectoral linkage of infrastructure generates positive externalities and multipliers that are useful for industrial growth. Positive externalities and the multiplier effect of infrastructure such as energy infrastructure provide the right environment for citizens to acquire knowledge, which, in turn, enhance productivity (Udah and Ebi, 2017).

Inclusive and sustainable industrialization, together with innovation and infrastructure, can unleash dynamic and competitive economic forces that generate employment and income. They play a key role in introducing and promoting new technologies, facilitating international trade and enabling the efficient use of resources. However, the world still has a long way to go to fully tap this potential. Least developed countries, in particular, need to accelerate the development of their manufacturing sector if they are to meet the 2030 target and scale up investment in scientific research and innovation.

Global manufacturing growth has been steadily declining, even before the outbreak of the COVID-19 pandemic. The pandemic is hitting manufacturing industries hard and causing disruptions in global value chains and the supply of products. In Nigeria for instance, Uda and Ebi (2017) observe that, industrial development indicators such as share of manufacturing in industrial output, manufacturing per capital, level of manufacturing export, index of industrial output, capacity utilization, are still below desired policy objective. Nigeria needs industrialization to achieve prosperity and a decent standard of living for her citizens. But this can only be achieved through good governance policies and infrastructure development. The lack of these two critical factors have largely undermined the industrialization trajectory in the country.

There is need for Nigeria to be industrialized to add value to her huge raw materials and services. Access to finance and markets is key to promoting industrialization. However, failure in designing governance policies can be a serious downside for promoting the sector. Industrial policies are more likely to achieve results if targets are agreed upon in a collaborative manner, involving the private sector as well as the competent public entities and civil service organizations. "There is a need to look into the settlement framework, the distribution and marketing strategy, as well as productive integration and focus on tax policies. Industrialization is a long-term process of more than 20 to 50 years, which requires incredible commitments and leadership, as well as appropriate policy in public sector procurement. While there is need to focus on attracting foreign investments, leveraging domestic and regional markets is necessary. There is need to have functional states with effective leaders. We need to get the policies right, and build a nation with leaders capable of building and leading industrial policies.

Overall, Nigeria's industrialization would have a more positive impact on the country's Gross Domestic Product. However, for this to happen, a comprehensive and resolute industrial policy that can be aligned with countries' development goals, should be designed. Given this scenario, the industrial settlement framework as well as infrastructure development and good governance, are particular dynamics to be looked into.

This study therefore seeks to evaluate the impact of infrastructure and good governance on industrial development of Nigeria and the impact of good governance on infrastructural development.

2 LITERATURE REVIEW

2.1 Conceptual Issues

Industrialization is seen as a socio-economic process of quick transformation within the manufacturing sector in relation to a plethora of avenues of production and work done within an economy. It encompasses the added value of the manufacturing sector when the overall size of the economy is considered. In accordance with Gui-Diby and Renard (2015), when the level of development in the manufacturing sector is comparatively high with regard to other sectors within an economy, the industrialisation rate in the country is also relatively high. With this understanding, two dimensions are essential for the consolidation of the industrialisation process, (i) the provision of incentives of production to the manufacturing sector and (ii) the sustainability of production in order to meet requirements at the local and international levels.

The enabling incentives for production require in the manufacturing sector could be requisite infrastructural development and good governance. Infrastructural development of any nation requires the creation of basic foundational services to enhance economic growth and quality of life. Rigorous infrastructure building have better efficiency and competitiveness (Davies et al, 2019). Sustaining production in order to meet national and international taste requires development of some basic infrastructure such as rail and road networks, energy, water treatment and flood prevention, systems for reuse and recycling that prevent harmful waste from entering the environment, digital infrastructure, communication networks and computing facilities, social infrastructure such as schools, hospitals, emergency services, community support, public space, libraries and cultural institutions, resilience provision of shelter in time of natural disaster such as flooding and earthquake shelter and government services such as consumer protection and fair competition regulations and enforcement (Diugwu et al, 2015 and Babatunde, 2019).

While many developments in the world economy depend on external factors that are hard to influence, steadfast leadership from indigenous policymakers can help improve domestic governance and ensure that public resources are well used and thus contribute to shared and lasting prosperity. However, it has been observed that enhancing governance and integrity in public affairs is probably sub-Saharan Africa's most urgent challenge to sustainably root poverty out of the region. Poor governance, including lack of basic freedoms, such as citizens' rights to hold their government accountable, has held back most countries in the region from entering the club of emerging middle-

income countries, and has prevented others from escaping the fragility trap. Thus, for the region's average GDP per capita to move to upper- middle-income status, growth will need to increase sustainably by 2 percentage points to 7 percent over a minimum of 15 years. Improvements in governance will also reduce inequality substantially. The combined impact of better governance on growth and inequality will accelerate the eradication of poverty in the continent (Newiak, et al, 2022).

The existence of functional infrastructure in an economy makes industrial productivity more of a breeze through promotion of investment, movement of products, people and services, and facilitation of information and communication (Orji et al, 2017). However, the deplorable situation of most of the infrastructural facilities in Nigeria as well as their lack of maintenance especially of the roads, electric power, and water, tend to limit the contribution of infrastructure to industrial growth and development in Nigeria. Lack of transparency and accountability in governance has resulted in inadequate funding from government for maintenance of these facilities. Careless use, vandalization, corruption, and delays in construction has resulted in poor state of infrastructure which invariably leads to low industrial productivity. Industrialists afraid of increasing cost of production and limited patronage especially from the government agencies are discouraged to venture into manufacturing activities. This in turn leads to lower national income.

The table below shows performance of all six indicators of governance in ECOWAS countries for 2010-2019 average.

Table 1: Governance indices performance in ECOWAS countries (2010-2019 average)

Countries	Voices /Accountability	Political stability	Governance effectiveness	Rule of Law	Control of corruption	Regulatory Quality	overall	Ranking
Benin	52	59.7	60.7	66.1	56.7	60.9	58.6	4th
Burkina Faso	53.4	56.7	56.5	57.4	57.6	60.9	54	6th
Cape verde	68.4	76.6	73	76.2	58.6	68.8	73.1	1st
Cote d' Ivoire	44.4	54.2	50.8	58.2	49.9	56.9	53.9	7th
Gambia	42.9	57.1	56.4	58	50.7	60.2	55.9	5th
Ghana	68.3	69.7	62.8	66	40	63.5	64.3	2nd
Guinea	35.5	38.3	46.4	43.4	26.7	53.2	42.5	14th
Guinea Bissau	40.8	47.5	30.2	48.5	21.6	52.5	41.4	15th
Liberia	56	54.9	46.5	54.9	30.2	43.9	47.9	10th
Mali	47.3	42.2	47.3	45.1	32.9	52.3	46.6	12th
Niger	41.2	49.5	50.4	52.7	46.6	53.8	47.8	11th
Nigeria	49.5	43.6	50.1	44.3	29.5	45.5	45.5	13th
Senegal	53.8	64.3	67	68.2	59.5	60.9	63.2	3rd
Sierra Leone	49.4	56.8	59.6	56.2	43.9	42.5	51	8th
Togo	27.3	48.2	56.3	51.3	45.5	47.7	50.1	9th

Source: Adapted from Mo Ibrahim Index of African Governance Report, 2020.

Voice and Accountability (VA) The index for Voice and Accountability captures perceptions of the extent to which the citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

Political Stability and Absence of Violence/Terrorism (PV) The index of Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism. The index is an average of several other indexes from the Economist Intelligence Unit, the World Economic Forum, and the Political Risk Services, among other

Government Effectiveness (GE) The index of Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

Regulatory Quality (RQ) The index of Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development

Rule of Law (RL) The index for Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence

Control of Corruption (CC) Capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

All the indicators are taken as 100%. This means, the higher the indicator, the better governed a country is and the lower the indicator, the poorly governed a country is.

From the table above, Cape Verde performance is more impressive with the average indicators of 73.1%, this is followed by Ghana, Senegal, Benin, Gambia, Burkina Faso, cote d'Ivoire, Sierra Leone and Togo in that order. On the average, Nigeria ranking is poor in terms of overall governance. A growing volume of literature suggest that lack of quality governance hinders growth and investments, and aggravates poverty and inequality (Adamu, 2016). In terms of government effectiveness, Nigeria only ranked above Mali,

Guinea, Guinea Bissau and Liberia. Using the rule of law as indicator of governance, it is found that Nigeria ranked only above Guinea while it ranked below every other country. In terms of fighting corruption and regulatory quality, Nigeria performance is abysmal. This indicates that Nigeria is badly governed and that ease of doing business especially by private individuals is not guaranteed. Absence of industrialization due to corruption and lack of regulatory framework no doubt chase away foreign private investors and makes the economy suffers high level of unemployment.

Consequently, a well-industrialized economy is expected to have adequate regulatory quality framework that will impact positively on the industrial sector of the economy which is seen as an engine of economic growth. Availability of adequate and efficient infrastructural set-up not only improves the quality of life of the people but also promotes rapid industrialization (Azolibe and Okonkwo, 2020).

2.2 Theoretical Framework: Infrastructure-Led Development Theory

The theory of infrastructure-led development was proposed by Professor Pierre – Richard Agenor in 2006 in a discussion paper series of the Centre for Growth and Business Cycle Research at the University of Manchester. In the final version of this theoretical postulation in February 2010, the theory proposed a long-run development linked to public infrastructure being the key mechanism of growth (Agenor, 2010). The justification for this basic thesis of Agenor's (2010) is that the lack of growth and development in many low income countries is attributable to lack of infrastructure. With particular reference to sub-Saharan Africa, Agenor (2010) observed that only 16% of roads are paved, and that less than one out of five Africans statistically have access to electricity.

The justification of Agenor's (2010) theory of infrastructure-led development is hinged on two key motivations. The first justification is that infrastructural investment must reach a certain minimum level before it begins to produce any significant effect on development and as such investments in infrastructural provisions beneath the threshold from where it begins to have effect is not proportionate to the zero level of developmental effect at that level. This assumption explains the non-linearity relationship held by the theory (Agenor, 2010). Secondly a network-chain of effects on other developmental catalysts is recognized and incorporated in the position of the theory. In this light, the World Bank (1994) also agrees that the short coming of not achieving economies of scale from network externalities is a major setback of geographical locations lacking in infrastructural provisions.

As noted by Prakash (2018), Africa faces development gaps at two main levels:

geographical and industrial. Geographical development gaps are the differences in income levels and development stages amongst countries or regions within a country. Industrial development gaps refer to differences in productivity and development stages between multinational and local firms, large firms and small and medium enterprises (SMEs), and manufacturing and non-manufacturing sectors. Planned infrastructure development and connectivity improvements can positively exploit the diversity amongst countries and sub-regions to narrow these development gaps in Africa. Geographical development gaps can be reduced through participation in production networks. Infrastructure enhancements enable countries or sub-regions to attract manufacturing industries. They also allow people to move from rural to urban areas. The smooth movement of people from agricultural, informal occupations in rural areas to formal, nonagricultural occupations in urban areas is an effective way to raise incomes and supply competitively priced labour to the manufacturing and modern services sectors.

2.3 The Empirics

Usah and Ebi (2017) examined the importance of infrastructure and human capital on industrialization in Nigeria using time series data from 1970 to 2014. The study captured the interrelationship among the variables with Pairwise Granger causality test and used Ordinary Least Squares (OLS) estimation technique. The parsimonious results suggest that gross domestic investment, electricity supply and trade openness are the required elements to accelerate the pace of industrialization in Nigeria. This implied that providing adequate and stable supply of electricity, deepening public and private investments as well as opening the economy to the vagaries of international trade has short and long-termed lasting effect on industrial development. The policy perspective is that government should prioritize the generation and distribution of electricity, increase the quantum of investments in road infrastructure and opening of the economy in order to accelerate the pace of industrialization

Orji et al, (2017) analysed the effects of infrastructure on the industrial sector of Nigeria. In that vein, ordinary least square method of regression analysis was adopted, using time series data spanning from 1990 to 2015. Industry value-added (% of GDP) was used as an indicator of Nigeria's industrial sector performance, while index of electricity consumption, gross capital formation, and federal government spending on transport and communication were used as indicators for infrastructural development. The results of the regression showed that the index of electricity consumption exerted a positive but insignificant impact on industry value-added; gross capital formation and federal government spending had a negative but significant impact on industry value-added on industry value-added. The study recommended that measures

to revamp and maintain the power sector of Nigeria must be taken seriously to ensure better supply of power. It was also recommended that corruption be curbed and projects, for which funds are disbursed, be properly monitored so as to ensure that efficient and long-lasting infrastructure will be built and properly maintained to encourage greater industrial output.

Asongu and Adhiambo (2019), examined the role of governance in modulating the effect of capital flight on industrialisation in Africa. The empirical evidence was based on Generalised Method of Moments and governance was bundled by principal component analysis, namely (i) political governance from political stability and “voice and accountability”; (ii) economic governance from government effectiveness and regulation quality; and (iii) institutional governance from corruption-control and the rule of law. First, governance increases industrialisation whereas capital flight has the opposite effect; and second, governance does not significantly mitigate the negative effect of capital flight on industrialisation. The implication is that to boost ongoing industrialization efforts in Africa, the governments of African countries would have to increase their efforts towards improving good governance in view of potentially mitigating the adverse effect that capital flight has on industrialisation.

Azolibé and Okonkwo (2020), examined whether the state of infrastructure development in Sub-Saharan Africa actually stimulates industrial sector productivity, using a panel data set of 17 countries spanning from 2003 to 2018. The study used panel least square estimation technique to examine the relationship between the variables. The result of the study indicated that the major factor that influences industrial sector productivity in Sub-Saharan Africa is their quantity and quality of telecommunication infrastructure. Analysis shows that the relatively low level of industrial sector productivity in Sub-Saharan Africa is largely due to their poor electricity and transport infrastructure and underutilization of water supply and sanitation infrastructure. Practical implications – The government should partner with other developed countries of the world such which are the top ten countries in infrastructure ranking as currently released by the World Bank, to equally extend their quality infrastructure to their own country for enhanced industrialization.

The reviewed literature no doubt supports the infrastructure –led growth theory by confirming the relevance of infrastructure to industrialization. What is missing in some of the works is that the researchers had not shown the link between industrialization and governance and between governance and infrastructure. This study fills that gap. Even when governance and industrialization are discussed, the discussion are taken in aggregate without

being country specific. The present study apart from looking at industrial and infrastructural development, it extends to industrialization and governance and how infrastructure itself can be affected or influenced by governance in Nigeria.

3 METHODOLOGY AND MODEL SPECIFICATION

3.1 Model Specification

This study seeks to determine the link between industrialization and infrastructure and governance and how governance can influence the quality of infrastructure. Following Adamu (2016), this study adopts econometric approach to establish the cause and effect relationships among variables of interest. In view of this, we adopt a regression model of the form;

$$IND_t = f(X_{it}, Y_{it}) \quad (1)$$

Equation 1 implies that industrialization at a given time (IND_t) is dependent on good governance and infrastructure. Where X_{it} is the vector of governance indicators and Y_{it} is the vector of quality of infrastructure. If governance is represented by the six indicators of good governance, ie; voice and accountability(VA), political stability and absence of violence(PV), government effectiveness (GE), regulatory quality (RQ), rule of law (RL) and control of corruption (CC) and if infrastructure is represented by transport network (TN), access to energy (AE), digital access (DA) and mobile communication. Then, equation 1 can be written as;

$$IND_t = \alpha_0 + \beta_1 VA + \beta_2 PV + \beta_3 GE + \beta_4 RQ + \beta_5 RL + \beta_6 CC + \beta_7 TN + \beta_8 AE + \beta_9 DA + e_i \quad (2).$$

Where;

α_0 = intercept

$\beta_1 - \beta_9$ are parametres

e_i = error term

However, because of paucity of data for estimation, infrastructure is taken in its aggregate form which consist of the index of transport network, access to energy, digital access and mobile communication. Hence, equation (2) is written as:

$$IND_t = \alpha_0 + \beta_1 VA + \beta_2 PV + \beta_3 GE + \beta_4 RQ + \beta_5 ROL + \beta_6 COC + \beta_7 Infr + e_i \quad (3)$$

Where Infr is infrastructure and other variables are as earlier explained.

Thus, equation (3) establishes the relation between industrialization, good governance and infrastructure.

In determining the relation between infrastructure and good governance, we

formulate another equation.

$$\text{INFr} = f(\text{good governance}) \quad (4)$$

Equation (4) stipulates that infrastructure is a function of good governance.

Disaggregating good governance into its various components, we can rewrite equation (4) as;

$$\text{INFr} = \alpha_0 + \beta_1 \text{VA} + \beta_2 \text{PV} + \beta_3 \text{GE} + \beta_4 \text{RQ} + \beta_5 \text{ROL} + \beta_6 \text{COC} \quad (5)$$

Where Infr is infrastructure, while other variables are as earlier defined.

3.2 Data Source and Estimation Procedure

Data for this study was obtained from MO Ibrahim governance index report 2020 and www.theglobaleconomy.com. For the period 2000- 2020. Industrialization was measured by industry value added, governance by the six indicators of governance as explained earlier and infrastructure on the aggregate based on the various indices of infrastructure as explained earlier. To estimate the relationship between variables of interest, ordinary least square(OLS) estimation technique was used.

4 EMPIRICAL FINDINGS

Table 2: Result of the Relationship Between Industrialization, Governance & Infrastructure

Dependent Variable: Industrialisation.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	64.48601	39.43568	1.635220	0.1260
COC	-0.228328	0.242620	-0.941091	0.3638
GE	0.022781	0.063712	0.357567	0.7264
INFR	-0.156782	0.494733	-0.316903	0.7563
PV	7.720953	11.12137	0.694245	0.4997
ROL	13.74725	10.63194	1.293014	0.2185
RQ	-3.405686	9.116025	-0.373593	0.7147
VA	-40.06459	13.76632	-2.910335	0.0122
R-squared	0.694067	Mean dependent var		49.14429
Adjusted R-squared	0.529334	S.D. dependent var		6.149382
F-statistic	4.213288	Durbin-Watson stat		1.709975
Prob(F-statistic)	0.012305			

From the analysis, it can be seen that a negative and non-significant

relationship exist between control of corruption as an indicator of governance and industrialization, but government effectiveness has positive non-significant relationship with industrialization. Again, infrastructure has negative non-significant relationship with industrialization. However, political stability and absence of violence as an indicator of governance is positively and non-significantly related with industrialization. Also, rule of law is positively and non-significantly related with industrialization. But, regulatory quality is negatively non-significantly related with industrialization. However, voice and accountability has negative significant relationship with industrialization. This implies that industrializing without being accountable and giving attention to the needs of the people has negative influence on industrialization. Overall, it can be said that 69% variation in industrialization is explained by governance and infrastructure. Consequently, it should be admitted that inability of a system to control corruption and ensure effective functioning of the public service will result in poor state of infrastructure which will generate spiral effect on other sector of the economy negatively.

Table 3 Result of the Relationship Between Governance and Infrastructure Dependent variable: Infrastructure

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	57.12740	14.85722	3.845094	0.0018
COC	0.065262	0.129901	0.502402	0.6232
GE	-0.008940	0.034335	-0.260375	0.7984
PV	-6.411748	5.758346	-1.113471	0.2843
ROL	5.661988	5.540586	1.021911	0.3242
RQ	4.575885	4.770331	0.959239	0.3537
VA	15.78207	6.124889	2.576711	0.0219
R-squared	0.730605	Mean dependent var		51.06429
Adjusted R-squared	0.615150	S.D. dependent var		3.673729
F-statistic	6.328043	Durbin-Watson stat		2.274174
Prob(F-statistic)	0.002169			

Infrastructure whether hard or soft is germane to industrial development in any economy. The extent to which infrastructure can contribute industrial growth of an economy is a function of governance. The result above shows that control of corruption as an index of governance has positive and non-significant relation with infrastructure. This means that if there is improvement in the control of corruption, quality of infrastructure will as well improved. The

dearth of infrastructure in our polity can no doubt be traceable to corrupt influence of public office holders who will rather choose to divert public fund for private use. Government effectiveness and political stability are found to be negatively and non-significantly related with infrastructure. Since infrastructure in Nigeria is provided by the public sector, poor working of the public sector sometime due to incessant change in government structure can affect the provision and quality of infrastructure at a given point in time. This result no doubt show that when government is ineffective perhaps due to instability and increase in violent and insecurity, the likelihood of infrastructure deficit is certain. Rule of law and regulatory quality are found to be positively non-significantly related with infrastructure. What this implies is that when there is promotion of the rule of law, regulatory quality which would ensure good macroeconomic environment will be ensured and this will eventually result in infrastructure development. Voice and accountability is positively and significantly related with infrastructure. What this implies is that when the voice of the people are allowed through institution of true electoral process, accountability will result and this will eventually catapult to infrastructural development. This is because the masses will be considered in the cause of developing any infrastructure. On the whole, it is observed from the result that 73% variation in infrastructure is caused by good governance.

5 Conclusion and Recommendations

The significance of infrastructure and good governance as key to the industrial development and growth of any nation is not in doubt. Poor state of infrastructure in Nigeria is no doubt due to poor governance especially corruption in high places. It is also obvious that poor state of infrastructure inhibits industrial growth.

Poor performance of governance indicators clearly robs off on industrial and infrastructural sectors of the economy and send spiral wave across every other sector of the economy. Government effectiveness as an indicator of governance has an index of -2.5 to +2.5. The average value of the indicator for Nigeria during the period 1996-2020 was -1.03 points with a minimum of -1.21 points in 2009 and a maximum of -0.89 points in 2005. The latest value from 2020 is -1.03 points. This value indicates a weak government effectiveness.

Regulatory quality index like government effectiveness has an index range of -2.5 weak; 2.5 strong. Data for this indicator between 1996-2020 shows the average value for Nigeria during that period to be -0.89 points with a minimum of -1.35 points in 2004 and a maximum of -0.66 points in 2013. The latest value from 2020 is -0.96 points. Again, indication of weak performance.

Political stability as another indicator of governance has the range of -2.5

weak; 2.5 strong. Data for that indicator provided by the global economy for 1996 – 2020 shows average value for Nigeria during that period to be -1.81 points with a minimum of -2.21 points in 2010 and a maximum of -0.59 points in 1998. The latest value from 2020 is -1.86 points. Again, another indication of weak performance.

The weak performance of all the indicators as presented here no doubt affect infrastructural development and industrial growth in Nigeria. The fact that these two key areas (infrastructure and governance) perform woefully indicates that other sectors cannot do any better.

Voice and accountability index also ranges between -2.5 weak and 2.5 strong. The average value of the indicator for Nigeria during that period was -0.68 points with a minimum of -1.55 points in 1996 and a maximum of -0.32 points in 2016. The latest value from 2020 is -0.59 points.

Rule of law index (-2.5 weak; 2.5 strong): The average value for Nigeria during the period 1996-2020 was -1.12 points with a minimum of -1.43 points in 2003 and a maximum of -0.81 points in 2020. The latest value from 2020 is -0.81 points.

The fact that all the examined indicators are weak in their performance justify their relation outlook with industrialization and infrastructure. It is also worth mentioning that poor performance of the industrial sector exacerbates other vices in the economy such as unemployment, insecurity, youth restiveness, poor investment climate and poor institutional framework.

Thus, to ensure good governance with a view to ensuring infrastructural development and industrial growth, there must be genuine fight against corruption through institution of workable and efficient institutions and proper maintenance of the rule of law. Institutions of government should be ready to be accountable, transparent and diligent in the conduct of government businesses. The formation of EFCC and ICPC as anti-graft agencies was to prevent graft and high powered theft. Unfortunately, these institutions have been hoodwinked into the whim and caprices of the ruling class because of undue regards for the rule of law. More voice should be given to the electorates by ensuring the existence of efficient and workable electoral system. A system of probity where the citizens are not intimidated to question the use of their collective resources should be promoted.

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RURAL POPULATION ATTENUATION AND FOOD PRODUCTION IN NIGERIA

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Abstract

The Nigeria's rural population is marked by continuous decline as a result of rural-urban migration. Since agriculture is more concentrated in the rural areas, this could have a dampening effect on food production. Ascertaining the influence of rural population growth on food production in Nigeria was therefore the objective of the study. The study was conducted with the aid of data from 1961 to 2018 which were sorted out from the World Bank and analysed using the Johhansen cointegration test, Ordinary Least Squares (OLS), Dynamic (OLS), and Fully Modified OLS. Our findings portrayed that a long-run link exist concerning food production and rural population growth in Nigeria. From the Dynamic OLS which stands to be our lead model, it was realized that the influence of rural population on food production has been negative and significant. This negative effect is linked to the continuous rural-urban migration that has left agriculture into the hands of the few elderly. To curb this, the paper suggested that making agriculture attractive through aggressive mechanisation and provision of inputs, rural population will be able to accelerate food production and ensure food sufficiency in the country.

Keywords: Agriculture, Arable Land, Food Sufficiency, Crops, Livestock, Rural-Urban Migration.

1 Introduction

The major role of agriculture has been tagged of accelerating food production and ensuring food sufficiency (Otsuka, 2013; Wegren and Elvestad, 2018; Okijie and Effiong, 2021). The role has also been extended to capture the fact that agriculture is fundamental to economic growth, as it accounted for 4% of global gross domestic product (GDP); while contribution in some least

developing countries exceeded 25% of GDP in 2018 (World Bank, 2022). Growth driven by agriculture, poverty diminution, and food security are at risk varying from manifold blows – from COVID-19 associated disturbances to extreme weather, pests and conflicts (World Bank, 2022), plus rural-urban migration – are impacting food systems, bring about upsurge in food prices and mounting hunger (World Bank, 2022). Our core concern is on the risk caused by rural-urban migration, resulting to rural population attenuation, on food production in Nigeria.

Nigeria with 70.8 million hectares of agriculture land area is characterised with prominent crops like yam, maize, millet, guinea corn, beans, cassava, and rice (Food Agricultural Organization (FAO), 2022). By output, the quantity of rice production in Nigeria escalated by 8.11% from 3.7 million metric tonnes (MT) as at 2017 to 4.0 million MT in 2018. Nigeria's annual rice consumption is put at 6.7 million MT, implying that domestic production as at 2018 only caters for 59.70% of the total consumption (FAO, 2022). The domestic deficit of 2.7 million MT is thus either imported or covered via smuggling. The government of Nigeria hitherto banned the importation of rice onto the country as a policy stand to boost domestic production. For cassava, Nigeria was ranked the world's highest producer as it produced 59 million tons as at 2017, making it 20% of world's total production (International Institute of Tropical Agriculture, 2017; FAO, 2022). For livestock production, it has been stated that the aspect has been less exploited the northern part of Nigeria being favourable for its production due to ecological factors. As of 2017, a total of 76 million goats, 43.4 million sheep, and 18.4 million cattle were reared in Nigeria (FAO, 2022); while 180 million poultry birds were recorded (Federal Ministry of Agriculture and Rural Development (FMARD), 2017).

In line with the FMARD, Nigeria diverse problems when it comes to unlocking her agricultural potentials, and such include policy framework, political commitment, agricultural technology, and infrastructure deficit (FMARD, 2016). In curtailing these challenges, the document made reference to the three pillars of promotion of agricultural investment, financing agricultural development programmes, and research for agricultural innovation and productivity, as the core ways in which the Federal Government can promote agriculture. In this light, the 2016 – 2020 policy thrust was centred on four key areas of food security, import substitution, job creation, and economic diversification (FMARD, 2016).

With policies being put in place to stimulate agricultural production, it is still worthy to note that agricultural activities are more concentrated in the rural communities. This implies that apart firm capital input, labour is also very crucial in agricultural development. With a rural population of 99,033,580 recorded in 2020 as against 38,862,452 as at 1961, it can be said that the rural

population has grown significantly within the era. This cannot actually be true when comparing the proportion of the rural population to total population over time. Our argument can be validation given the trend observed in Figure 1.

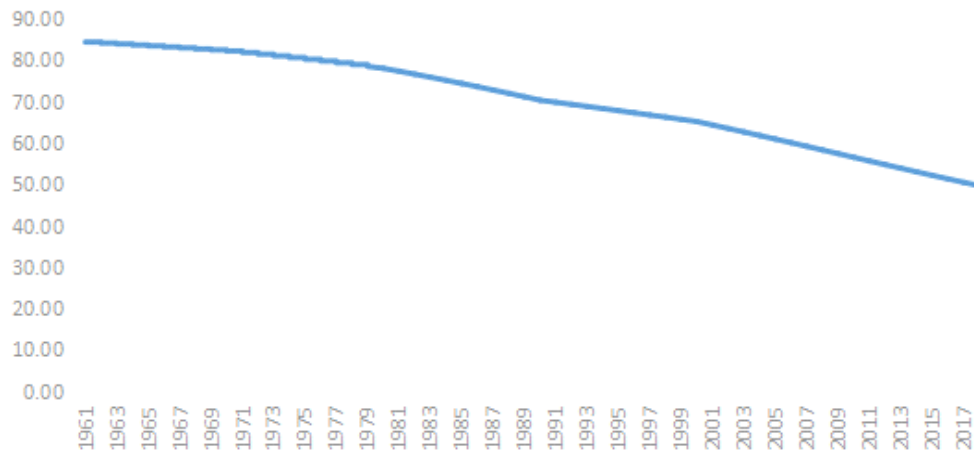


Figure 1: Trend in rural population (% of total population)

Consistent with Figure 1, the proportion of the rural population to the total population has been declining momentarily. At 1961, the proportion of the rural population was 84.37% of the total population and this revealed a substantial rural concentration of the population. With incessant rural-urban drift, the population of the rural communities kept declining reaching 78.03% and 65.16% in 1980 and 2000 respectively, before it plunges further to 56.52% in 2010 and 49.66% in 2020, which is less than half of the total population.

Likewise, the growth in rural population has been showing some form of peaks and floors over the epochs with the 1970s recording a peak in rural population growth. Figure 2 unveils this trend.

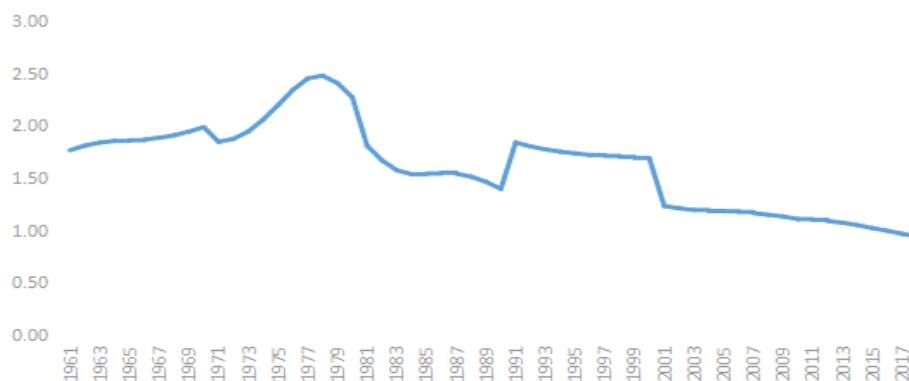


Figure 2: Trend in rural population growth in Nigeria (annual %)

With the rural population growing steadily in the 1960s and reaching a climax of 2.48% in 1978, a tremendous decline was recorded thereafter with the growth rate waning to 1.39% in 1990 before a leap to 1.84% was recorded in 1991. Subsequent years were marked with massive declining rural population to 1.11% in 2010 and 0.94% in 2020.

Given this trend, our concern then stems from the labour-output relationship of the agricultural sector in facilitating food production. With the declining rural population which could serve as a labour pool in the rural areas for agricultural production, could it be that food production will be adversely affected? This paper thus gears towards ascertaining the influence of rural population decline on food production in Nigeria from 1961 to 2018. In particular, the study sought to: (i) investigate the influence of rural population growth on crop production in Nigeria; (ii) examine the weight of rural population on livestock production in Nigeria; and (iii) analyse the inspiration of rural population growth on food production in Nigeria.

2 Overview of Agricultural Programmes and Food Production

2.1 Nigeria's Agricultural Policies and Programmes

Diverse agricultural policies and programmes have been put in place to promote agricultural infrastructure and boost agricultural production in Nigeria. These policies as adumbrated in Kanu and Ukonze (2018) and cited in Effiong and Okijie (2022) are highlighted as follows:

- a) Operation Feed the Nation (OFN)
- b) National Accelerated Food Production Programme (NAFPP)
- c) River-Basin Development Authority (RBDA)
- d) Agricultural Development Programme (ADP)
- e) The Green Revolution (GR)
- f) Agricultural Credit Guarantee Scheme (ACGS)
- g) Directorate for Food, Road and Rural Infrastructure (DFRRI)
- h) National Agricultural Insurance Corporation (NAIC)
- i) National Agricultural Land Development Authority (NALDA)
- j) Agriculture Promotion Policy (APP)

In line with the Agricultural Transformation Agenda (ATA), six core components were identified which include Nigerian Incentive-based Risk-Sharing System for Agricultural Lending (NIRSAL); Agricultural Extension Transformation Agenda (AETA); Staple Crop Processing Zone (SCPZ); Growth Enhancement Support Scheme (GESS); Agricultural Marketing and Trade Development Corporations (AMTDCs); and Agricultural Commodity Value Chain Development (ACVCD). As of 2014, the Youth Employment in Agriculture Programme (YEAP) was launched by the federal government to

address the issue of youth unemployment in the country (see Olomola and Nwafor, 2018).

Similar to the above include the establishment of the Nigeria Agricultural and Cooperative Bank and the President Buhari's agricultural policy (explored by Meshach, 2018) to ban importation of some food items and boosting local production of food. All these policies were geared towards sustainable development of agriculture and ensuring food security in the country. But the extent to which they aid in the actualization of the said policy can be questioned based on the food crisis so experienced in the country as attributed to recent upsurge in food prices in the country.

With food production growing by more than three times within 1960 and 2015 which was accompanied by productivity-augmenting 'Green Revolution' technologies and a substantial development in the use of land, water and other natural resources for agricultural purposes, the world is still plagued with persistent hunger and widespread hunger and malnutrition; making the achievement of eradicating hunger by 2030 or even by 2050 to seem unachievable (FAO, 2017).

2.2 Food Production in Nigeria

The food production in Nigeria can be looked at in terms of the inputs and the implied output. The input considered are the number of tractors, agricultural land, and labour. These inputs captures both the capital and labour inputs, though some other input like improved seeds, fertilizers, and agrochemicals are also crucial. Table 1 unveils these inputs for selected periods.

Table 1: Agricultural Inputs

Year	Agricultural machinery, tractors	Agricultural land (% of land area)	Arable land (% of land area)	Rural Population (% of total Population)
1961	500	58.39	26.00	84.37
1965	1,000	64.86	32.47	83.45
1970	2,900	67.01	35.00	82.24
1975	5,650	60.55	28.55	80.22
1980	8,400	55.38	21.52	78.03
1985	11,150	60.31	25.25	74.37
1990	13,900	67.62	30.93	70.32
1995	16,650	71.77	36.12	67.80
2000	19,400	72.67	38.43	65.16
2005	23,000	73.56	39.53	60.93

2010	NA	74.46	36.23	56.52
2015	NA	75.36	37.33	52.16
2018	NA	75.90	37.33	49.66

Source: World Bank (2021).

Nigeria has been experiencing a momentous increase in the number of tractors which are crucial for mechanization. The number of tractors in 1961 was 500 which doubled as at 1965. This followed a more than doubled number from 1,000 in 1965 to 2,900 as at 1970. In the 1980s, the number of tractors hovered within 8,000 and 11,000 with a magnificent increase to 16,650 in 1995. This was accompanied by another increase to 23,000 in 2005 though recent data has not been made available.

The agricultural land and arable land kept increasing over the years, pointing to the fact that a greater proportion of the arable land has been put under cultivation. The critical point to note is that the arable land has not even reach 50% of the total land area, pointing to the low agricultural production in the country. The labour component comprising the rural population is characterised with a declining trend for the selected era. The proportion of the rural population to total population declined from 84.37% in 1961 to 78.03% in 1980. It additionally plummets to 65.16% and 56.52% in 2000 and 2010 respectively, before reaching 49.66% in 2018. This declining trend portrays disengagement of rural dwellers in agriculture which has a dampening influence on food production in the country (see Ikelegbe and Edokpa, 2013).

With these inputs, the agricultural indices have shown a continuous increase right from the 1960s from crop production index to livestock production index, and then to the aggregate food production index. Table 2 captures these dynamics in the diverse indices for selected periods.

Table 2: Agricultural Indices

Year	Crop production index (2014-2016 = 100)	Livestock production index (2014-2016 = 100)	Food production index (2014-2016 = 100)
1961	18.59	17.15	18.31
1965	22.17	18.51	21.62
1970	27.20	23.81	26.73
1975	23.34	27.93	23.67
1980	21.31	44.75	23.75
1985	25.04	57.86	28.47
1990	38.93	50.26	39.90

1995	54.16	61.82	54.85
2000	65.77	74.57	66.61
2005	81.54	87.17	82.05
2010	84.63	98.17	86.02
2015	98.50	101.78	98.85
2018	105.40	103.35	105.20

Source: World Bank (2021).

The general observation from Table 2 is that all these indices has been on the rise, with crop production index surging from 18.59 in 1961 to 65.77 and 105.40 in 2000 and 2018 respectively. Similar trend is being observed for livestock production which escalated from 17.15 in 1961 to 50.26 in 1990 before reaching 87.17 and 103.35 in 2005 and 2018 respective; while food production also exhibited similar trend rising from 18.31 in 1961 to 54.85 and 105.20 in 1995 and 2018 respectively. These increase is reflected in the agricultural GDP over the years, which Table 3 clearly present from 1981 to 2020.

Though one can notice a rising trend in food production, having a clear view of whether there has been any improvement in the index will be to compare them with the base year. with the base year index selected to be 100 as 2014-2016, it is clear that majority of the years has not been able to meet up to the base year index, with only minute improvements observed 2018 where the food production index stood at 105.20 against 98.85 in 2015.

Table 3: Agricultural GDP, 1981 – 2020

Agricultural GDP (in			Agricultural GDP		
Year	₦' billions)	% of GDP	Year	(in ₦' billions)	% of GDP
1981	17.05	12.36	2001	2,015.42	24.73
1982	20.13	13.64	2002	4,251.52	37.35
1983	23.80	15.14	2003	4,585.93	34.18
1984	30.37	18.49	2004	4,935.26	27.51
1985	34.24	18.41	2005	6,032.33	26.36
1986	35.70	18.20	2006	7,513.30	24.99
1987	50.29	20.76	2007	8,551.98	24.92
1988	73.76	23.60	2008	10,100.33	25.54
1989	88.26	21.49	2009	11,625.44	27.03
1990	106.63	21.77	2010	13,048.89	23.89
1991	123.24	21.09	2011	14,037.83	22.29
1992	184.12	20.52	2012	15,816.00	22.05
1993	295.32	23.72	2013	16,816.55	21.00
1994	445.27	25.43	2014	18,018.61	20.24

1995	790.14	25.74	2015	19,636.97	20.86
1996	1,070.51	26.46	2016	21,523.51	21.21
1997	1,211.46	27.69	2017	23,952.55	21.06
1998	1,341.04	28.19	2018	27,371.30	21.43
1999	1,426.97	26.30	2019	31,904.14	22.12
2000	1,508.41	21.58	2020	37,241.61	24.45

Source: Central Bank of Nigeria (2020)

In line with Table 3, agricultural output has been on the surge over the selected time with an output valued at N17.05 billion in 1981 rising to N106.63 billion in 1990. This trend continued reaching N13,048.89 billion in 2010 before growing momentarily to N37,241.61 billion in 2020. What has been dangling is the contribution of the agricultural sector to the overall GDP. With the contribution of 12.36% in 1981, it rose sharply to 21.77% in 1990 before reaching a relative maximum of 28.19% in 1998. This was followed by a continuous decline reaching 24.73% in 2001 before a magnificent leap was recorded in 2002 up to 34.18% in the subsequent year of 2002. With this feat being reached, subsequent years were marked with declining agriculture contribution to GDP from 34.18% in 2003 to 20.24% in 2014. Minute improvements were recorded as the value seems to rise in subsequent years up to 24.45% in 2020.

2.3 Linkages Concerning Food Production and Population Growth

Studies on food production and population can be linked to the theory of population by Thomas Malthus, where population was observed to rise faster than the supply of food. Our study is then centred on rural population as a labour input in food production; and given the continuous decline of the proportion of rural population driven by rural-urban migration, food production could likely be affected. On whether population could affect food production, some studies have put forth diverse arguments and findings.

As Abdulrahman (2013) noted, food production does not grow in line with the upsurge in population while conducting a study for Nigeria by comparing it with India and USA. The study noted that Nigeria has been below the base year index in her food production, pointing to the problem of food sufficiency in the country.

Ikelegbe and Edokpa (2013) in their study utilized the survey research to detect “agriculture production and food nutrition security on twenty rural communities in Benin, Nigeria”. The study discovered that the migration of people from rural areas to cities causes a labour shortage in the agriculture sector. Major contributing causes to the loss in agricultural production over the past five years in the studied areas are a lack of access to fertilizer and inadequate infrastructure.

The work of Mekuria (2018) Aimed at investigating the association concerning population upsurge and food production in Ethiopia while highlighting trends and conflicts in population expansion. This analysis reveals that agricultural productivity and population growth have both risen over time. In contrast to population increase, production growth exhibits erratic trends.

Also, Adama et al. (2018) scrutinized the repercussion of economic and socioeconomic issues on agricultural output in rural communities of Nigeria. The study considered four crops – cassava, yam, maize, and rice. Two models which were estimating via OLS were specified. The first model captures the influence of economic and socioeconomic issues on the identified crops, while the second model captured the influence of economic and socioeconomic issues on total output. In the first model, family labour and farm size posed a positive and substantial weight on cassava production and on maize production. For yam and rice production, farm size put forth a positive and significant effect; while family labour wielded a negative influence on rice production but a positive wave on yam production. In both cases, the effects were not significant. At the aggregate, both farm size and family labour put forth a positive inspiration of total output of the famer, though such effects were not significant.

Oguntegbe et al. (2019) has studied the problem of population as it affects food production in Nigeria. With the study using data from 1980 spanning through 2011 and using the OLS and the ‘instrumental variable approach (IVA)’ of estimation, the result of the OLS captured that population and food production exhibits a positive connection. Meanwhile, it was reported based on the IVA that population growth increase plummets food production, thus calling for population control policies.

Our study is centred around the rural population attenuation as it affects food production in Nigeria. Food production will be split into crop production, livestock production, and aggregate food production in Nigeria. The estimation technique lies within the cointegration and OLS estimation of diverse varieties – OLS, DOLS, and FMOLS.

3 METHODOLOGY

3.1 The Model

The model for this study is modified from the works of Oguntegbe et al. (2019) where they explored “population growth and food security in Nigeria. Their model defined food production (food production index being used as a proxy) as being dependent on population growth, income per capita, and arable land. Our model follows the same pattern but excludes income per capita, in addition to disaggregating it into crop production, livestock production, and then to

food production. The models so specified are in line with the intent of the study which were splits into three major categories. In specifying our models, arable land and rural population growth are the independent variables while crop production, livestock production, and food production turns out to be the dependent variable for Model I, Model II, and Model III respectively.

Model I: This focuses on specifying the connection inherent in crop production and rural population growth. The functional form is specified thus,

$$CRP_t = f(ALA_t, RPG_t) \quad - \quad - \quad - \quad - \quad - \quad - \quad (1)$$

Where CRP = crop production (measured by crop production index)

ALA = arable land (measured as % of total land area)

RPG = rural population growth (measured in %)

Equation (1) is renovated into an amenable form for estimation is given thus;

$$CRP_t = \beta_0 + \beta_1 ALA_t + \beta_2 RPG_t + \mu_t \quad - \quad - \quad - \quad - \quad - \quad (2)$$

Where the variables are the same as given above, β_0 is the constant, β_1 and β_2 are the parameters to be estimated, and μ_t is the stochastic component. It is anticipated that $\beta_0 \neq 0$; and $\beta_1 > 0$; and $\beta_2 < 0$.

Model II: This model reflects on the influence of rural population growth on livestock production, and it is expressed thus;

$$LPI_t = f(ALA_t, RPG_t) \quad - \quad - \quad - \quad - \quad - \quad (3)$$

Where LPI reflects livestock production (measured as crop production index). With a renovation of Equation (3), the estimable form becomes;

$$LPI_t = \varphi_0 + \varphi_1 ALA_t + \varphi_2 RPG_t + \mu_t \quad - \quad - \quad - \quad - \quad - \quad (4)$$

With φ_0 being the constant, φ_1 and φ_2 being the parameters to be estimated, μ_t and being the stochastic component. It is expected that $\varphi_0 \neq 0$; $\varphi_1 > 0$; and $\varphi_2 < 0$.

Model III: The model captures the influence of rural population growth on food production. The model is specified as follows:

$$FPI_t = f(ALA_t, RPG_t) \quad - \quad - \quad - \quad - \quad - \quad (5)$$

Where FPI is food production and the variables on the right are as earlier defined. A transformation of Equation (5) yields a model amendable for estimation which is expressed as follows.

$$FPI_t = \delta_0 + \delta_1 ALA_t + \delta_2 RPG_t + \mu_t \quad - \quad - \quad - \quad - \quad - \quad (6)$$

With δ_0 being the constant, δ_1 and φ_2 being the parameters to be estimated, μ_t and being the stochastic component. It is expected that $\delta_0 \neq 0$; $\delta_1 > 0$; and $\delta_2 < 0$

3.2 The Data

The data spans from 1961 through 2018 making a total of fifty-eight (58)

years under consideration. These data were obtained on key variables like crop production, livestock production, food production, arable land, and rural population growth. These were solely gotten from the World Bank (2021) database on “World Development Indicators”, and this source is reliable as it stands as an official body globally recognized.

3.3 Analytical Technique

As our study makes use of time series data, our data were first subjected to unit root test. The test which was conducted under the constant and trend assumption followed the Augmented Dicky-Fuller (ADF) approach. The data were further analysed using the cointegration test to reveal the existence of any form of long-run link in the model. The study also put to use, the OLS approach with varying dimensions – the OLS itself, the Dynamic OLS, and the Fully Modified OLS. These method aids in estimating long-run (stable) estimates of the models. Meanwhile, the selection of the lead model will be based on the explanatory power that it has the significance of the variable(s) of interest.

4 EMPIRICAL FINDINGS

4.1 Stationarity Test

The stationarity test so conducted aids in the detection of the prevalence of ‘unit root’ in the series, and the ADF approach is utilized.

Table 4: Unit root test result

Variables	Level ADF Test Statistic	Fist Difference ADF Test Statistic	Order of Integration
CRP	-2.1091 (0.5293)	-3.5067 (0.0485)*	I(1)
LPI	-3.0043 (0.1401)	-8.5843 (0.0000)**	I(1)
FPI	-2.0680 (0.5516)	-3.5560 (0.0433)	I(1)
ALA	-1.7952 (0.6941)	-8.2008 (0.0000)**	I(1)
RPG	-2.6737 (0.2512)	-5.8389 (0.0001)**	I(1)

*Note: ** and * means significance at 1% and 5% level respectively.*

An overview of Table 4 unveils that all the series only turned stationary after they have been differenced once. Thus, the order of integration of the variables are strictly at first difference, expressed as I(1). Our analysis will

advance to defining any form of cointegration that may exist concerning the variables in the respective models.

4.2 Cointegration Test

In the course of the variables being I(1), the right test for long-run connection concerning the variables is the ‘Johansen cointegration test’. Table 5 through Table 7 unveils the result of the test so conducted.

Table 5: Johansen cointegration test result for Model I

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None *	0.260142	31.14097	29.79707	0.0348
At most 1	0.136523	14.26837	15.49471	0.0759
At most 2*	0.102376	6.048214	3.841466	0.0139

Source: Researchers Computation (2022)

Result for Model 1 reports the existence of one cointegrating equation given that the level of significance in 5%. This is achieved since the Trace statistic is more than the critical value at $p < .05$. Such supports that cointegration exists, confirming that a long-run relationship exist concerning crop production and rural population growth.

Going to Model II, the result is obtainable in Table 6 where it is observed that there abound one cpintegrating equation.

Table 6: Johansen cointegration test result for Model II

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None *	0.269904	32.14601	29.79707	0.0263
At most 1	0.139841	14.52961	15.49471	0.0695
At most 2*	0.103108	6.093896	3.841466	0.0136

Source: Researchers Computation (2022)

Such existence of cointegration supported by the result adumbrated in Table 6 supports that a long-run link exist concerning livestock production and rural population growth.

Table 7 reflects on the same test in regards to Model III where one cointegrating equation is being reported.

Table 7: Johansen cointegration test result for Model III

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None *	0.343041	30.47371	29.79707	0.0417
At most 1	0.113911	6.946258	15.49471	0.5839
At most 2	0.003097	0.173713	3.841466	0.6768

Source: Researchers Computation (2022)

With the existence of the cointegrating equation, it is valid to state that a long-run rapport abounds concerning food production and rural population growth.

To detect the stability of the long-run cointegrating relationship, the Hansen instability test is utilised and Table 8 unveils the result.

Table 8: Hansen Instability test result

Model	Lc statistic	Stochastic Trends (m)	Deterministic Trend (k)	Excluded Trends (p2)	Probability
I	0.4980	2	0	0	0.0451**
II	0.5406	2	0	0	0.0359**
III	0.5030	2	0	0	0.0438**

*Note: ** means significance at 1% level.*

Source: Researchers Computation (2022)

With the aid of the 5% probabilities, the Hansen instability test result in Table 8 portrays that the Lc statistics for all the three models were significant ($P < .05$). This points to the refutation of the ‘null hypothesis’ that the long-run cointegrating estimates are instable.

4.3 Regression Estimates

The regression result so estimated is in accordance with the three models that were specified in the study. The results so obtained are unveiled in Table 9 through Table 11, where the sway of the dependent are observed as they affect crop, livestock, and general food production. The result so unveiled is based on the three approaches of estimation which are the OLS, Dynamic OLS, and the Fully Modified OLS.

Model I

Model I is estimated to bring to the fore, how rural population growth affects crop production. The result of the estimation is unveiled in Table 9.

Table 9: Regression result (Model 1)

Dependent Variable: Crop Production Index (CRP)			
Variables	OLS	DOLS	FMOLS
ALA	1.7907 (0.0000)**	1.6038 (0.0116)*	1.7243 (0.0030)**
RPG	-41.560 (0.0000)**	-49.2585 (0.0000)**	-48.4444 (0.0000)**
C	57.690 (0.0040)**	77.0585 (0.0248)*	71.8092 (0.0144)*
R-Squared	0.7878	0.8714	0.7778
Adjusted R-Squared	0.7801	0.8491	0.7695

*Note: ** and * means significance at 1% and 5% level respectively.*

Source: Researchers Computation (2022)

For Table 9 under the OLS approach where the dependent variable is crop production (CRP), rural population growth is captured to a negative sway on crop production which matches with our a priori expectation; with such influence being significant. The coefficient attracts a 41.560% decline in crop production given a 1% decline in rural population growth. In the same Table 9, arable land (ALA) put forth a significant influence on crop production, with the effect being positive. With arable land increasing by 1%, there is a likelihood that crop production will increase by 1.7907%. Holding ALA and RPG unchanged, the constant (C) portrays that crop production will be 57.69. It is also being unveiled here that the two variables accounts for 78.78% of the total changes in crop production, given the R-squared of 0.7878; and such will still be 78.01% if the degree of freedom is taken in cognizance.

In the DOLS estimates, the a priori sign are still the same with the OLS and the estimates are also significant in influencing crop production. If arable land increases by 1%, there is a likelihood that crop production will escalate by about 1.6038%; while if rural population growth upsurges by 1%, crop production plummets by 49.2585%. With ALA and RPG devoid if variations, crop production will attract a value of 77.06. The model defined 87.14% of the overall changes in crop production and remained at 84.91% is consideration is made for the degree of freedom.

In the FMOLS, similar outcome is observed where RPG yields a negative sway on CRP and ALA put forth a positive weight, all of which are

significant. As ALA surge by 1%, CRP escalates by 1.7243%; while as RPG intensifies by 1%, CRP plummets by about 48.4444%.

The CRP will be about 71.81 if ALA and RPG remain unchanged. The model also explains about 77.78% of the aggregate variations in CRP with such explanatory power remaining at 76.95% with due consideration of the degree of freedom.

Given the results from the three approaches, it is clear that the best model is the one being estimated by the DOLS where the coefficients are significant and the R-squared is also higher compared to the other two approaches.

Model II

Model II is estimated to bring to the fore, how rural population growth affects livestock production, with the result presented in Table 10.

Table 10: Regression result (Model I1)

Dependent Variable: Livestock Production Index (LPI)			
Variables	OLS	DOLS	FMOLS
ALA	0.6476 (0.1456)	0.3378 (0.6671)	0.5604 (0.4062)
RPG	-53.6197 (0.0000)**	-62.1842 (0.0000)**	-59.8215 (0.0000)**
C	122.5205 (0.0000)**	147.7054 (0.0011)**	136.0602 (0.0002)**
R-Squared	0.7186	0.8146	0.7187
Adjusted R-Squared	0.7083	0.7823	0.7083

Note: ** means significance at 1% level.

Source: Researchers Computation (2022)

With the result under the OLS, arable land put forth a positive wave on livestock production while rural population growth wielded a negative influence. The so identified influence of the variables is also significant in affecting the dependent variable. If arable land intensifies by 1%, the outcome will be that livestock production will gather a rising trend by 0.6476%; while if rural population growth surges by 1%, livestock production plummets by 53.6197%. The index of livestock production will be 122.52 assuming that ALA and RPG persist to be unchanging. The model is seen to explain 71.86% of the entire variations in livestock production, and it still stands at 70.83% given a case of giving consideration to the degree of freedom.

In the DOLS, ALA still wields a positive weight on LPI while RPG put forth a negative inspiration; with the effect of the two variables being significant. Livestock production is likely to increase by 0.3378% if a 1% increase in ALA is recorded; while the variable will experience a 62.1842% degeneration if RPG surges by 1%. Livestock production index will remain at 147.71 is ALA and RPG stays unchanged. The R-squared is an indication that ALA and RPG jointly account for 81.46% of the entire changes in livestock production, and it will be 78.23% if allocation is made for degree of freedom.

The FMOLS approach still offer a similar result where ALA put forth a positive influence which is significant, and RPG put forth a deleterious influence which is also significant. If ALA surges by 1%, there is a likelihood that LPI will escalate by about 0.5604%; while a 1% surge in RPG make LPI to plummet by 59.8215%. Livestock production will remain at 136.06 is both ALA and RPG remains unchanged. The ALA and RPG collectively account for 71.87% of the entire changes in livestock production, and the explanatory power retains its goodness of fit at 70.83% is allocation is given to the degree of freedom.

It is also glaring that the DOLS offers the best estimates as it holds a greater explanatory power as showcased in its higher R-squared when compared to other approaches. Thus, the estimate form the DOLS approach serves as our lead model.

Model III

Here, the overall food production in the economy is considered and the model traces how rural population growth and arable land influences it. Table 11 offers an eye view of the result so obtained from the estimation.

Table 11: Regression result (Model I1I)

Dependent Variable: Food Production Index (FPI)			
Variables	OLS	DOLS	FMOLS
ALA	1.6653 (0.0000)**	1.4648 (0.0215)*	1.5961 (0.0059)**
RPG	-42.9465 (0.0000)**	-50.7416 (0.0000)**	-49.7721 (0.0000)**
C	64.7797 (0.0014)**	84.7895 (0.0149)*	78.8818 (0.0078)**
R-Squared	0.7855	0.8702	0.7762
Adjusted R-Squared	0.7777	0.8477	0.7680

Note: **and * respectively means significance at 1% and 5% level.

Source: Researchers Computation (2022)

As the overall food production is being considered, similar result is observed where, under the OLS, arable land accounted for a positive sway while rural population growth wielded a negative inspiration on food production. A unit percent upsurge in ALA accounts for a 1.6653% escalation in total food production; while a 1% surge in RPG causes food production to plummet by 42.9464%. With arable land and rural population being kept unchanged, food production index attracts a value of 46.78. Both ALA and RPG is noted to account for 78.55% of the overall volatility in food production, and this remains at 77.77% is adjustment is given for degree of freedom.

In the DOLS approach, it is noticed that the effect of ALA was positive while that if RPG was negative, with both wielding a significant inspiration on food production. As ALA proliferates by 1%, FPI also surges by 1.4648%; while the proliferation of RPG causes FPI to plummet by 50.7416%. Food production index will be 84.79 if RPG and ALA is held constant; while the two variables altogether explains 87.02% of the overall discrepancies in food production.

With respect to the FMOLS similar trend is also being reported where the weight of ALA is positive and significant; while that of RPG is negative and significant. It emanates from the coefficient that if ALA surges by 1%, FPI will proliferate by 1.5961%; and if RPG surges by one percent, FPI shrinks by 49.7721%. The FPI will be 78.88 if both RPG and ALA are not allowed to vary; and RPG and ALA jointly account for 77.62% of the overall changes in food production.

Still one the lead model, the result offered by the DOLS offers a greater explanation of the changes in FPI by having a higher coefficient of multiple determination compared to the OLS and the FMOLS. Consequently, the result offered by the DOLS is being upheld.

4.5 Discussion of Findings

It is clear that two major findings are drawn from this study. First, that arable land put forth a positive and significant weight on food production and second, that rural population growth wielded a deleterious and significant influence on food production in Nigeria. Going by the first major findings, it is expedient that as more agricultural land is put under cultivation, the outcome will be rising agricultural output which stems to greater food production in Nigeria. As our data has indicated, arable land

(% of total land area) has been rising over the years and this translates to having greater quantity of food produced in the nation.

For the second major findings, it is no longer a new issue that agriculture is being practiced majorly by the rural dwellers in Nigeria. Consequently, a greater rural population without a declining marginal product of labour which can be achieved via mechanisation, agricultural activities can be boosted which in turns boost food production. The rural population in Nigeria has been characterised by greater rural-urban migration which has led to agriculture being abandoned by the agile youths who seeks greener pasture in the urban centres. Such migration and neglect of agriculture in the rural areas can be linked to the negative influence in which rural population growth put forth on food production in Nigeria.

The findings of this study are in line with the one reported by Oguntegbe et al. (2019) where they noticed that population growth wielded a negative weight on food production while arable land put forth a positive effect, which were significant in both cases. With declining rural population growth which implies increased urbanization, it is likely that the increased urbanization will reduce the size of agricultural land for non-agricultural purposes (See Satterthwaite, et al., 2010). The implications of this findings centre on the need to put more proportion of the arable land under cultivation, and the need to curb the rising rural-urban migration that has depleted rural labour supply in agriculture.

5 Conclusion and Recommendation

The Nigeria has been noted to be a nation characterised by rising urban population that is as a result of massive influx of people from the rural to the urban areas (Effiong, and Okijie, 2022). In this regards, there has been an outflow of rural labour that could amplify agricultural production which is a panacea for food production and sufficiency. The concern of this paper stems from this angle and this led to the examination of the influence of rural population growth on food production in Nigeria from 1961 through 2018. The methodology of the study follows the stationarity test, cointegration test, and ordinary least squares approach of diverse variant – OLS, DOLS, and FMOLS. Our models were segmented into three – first ascertaining the influence of rural population growth on crop production; second capturing the influence of rural population growth on livestock production; and the third reflecting on the influence of rural population growth on food production in general.

The test for stationarity executed with the aid of augmented unit root test gave us that our variables were all stationary at first difference, leading to the cointegration analysis. In line with the result of the Johansen cointegration test, it was unveiled that cointegration exists concerning the three models; and this was further upheld by the Hansen instability test. With the R-squared of the models being used in the selection of the lead model for OLS, DOLS, and FMOLS, it was realized that the DOLS served better as it recorded the highest R-squared in all cases and the coefficients were also significant. From the result, we noticed that rural population growth put forth a negative effect of crop production, livestock production, and food production in general; and the effect was significant. It was further observed that arable land put forth a desirable influence on crop production, livestock production, and crop production in general. Our model unveiled that both arable land and rural population growth collectively explicated 87.14%, 81.46%, and 84.77% of the whole variation in crop production, livestock production, and food production respectively.

The findings therefore raise concern on the capability of the rural communities to drive food sufficiency in nation as characterized by the continuous rural-urban drift. This calls for rural agricultural development driven by aggressive mechanization, plus ensuring rural development to curtail the menace of rural-urban migration that has spearheaded the deleterious influence of the rural population on food production. Driving agricultural revolution by harmonizing diverse rural agricultural policies and programmes will aid in facilitating rapid and substantial upsurge in food production within the country.

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ARTIFICIAL INTELLIGENCE COSTS AND CORPORATE PERFORMANCE OF DEPOSIT MONEY BANKS IN NIGERIA

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Abstract

This study is an empirical study of Artificial Intelligence Costs and Corporate Performance of Deposit Money Banks (DMBs) in Nigeria. Ex-post facto research design was adopted in the study. The population was made up of the twenty-five (25) DMBs in Nigeria and sample size of 14 was selected based on the criterion that only this number of banks were fully listed and actively traded with NSE from January 01, 2011 to the December 31, 2021; which means that their 2011 to 2021 annual reports are accessible. Purposively sampling technique was adopted in the study to select the fourteen (14) sampled banks. The data were analysed using descriptive and inferential statistics (multiple regression analysis). Results showed that Investment Costs in Artificial Intelligence Technologies – Robotic Technology (ATM costs being used as a proxy) has a significant negative influence on corporate performance (ROE); intelligent financial supporting systems (Hardware and software/intangibles assets costs) and Bank Network and Apps/POS costs both have positive significant influence on corporate performance (ROE). It was concluded in the study that artificial intelligence has significant joint positive influence on corporate performance (profitability, ROE). It was recommended in the study among others that, the deposit money banks in Nigeria should invest more on improved and more advanced artificial intelligence technologies such as POS, telebanking, internet banking, banking

apps, card data, smartcard/electronic purse and other electronic banking technologies that is void of incessant fraudulent activities, bank network failure, power challenge, security issues especially in some remote areas among others. Banks should stop investing more on ATMs because of the operational costs burden on the banks' profitability.

Keywords: Artificial Intelligence Costs (AIC), Corporate Performance, Robotic Technology, ATM, Intelligent Financial Supporting Systems, Bank Network and APPS/POS, E-banking.

1 Introduction

Artificial Intelligence (AI) in accounting and banking is one of the most importance benefits of science and technology in this 21st Century and the future as contributed by John McCarthy (1927 – 2011) popularly known as the Father of Artificial Intelligence. Artificial intelligence is considered the ability of a machine to imitate human actions like communication, decision-making, operations and handling of tasks among others. Some benefits of implanting Artificial Intelligence solutions, such as the possibility of obtaining more accurate results and time saving while processing a large amount of data are already known in different fields of activity. Artificial Intelligence in accounting solutions is not a new subject for researchers or a common practice for intellectual leading companies in technology but it is an interesting area of study recently due to its cost implications on the profitability, especially for their impact on the accounting and banking professions (Andriosopoulos *et al.*, 2019) and the post-COVID -19 lockdown of the entire world.

Dongre *et al.* (2020) opined that Artificial Intelligence plays greater roles in ordinary business activities in the areas of analysis and handling of documents in accounting and the uses of robotic technologies. Artificial intelligent automation is helpful in preparing payroll, bookkeeping, handling of daily routines, time savings, speed, reduces monotonous responsibilities, and increasing higher level of accuracy. The authors added that Artificial Intelligence technology will enhance several business accounting's processes to include procurement and purchasing, invoicing, purchase orders, expense reports, accounts payable and receivables among others. It can also improve fraud detection through more sophisticated machine learning model of normal activities and better prediction of fraudulent activities in the firm as well as reducing the operational costs and barriers of doing business and improves firms' performances.

Moreso, in the banking sector, artificial intelligence technologies can help to store banking data for a long time and easily access banking work, it can design Mc-excel in that way which supports accounting activities such as budgeting, preparing financial statements and routine reports, improve workplace communication with the help of them the organization personnel easily understand their work this will lead to increase productivity. To the health care sector, artificial intelligence can assist to maintain the records and accounts of every patient as well as helps to improve reliability, predictability, consistency of the pharmaceutical work.

Following the failure of businesses in the 2000's, about 60% to 94% of firms in US have embraced AI, especially, the banking sector and many more organizations have therefore directed towards the more application of science and technology such as Artificial Intelligence in their activities, accountancy profession is not in exception. Although the application of Artificial Intelligence in accounting and finance looks positive to the increasing of efficiency in organizations, it seems that the firms might ignore monitoring the costs and updates required for accounting intelligent systems to avoid any risk and uncertainty (Gotthardt *et al.*, 2019). Moreso, some firms and even industries may lack the understanding of how Artificial Intelligence techniques can improve corporate operations and what appropriate accounting system to decrease Artificial Intelligence operation risks. This raises some doubts about the usefulness of this technology and allows companies to have concerns about whether adopting AI is worth it or not (Nickerson, 2019). Thus, it can be argued that the existence of AI itself may change the workload of accountants and auditors and increase their efficiency and effectiveness as well as aids bankers in financial analyses and agencies (Solaimani *et al.*, 2020) while others opined of the high costs burden of AI costs on banks' profitability.

Recently, some firms used robotic technology having an intelligent machine to perform a complete task without the use of human assistance such as Automated Teller Machine (ATM), banking apps, Point of Sale (POS) among others in most banks, Aluminum Smelting Companies, Coal Mining Companies, drones for security firms and agents, industrial manipulator arm (unimate), supercomputer for predictions and budgeting, security robots such cobalt, self-driving cars, telepresence robots that allow one to be present at a place without actually going there, aquanaut, diving humanoid among others. Also, in today's business, Natural Language Processing (NLP) provides computers with the ability to understand and interpret human language, written or spoken. How difficult a task it is, one can tell by observation of AI that look at

things like humans, computer vision and security could analyze images. Nowadays, documents, videos, and images can be analyzed by AI as well. The pace of AI innovation is both exciting and costly. Some firms may not deploy these AI technologies, simply because, it is too costly to run it. But advocates of AI in accounting and finance believe that the gains from running them will in a long -run outweigh the costs of running them.

However, over the years, studies undertaken on AI in accounting and finance were aimed at examining what is the correct way to start Artificial Intelligence adoption in firms; Meservy *et al.* (1992) examined the application of artificial intelligence in accounting, tax and audit services using expert/decision support system, simulation model as artificial intelligence technologies. Some authors examined the importance, opportunities, risks challenges of artificial intelligence (such as Bizarro and Dorian, 2017; Dongre *et al.*, 2020; Stancu and Duțescu, 2021); other researchers such as Zhang *et al.* (2020) holistically reviewed of recent developments in AI, Big Data and Machine Learning, exploration of the evolution of accounting profession faced by various technological advancement, examination of inherent hurdles and opportunities of new technologies posed in front of accounting professionals and pedagogy using the machine and deep learning, artificial general intelligence, blockchain technology, robotic process automation, radio frequency identification (RFID), speech recognition - natural language processing, artificial neural networks as the artificial intelligence technologies.

Whereas some authors examined the relationship of Artificial Intelligence between artificial intelligence (AI) and corporate accounting operations (Solaimani *et al.*, 2020) and authors such as Odoh *et al.* (2018) examined impact of artificial intelligence in accounting (investment in AI being a proxy) on the performance of accounting operations among accounting firms. But of all the studies, none has holistically examined the influence of artificial intelligence and the corporate performance in relation to the various cost components involved in artificial intelligence in accounting and finance (intellectual technologies – robotic technology (such as ATM), intelligent financial supporting systems (such as Hardware and software/intangibles assets) as well as bank network and apps and the financial performance in terms of return on equity (ROE). Therefore, this study sought to examine this problem.

The main objective of the study is to examine Artificial Intelligence Costs and Corporate Performance of Deposit Money Banks in Nigeria. The specific objectives include, to:

- i. examine the influence of robotic technology (RT) costs on Corporate Performance of Deposit Money Banks in Nigeria in terms of return on equity (ROE).
- ii. evaluate intelligent financial supporting systems (IFSS) costs impact on Corporate Performance of Deposit Money Banks in Nigeria in terms of return on equity (ROE).
- iii. assess how bank network and apps as well as POS affect Corporate Performance of Deposit Money Banks in Nigeria in terms of return on equity (ROE).
- iv. determine the joint influence of Artificial Intelligence costs (Robotic technology, intelligent financial supporting systems as well as bank network and apps/POS) on Corporate Performance of Deposit Money Banks in Nigeria in terms of return on equity (ROE).

The following Null Hypotheses were framed in line with Specific Objectives of the study:

- H₀₁:** Robotic technology (RT) costs do not significantly influence Corporate Performance of Deposit Money Banks in Nigeria in terms of return on equity (ROE).
- H₀₂:** Intelligent financial supporting systems (IFSS) costs do not significantly impact Corporate Performance of Deposit Money Banks in Nigeria in terms of return on equity (ROE).
- H₀₃:** Bank network and apps costs do not significantly affect Corporate Performance of Deposit Money Banks in Nigeria return on equity (ROE).
- H₀₄:** There is no significant joint influence of Artificial Intelligence costs (Robotic technology, Intelligent financial supporting systems as well as bank network and apps) on Corporate Performance of Deposit Money Banks in Nigeria return on equity (ROE).

2 Review of Related Literature

In this Section, the related literature were reviewed in three viewpoints as; conceptual review, theoretical framework and empirical review of literature.

2.1 Conceptual Review

2.1.1 Artificial Intelligence

Artificial Intelligence is the ability of a digital computer or a robot technology

to do accounting and finance and other difficult tasks that are usually done by humans due to the fact that the tasks require human intelligence and discernment or intelligence beings. AI is term that describes technology mimicking human processing capabilities. Artificial intelligence costs involve the expenditure incurred or investment in the provision of Artificial Intelligence technologies. Intelligent financial supporting systems (IFSS) is also called financial technologies set up to ensure provisions of financial services to unbanked population. It involves the way technologies are used to make money changes hand in financial transactions such as online shopping, ticket purchases and payments for goods and services, internet banking, debit and credit cards banking through the use of bank's internet network (Oriobe & Akinyede, 2017).

Some common applications of Artificial Intelligence technologies in the banking sector include:

(i) Customer service/engagement (Chatbot): Chatbots deliver a very high return on investment (ROI) in cost savings, making them one of the most commonly used applications of AI across industries. Chatbots can effectively tackle most commonly accessed tasks, such as balance inquiry, accessing mini statements, fund transfers, etc. This helps reduce the load from other channels such as contact or enquiry centres, internet banking among others.

Chatbots, facial recognition, and natural language processing (NLP) make banking apps easier to use, improving customers satisfaction. AI in banking can help automate and improve customer-facing operations. the Chatbot can answer financial questions, help customers make payments and assist more users without needing more staff. This will serve their clients at any time despite potential worker shortages. This improved accessibility helps banks provide higher customer satisfaction and generate loyalty.

(ii) Robo Advice: Automated advice is one of the most controversial topics in the financial services space. A robo-advisor attempts to understand a customer's financial health by analyzing data shared by them, as well as their financial history. Based on this analysis and goals set by the client, the robo-advisor will be able to give appropriate investment recommendations in a particular product class, even as specific as a specific product or equity.

(iii) General Purpose/Predictive Analytics: One of Artificial Intelligence's most common use cases includes general-purpose semantic and natural

language applications and broadly applied predictive analytics. Artificial Intelligence can detect specific patterns and correlations in the data, which legacy technology could not previously detect. These patterns could indicate untapped sales opportunities, cross-sell opportunities, or even metrics around operational data, leading to a direct revenue impact.

(iv) Cybersecurity: Artificial Intelligence (AI) can significantly improve the effectiveness of cybersecurity systems by leveraging data from previous threats and learning the patterns and indicators that might seem unrelated to predict and prevent attacks. In addition to preventing external threats, AI can also monitor internal threats or breaches and suggest corrective actions, resulting in the prevention of data theft or abuse.

(v) Credit Scoring/Direct Lending: Artificial Intelligence (AI) is instrumental in helping alternate lenders determine the creditworthiness of clients by analyzing data from a wide range of traditional and non-traditional data sources. This helps lenders develop innovative lending systems backed by a robust credit scoring model, even for those individuals or entities with limited credit history. AI covers a wide range of technologies, including machine translation, chatbots and self-learning algorithms, all of which can allow individuals to better understand their environment and act accordingly. Organizations have been adopting AI technological innovations with a view to adapting to or disrupting their ecosystem while developing and optimizing their strategic and competitive advantages (Wamba-Taguimdje *et al.*, 2020).

2.1.2 Corporate Performance

Corporate performance as relates to accounting and finance involves to the level of success or failure in terms of financial performance indices. According to Mutende *et al.* (2017), financial performance refers to a firm's ability to achieve planned financial results as measured against its intended resources. The concept of banks' financial performance has to do with the level of success or failure of a bank in monetary terms. Generally, the common financial indices and ratios used in measuring banks' financial performance are revenue growth, return on equity, return on assets, profit margin, sales growth, capital adequacy, liquidity ratio, return on deposits (ROD), net interest margin (NIM), profit expense ratio (PER) and stock prices. Banks' performance is mostly evaluated in terms of profitability since it measures the efficiency of the managers and the firms' returns/profit for their investors. Profitability ratios or measures therefore provide an insight to the degree of success in achieving this primary objective (Idekulim, 2014). The most common profitability measures or ratios

are return on capital employed (ROCE), gross profit margin, net profit margin, return on equity (ROE) and return on assets (ROA).

In summary, ROCE measures the overall returns from all investments. Gross profit margin measures the proportion or percentage of sales revenue earned as profit after deducting cost of sales only, whereas net profit margin measures the proportion or percentage of sales revenue earned as profit after deducting all expenses except interest and tax. The operational performance of a business should be considered from the perspective of net profit and not gross profit margin. Return on equity (ROE) indicates the extent of profit on equity shareholding investment based on profit, while return on assets (ROA) is the extent of profit earned on every N1 invested on or utilised of total assets. ROA is sometimes called return on total assets. ROA is a measure of firms' performance that takes into consideration total assets or all capitals in the generation of the firms' profitability or returns. ROE is considered and used in this study because banks are financed by shareholders' funds/equity. Previous researches like those of Ifrueze *et al.* (2014) as well as Talan *et al.* (2017) have claimed that the profitability of firms could be affected the level of investment in infrastructures. Profitability is the financial matrix that indicates firms' ability to make enough incomes to cover its expenditures and operational costs during the operational period. The ability to make sufficient profit is the primary objective of every business, therefore, providing an insight to the level of performance. In other words, this is a company's capability of generating profits from its operations. Odoh *et al.* (2018) found that profitable firms in Nigeria are due to efficient investment on artificial intelligence (AI) and that the investment in artificial intelligence have significant impact on the return of equity of banks.

Evaluation of financial performance of banks entails x-raying the position of the banks by their profitability and efficiency. The profitability is the main index of a firm's performance. Banks have a peculiar type of financial indicators and therefore, the rate of profitability is very important to their performance. The performance can be divided into two elements: profitability and efficiency, which are interrelated in one way or another (Tahir, 1999). Thus, studies of profitability and efficiency of banks are important indices which contribute to the improvement of the banks' performance, the evaluation of banks' operations and the determination of management planning. Also, research on banks' performance is important for the improvement of the economy due to the fact that banks contribute to economic growth.

Given that the fundamental objective of a firm's business activity is that of generating profit for shareholders and other stakeholders, ROE best suits this purpose and is relevant in assessing performance. It reveals the rate of profit earned from an investment by shareholders and related investors (Epps and Cereola, 2008). It is a measure of the capacity of investment by shareholders to yield revenue in excess of what has been invested. Return on equity (ROE) usage as the dependent variable in this study is because it determines the extent of efficiency of the banks' management in using shareholders' investments. It indicates profit for the year obtained from operations in relation with equity contributed by shareholders. It is computed as:

ROE = Profit for the year / Total Equity.

2.1.3 Artificial Intelligence (AI) Impact on Firms Performance

Artificial Intelligence (AI) saves time and money by automating and optimizing routine processes and tasks. It increases productivity and operational efficiencies, make faster business decisions based on outputs from cognitive technologies. Artificial Intelligence (AI) allows managers to consider AI not as a single technology but as a set/combination of several different configurations of IT in the various company's business areas because multiple key elements must be brought together to ensure the success of AI: data, talent mix, domain knowledge, key decisions, external partnerships, and scalable infrastructure. IA also improves business processes such as meetings, enhancing sales and marketing, customer service, product development processes, automating content generation, the manufacturing process and refining recruitment. IA can help address regulatory compliance, manage risks and detect fraud.

The aim of the study is to provide empirical evidence regarding Artificial Intelligence (AI) costs implication on the financial performance of listed deposit money banks in Nigeria. This association is demonstrated in the conceptual model specified in Figure 1.

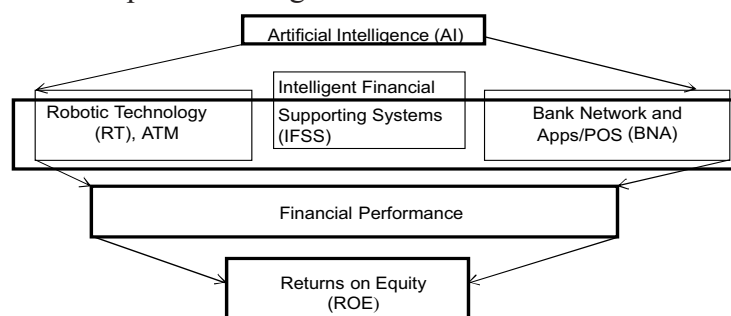


Figure 1: Conceptual Framework, Developed by Researchers (2022)

2.2 Theoretical Framework

Contingency Theory: This theory was propounded by Fred Edward Fiedler in 1964. A contingency theory is an organisational theory that states that there is no best way to organize a corporation, a company, or to make decision than effective and efficient management and investment in its resources. This theory provides a realistic view of management and organisation of the deposit money banks DMBs in Nigeria. contingency theory is beneficial to DMBs because of the potential for learning from specific situations and using these lessons to influence future management of the same or similar situations. The ability to adapt external pressures and changes is also an advantage. The theory will help the managers to react quickly to the changes and resolving problems, it also gives them significant discretion in their decision-making and profit-orientation.

2.3 Empirical Review

Agarwall *et al.* (2021) examined Artificial Intelligence (AI) as the digital technology that must be brought together to facilitate enhanced performance of business organizations. The study aims at a pilot study to assess the influence of AI on the operating performance of the companies and thereby fills the gap in the existing literature. This paper aims at establishing the relationship and exploring the influence of artificial Intelligence on operational performance of companies in different sectors in India. An attempt has been made to assess the difference in operational performance in pre and post AI era. In the study, the artificial Intelligence is measured by the variables such as computer hardware and intangibles (computer software etc.). The operating profit and operating cost have been taken as the proxy variables for operational performance of companies. The study was based on secondary data which has been collected from annual reports of sample companies. The sample companies under study comprise of manufacturing, telecommunication, and IT companies for the time period from the year 2004 to 2018. The statistical software including Ms. Excel and EViews 10 have been used to run the t-test and panel regression model for statistical inferences. The study found that artificial Intelligence has a significant influence on companies operating cost as well as operating profit.

Odoh *et al.* (2018) examined the effect of artificial intelligence on the performance of accounting operations among accounting firms in South East Nigeria. Descriptive research design was adopted in the study among 185

accountants and managers in accounting firms in Anambra and Enugu State. Structured questionnaire was used to obtain the information needed for the study. Data collected were presented in table. The study hypotheses were tested using linear regression at 5% level of significance. The result of the study showed that Expert system ($r = 0.904$; $F = 608.447$; $p = 0.000$) and Intelligent agent ($r = 0.754$; $F = 178.810$; $p = 0.000$); has a significant effect on the performance of accounting function of accounting firms in South East Nigeria. It was concluded that, the application of artificial intelligence positively influences the performance of accounting functions. The researchers recommended that accountants and accounting firms should continually improve their knowledge regarding artificial intelligence as this will enhance the performance of accounting functions, thereby eliminating certain accounting cost.

Wamba-Taguimdje *et al.* (2020) investigated the influence of Artificial Intelligence (AI) on firm performance, notably by building on the business value of AI-based transformation projects. The research process deployed included responding to the research question, making discussions, interpretations and comparisons, and formulating recommendations. It was based on a review of 500 case studies from IBM, AWS, Cloudera, Nvidia, Conversica, Universal Robots websites among others. Studying the influence of AI on the performance of organizations, and more specifically of the business value of such organizations' AI-enabled transformation projects, required us to make an archival data analysis following the three steps, namely the conceptual phase, the refinement and development phase, and the assessment phase. The results of our study have highlighted such AI benefits in organizations, and more specifically its ability to improve on performance at both the organizational (financial, marketing and administrative) and process levels. Through working on the AI attributes, organizations can therefore enhance the business value of their transformed projects. The same results also showed that organizations achieve performance through AI capabilities only when they use their features/technologies to reconfigure their processes.

3 Methodology

Ex-post facto research design was used in the study. It is also referred to as causal-comparative design. The design was considered best for the study as it allows for the use of existing data as well as not permitted the control and

manipulate of variables since the subjects were selected on the basis of naturally occurring characteristics. The study's population was made up of the twenty-five (25) deposit money (consolidated) banks. The selection of this population was due to the fact they were listed and actively traded as at January 01, 2011 to December 31, 2021 and the sector deployed the highest number of artificial intelligence technologies for value and wealth creation during the booming of the universal banking. The DMBs were also noted for laying-off members of staff who the management felt were not adding value to the bottom line in order to reduce costs and also because of the deployment of artificial intelligence (AI). The list of the Deposit Money Banks in Nigeria as at January 01, 2011 - December 31, 2021 is showed in Table 1.

Table 1: List of Deposit Money Banks in Nigeria As At Jan. 01, 2011 - Dec. 31, 2021

S/N	BANK @ January 01, 2011	BANK @ December, 2021	REMARK/CRITERIA	SAMPLE
1.	Access Bank	Access Bank	Stock Actively traded on NSE	Qualify
2.	AfriBank	Main Stream Bank	Stock NOT Actively traded	NOT Qualify
3.	Diamond Bank	Diamond Bank	Stock Actively traded on NSE	Qualify
4.	EcoBank	EcoBank	Stock Actively traded on NSE	Qualify
5	Equatorial Trust Bank	Sterling Bank acquired	Stock NOT Actively traded	NOT Qualify
6.	First City Monument Bank (FCMB)	Merged with FINBANK	Stock Actively traded on NSE	Qualify
7.	Fidelity Bank	Fidelity Bank	Stock Actively traded on NSE	Qualify
8.	First Bank Plc	First Bank Plc	Stock Actively traded on NSE	Qualify
9.	First Inland Bank	Merged with FCMB	Stock NOT Actively traded	NOT Qualify
10.	Guaranty Trust Bank (GTB)	Guaranty Trust Bank (GTB)	Stock Actively traded on NSE	Qualify

11.	IBTC-Chartered Bank	IBTC-Bank	Stanbic	Stock traded	NOT	Actively	NOT Qualify
12.	Intercontinental Bank	Intercontinental Bank		Stock traded	NOT	Actively	NOT Qualify
13.	Nigeria International Bank	Nigeria International Bank		Stock traded	NOT	Actively	NOT Qualify
14.	Oceanic Bank	Acquired by EcoBank		Stock traded	NOT	Actively	NOT Qualify
15.	Key Stone Bank	Former Platinum Bank (Nationalized)		Stock traded	NOT	Actively	NOT Qualify
16.	Polaris Bank	Former Skye Bank		Stock on NSE	Actively	traded	NOT Qualify
17.	Heritage Bank	Former Spring Bank		Stock traded	NOT	Actively	NOT Qualify
18.	Stanbic Bank	Now IBTC-Stanbic Bank		Stock traded	NOT	Actively	NOT Qualify
19.	Standard Chartered Bank	Standard Chartered Bank		Stock traded	NOT	Actively	NOT Qualify
20.	United Bank Africa	United Bank of Africa		Stock on NSE	Actively	traded	Qualify
21.	Sterling Bank	Sterling Bank		Stock on NSE	Actively	traded	Qualify
22.	Union Bank	Union Bank		Stock on NSE	Actively	traded	Qualify
23.	Unity Bank	Unity Bank		Stock on NSE	Actively	traded	Qualify
24.	Wema Bank	Wema Bank		Stock on NSE	Actively	traded	Qualify
25.	Zenith Bank	Zenith Bank		Stock on NSE	Actively	traded	Qualify

From the total population of the study of twenty-five (25), the number that meet the specification and requirement for the study was fourteen (14) banks. This is due to the fact that only these fourteen (14) banks were fully listed and actively

traded with NSE beginning from 2011 to the ending of December 2021; which means that their 2011 to 2021 annual reports are accessible. Purposively sampling technique was adopted in the study. Purposive sampling technique was applied in the research to select the fourteen (14) sampled banks. This technique was used on the basis of the easiness with which the data can be collected from the banks' websites and data banks and having met the criteria of actively traded listed banks. The period from 2011 to 2021 was used based on the fact that the prior years of the sampled banks, some financial and non-financial information were not available due to non-trading of active stocks or delisting by NSE. Secondary sources of data were used and consisted of the annual reports and accounts of the selected listed banks and formed the main sources of data used in this study. Specifically, data were sourced from directors' reports, Financial Reporting Council of Nigeria (FRCN), Central Bank of Nigeria (CBN) Bullion/Reports, NSE financial statements and Fact book and compliance reports.

In order to test the research hypotheses, multiple regression models (functional form, econometrical form and conceptual model equation) were used:

$FP_{it} = f(AI_{it})$ - - - - - Functional Relationship Equation

$Y_{it} = \alpha_0 + \alpha_1 X_{1it} + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \alpha_4 X_{4it} + \varepsilon_{it}$ - - - Econometric Equation

$ROE_{it} = \alpha_0 + \alpha_1 \text{LogRT}_{it} + \alpha_2 \text{LogIFSS}_{it} + \alpha_3 \text{LogBNA}_{it} + \varepsilon_{it}$ -Conceptual Model Equation

Where; AI = Artificial Intelligence costs

ROE = Returns on Equity

RT (X_1) = Robotic Technology (RT) [ATM costs being a proxy]

IFSS (X_2) = Intelligent financial supporting systems (IFSS) [Hardware and software/intangible assets costs being a proxy]

BNA (X_3) = Bank network and apps costs as well as POS.

ε = Error Term

4 DATA ANALYSIS AND RESULTS

Table 2: Level of Investment in RT, IFSS, BNA and ROE in the Selected DMBs

S/N	DMBs	n	RT		IFSS		BNA		ROE	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	Access	11	21.44	12.18	0.44	0.24	1.19	0.59	0.12	0.04
2	Diamond	11	18.23	6.44	0.49	0.24	0.64	0.24	0.06	0.10
3	Eco bank	11	20.58	10.19	0.35	0.20	0.41	0.22	2.13	0.98
4	FCMB	11	16.80	4.67	0.61	0.34	0.05	0.03	0.05	0.06
5	Fidelity	11	17.81	6.35	0.43	0.14	0.42	0.21	0.04	0.04
6	First	11	62.75	26.12	2.42	1.11	0.30	0.16	0.09	0.06
7	GTB	11	18.83	3.13	0.67	0.12	0.93	0.90	0.24	0.06
8	Skye	11	14.55	2.69	0.66	0.45	0.34	0.18	0.17	14.46
9	Sterling	11	8.64	2.72	0.76	0.42	0.36	0.35	0.08	0.18
10	UBA	11	34.22	7.85	1.40	0.33	0.80	0.44	0.12	0.10
11	Union	11	28.46	2.37	1.14	0.54	0.49	0.48	-0.19	0.49
12	Unity	11	14.14	4.03	0.57	0.24	0.15	0.11	0.49	2.43
13	Wema	11	6.94	1.55	0.62	0.13	0.38	0.26	-0.49	1.41
14	Zenith	11	44.20	11.41	2.65	0.50	1.74	1.21	3.59	0.06

RT – Robotic Technology, IFSS - Intelligent Financial Supporting Systems, BNA - Bank Network and Apps Costs, ROE- Return on Equity. Note: RT, IFSS and BNA are in millions.

Result in Table 2 presents the level of RT, IFSS, BNA and ROE of the selected 14 Deposit Money banks. Based on the mean values, First Bank Plc reported the highest mean values of RT (62.75 million), IFSS (2.65 million), Zenith bank reported the highest BNA (1.74 million) and the highest in ROE (3.59). Result also shows that the least investments by the banks and the profitability level in terms of RT, IFSS, BNA and ROE were reported by Wema bank (6.94 million), Ecobank (0.35 million), Wema bank (0.08 million) and Wema bank (-0.49) respectively.

Table 3: Regression summary showing the influence of AI costs on Profitability of listed DMBs in Nigeria

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.799	0.658	0.641	0.1797525	1.97622

Source: Authors' Computation (2022) using SPSS Version 20.0

Table 3 is the presentation of the summary result of the influence of Artificial Intelligence (AI) costs on profitability of listed deposit money banks in Nigeria. Results show R-Square (R^2) of 0.658, which means that 65.8% of the variation in the profitability (ROE) of listed deposit money banks was accounted for by investment in Artificial Intelligence (AI) as measured by RT, IFSS and BNA. To examine whether there is presence of autocorrelation, the Durbin Watson test was used and the result yielded Durbin Watson statistic of 1.97622 was obtained which is greater than 1 and less than 3.00 meaning that there is no evidence of autocorrelation. Result of Analysis of Variance (ANOVA) showing whether there is a regression variability between the dependent variable (profitability as measured by ROE) and Artificial Intelligence (RT, IFSS and BNA) is presented in Table 4.

Table 4: ANOVA result summary of ROE, RT, IFSS and BNA of the selected listed deposit money banks in Nigeria

Model	Sum of Squares	df	Mean Square	F-calc.	F-crit.	p-value
1 Regression	841.285	4	210.321	20.802	2.43	0.001
Residual	1506.513	149	10.111			
Total	2347.798	153				

Source: Researchers' Computation (2022) using SPSS Version 20.0

From the ANOVA result presented in Table 4, the F-calculated of 20.802 was obtained with F-critical of 2.43 with p-value of 0.001. The F-calculated is greater than the critical F-value which means that the independent variables (RT, IFSS and BNA) are the Artificial Intelligence significantly responsible for the variation responsible for the variation in the dependent variable (ROE). This result also signifies that the regression model of ROE with RT, IFSS and BNA (AI) costs was statistically adequate to jointly predict the ROE (corporate performance).

Table 5: Coefficients of the regression ROE with RT, IFSS and BNA of Listed DMBs in Nigeria

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t-calc.	p-value	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
(Constant)	0.519	6.593		0.079	0.937		
1 RT	-2.496	0.938	-0.181	-2.661	0.009*	0.929	1.077
IFSS	1.499	0.353	0.333	4.244	0.000*	0.699	1.430
BNA	1.068	0.355	0.256	3.009	0.003*	0.596	1.679

Source: Researchers' Computation (2022) using SPSS Version 20.0

In Table 5, the regression coefficients for the model parameters were computed showing the influence of Artificial Intelligence costs on profitability (ROE) of listed deposit money banks in Nigeria. The result shows that as Robotic Technology (ATM) costs ($\beta = -0.181$, Std Error = 0.938, t-calc = -2.661 and p-value = 0.009) has a negative significant influence on profitability (ROE). This means that as RT increases, ROE decreases and vice versa. But IFSS costs ($\beta = 0.333$, Std Error = 0.353, t-calc = 4.244 and p-value = 0.000) and BNA Costs ($\beta = 0.256$, Std Error = 0.355, t-calc = 3.009, and p-value = 0.003) all have positive significant influences on profitability (ROE). This implies that as IFSS and BNA increase, ROE increases and vice versa. The result also reveals standardised beta coefficient of -0.181, for RT, which implies that if other variables are held constant, for every N1 increase in Robotic Technology (ATM) costs, the profitability (ROE) of the listed DMB in Nigeria will decrease by N0.181. It was also found that the standardised beta coefficient of 0.333 for IFSS and 0.256 for Bank network and apps (BNA). These imply that if other variables are held constant, for every N1 increase in IFSS and BNA, the profitability (ROE) of the listed DMB in Nigeria will increase by N0.333 and N0.256 respectively. The result also reveals tolerance of 0.929, 0.699 and 0.596 for RT, IFSS and BNA and Variance Inflation Factor (VIF) of 1.077, 1.430 and 1.679 respectively as a check for the possible presence of multicollinearity. The tolerances were all greater than 0.1 while VIFs were all less than 10 indicating that there is no evidence of multicollinearity.

In summary, the predicted model is:

$$ROE_{it} = 0.519 - 2.496RT + 1.499IFSS + 1.068BNA + \epsilon_{it}$$

From the regression results, for Hypothesis One (Ho1), on ROE, the value of t-calculated (2.661) is greater than its t-critical (1.98) and the p-value of 0.009 is

less than 0.05. Hence, the Null Hypothesis One is rejected, which means that there is a significant influence of RT (ATM) on ROE. For Hypothesis Two (Ho2), on IFSS, the values of t-calculated of 4.244 with p-value of 0.000 and t-critical of 2.00 were obtained. The t-calculated is greater than its corresponding t-critical (1.98) and p-value is less than 0.05. The Null Hypothesis is rejected. Therefore, there is a significant influence of IFSS on ROE. For Hypothesis Three (Ho3), on BNA, the t-calculated was 3.009 is greater than the t-critical of 2.00 and p-value is less than 0.05 ($0.003 < 0.05$). The Null Hypothesis is rejected. Therefore, there is a significant influence of BNA on ROE.

Discussion of the Findings

Hypothesis One was tested and the result from the regression analysis showed that Robotic Technology (measured by ATM costs) has a significant negative influence on corporate performance (ROE). This is confirmed as the p-value (0.009) for the influence of RT on ROE is less than 0.05 level of significance. The t-calculated of -0.181 indicated that Robotic Technology (ATM) has negative significant influence on corporate performance (ROE). The result obtained collaborates with the view of Jegede (2014). The author opined that, the deployment of ATMs terminals has averagely negative effect on the performance of Nigerian banks because of the alarming rate of ATM fraud and unreliable of bank network. In summary, it means that, the more the firms' investment in RT (ATM), the lesser the corporate profitability in terms of Returns on Equity (ROE). This could be so due to incessant fraudulent activities, unreliable of bank network, power challenge, security issues especially in some remote areas, increasing agency banking such as Point of Sale (POS) among others.

Hypothesis Two was tested and the result showed that there is a significant positive influence of intelligent financial supporting systems (IFSS) on corporate performance (ROE). This is confirmed as the p-value (0.000) for the influence of IFSS on ROE is less than 0.05 level of significance. The t-calculated of 0.333 indicated that intelligent financial supporting systems (Hardware and software/intangibles assets) have positive significant influence on corporate performance (ROE). This result is in support of the study of Agarwall *et al.* (2021). This is so due to its assistant in banking operations - online as well as offline operations as well as in and outside the banking hall.

Hypothesis Three was tested. The result of the empirical analysis also showed that Bank Network and Apps (electronic banking have significant positive influence on corporate performance (ROE). This result is in support of the study of Tunay, *et al.* (2018) that found that electronic banking technologies influence various performance indices of the bank.

Hypothesis Four was tested. The result of the empirical analysis also showed that Artificial Intelligence (proxied by robotic technology costs, intelligent financial supporting systems costs as well as bank network and apps costs) has significant positive influence on corporate performance (ROE). This is confirmed as the p-calculated (0.000) for the aggregate influence of AI Costs on ROE is less than 0.05 level of significance. This is confirmed as F-calculated of 20.802 is greater than F-critical of 2.43, meaning that, there is significant positive joint influence of Artificial Intelligence on Returns on Equity of the deposit money banks in Nigeria. This agreed with the views of Odoh *et al.* (2018) that found that Artificial Intelligence has significant positive influence on profitability.

5 Conclusion and Recommendations

The study aimed at examining the Artificial Intelligence Costs – Robotic technologies (ATM costs), intelligent financial supporting systems costs and bank network and apps/POS costs on Corporate Performance (proxied by profitability, ROE) of Deposit Money Banks in Nigeria from 2011 to 2021. A composite regression model was used to analyse the data for the study and results revealed that:

- i. Robotic Technology (measured by ATM costs) has a significant negative influence on corporate performance (ROE);
- ii. Intelligent financial supporting systems (proxied by Hardware and software/intangibles assets costs) have positive significant influence on corporate performance (ROE).
- iii. Bank Network and Apps/POS (e-banking) have significant positive influence on corporate performance (ROE).
- iv. Artificial Intelligence Costs (proxied by Robotic technology costs, Intelligent financial supporting systems costs as well as bank network and apps as well as POS costs) have significant joint positive influence on corporate performance (ROE).

Based on the findings of the study, it was concluded that investment in

Artificial Intelligence in the deposit money banks (proxied by Robotic technology costs, Intelligent financial supporting systems costs as well as bank network and apps/POS costs) has significant joint positive influence on corporate performance (profitability, ROE). Thus, Artificial Intelligence technologies – ATMs, Intelligent financial supporting systems (Hardware and software/intangibles assets) electronic banking apps as well as POS are predicted to be the key determinants of improved corporate performance in deposit money banks in Nigeria.

On the basis of the conclusion, the following recommendations are made;

- i. The deposit money banks should invest more on improved and digital artificial intelligence technologies such as POS, telebanking, internet banking, banking apps, card data/ smartcard/electronic purse and other electronic banking technologies that is void of incessant fraudulent activities, unreliable of bank network, power challenge, security issues especially in some remote areas among others. Banks should stop investing more on ATMs because of the operational costs burden on the banks' profitability.
- ii. Banks should strive to increase their security apparatus to subvert the tricks of web scammers, limit the amount which customers may be allowed to withdraw at a time and alerts given on every transaction as well as encouraging customers more on e-banking/ banking apps. More awareness should be created to customers and bank clients.
- iii. Deposit money banks in Nigeria should invest more on agencies banking apparatus especially in the remote areas and bullet proof vans and stringent security should be used for every cash collection and mob-up outside the banking premises.

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THE ROLE OF FORENSIC AUDITORS IN FACILITATING A SUSTAINABLE ACCOUNTABILITY FUTURE: A THEORETICAL PERSPECTIVE

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Abstract

The prominent issue militating against institutions and organizations in Nigeria is fraud. This has led to high rate of financial wastage which is highly inimical to the survival of the institutions. To curtail this trend and improve the financial workings of Nigerian institutions for sustainable future require routine forensic engagements, thus the active role of forensic auditors. The achievability of this target requires forensic auditors that are proactive in streamlining the efficiency in planning, Acting, doing and checking processes. In other words, achieving financial sustainability must be based on the PADC model of resource recovery which entails Plan, Act, Do and Check processes. Therefore, optimization of forensic auditing considers: availability and accessibility to detail information: comprehensibility in the presentation of details and facts: and independency in the gathering and compilations of details. Others are credibility in the analytical steps taken to arrive at a presentable conclusion and thoroughness in the process of the investigation and reporting. Based on these analytical perspectives, it is recommended that Forensic auditors should acquire the tactics of exploring social networking as a potent tool for information gathering necessary for opportunity identification; planned and systematic research. Also, the procedure of selecting forensic auditors should be handled by institutional independent, unit that is not directly involved in institution's financial implementation programmes.

Keywords: Forensic Auditing, Sustainable Future, Forensic Auditors Efficiency, Forensic Roles

1 Introduction

One of the clearing issues in the 21st century society is the increasing level of wastage in every facet of its workings. In other words, it may not be an

exaggeration to state that the extent of utilization of resources recently is inimical to the survival of the society organization. To say that this has transcended to the mismanagement of financial resources is to say the least. Issues abound in Nigeria related to wanton waste of resources meant for localized and generalized development of the nation. These have proportionately led to corporate scandals, corporate collapses and business failures thus eroding investors and public confidence in business activities. Sadly, these issues are not limited to government but spanned to corporate individual organizations/institutions. This bring to the fore the contentious question does the level of resource management in Nigeria has the capacity to sustain the future development?

Fundamentally, utilization of financial resources in any society could be said to be effectively and efficiently managed when it can promote healthy society, balanced with infrastructural and human capital development that can sustain not only the immediate needs but assist in serving as springboard for the outright development of the future. In other words, financial management must provide a template future sustainability. This underscores the importance of forensic auditors in the management of institutions/organization's financial performance for sustainable future. However, the cases in Nigerian institutions are different as could be seen in incessant corruption and embezzlement of funds, mismanagement of financial resources as well as unacceptable heightened financial malpractices. Hence, motivating the contemplation of the study to analytically assess and recommend measures to promote the roles of forensic auditors in facilitating a sustainable future.

2 Finance Resources Transformation for Sustainable Future

Financial transformation is one of the remarkable problems of most developing nations. This has severally led to government/corporate individuals' failure, bankruptcy, and poor implementation of projects and programmes as could be seen in folding of Nigerian banks and industries. However, to curtail the incessant financial failure, government/corporate institutions must ensure sustainability of its financial management system (Carmeli, Yitzhak and Vinerski 2008).

The concept of sustainability in financial management system entails adopting viable strategies and activities that meet the needs of the institutions as well as stakeholders today, while protecting, sustaining and enhancing the human, physical and natural resources that will be needed in the future. Dollery, Crase and Grant (2011) considered it as the ability to generate enough revenue to

meet expenses and to continue providing services at levels and quality require by the citizens. Basing from the positions of Dollery *et al.* (2011), it could be deductive to state that achieving a viable financial sustainability that can transform the existing/available resources for immediate and future accountability requires:

- i. Institutions/organizations to routinely measure the sustainability of their current behaviour as well as the direction to which they are moving toward (Gray and Wiedernan, 1999).
- ii. Identification of the size of changes requires to meets the set goals.
- iii. Effective selection of steps.
- iv. Collaboration with units' stakeholders.
- v. Efficient evaluation of the steps and processes.
- vi. Operation efficiency, enhancement in people and community commitments while minimizing the need to rely on scarce resources (Porter & Kramer, 2006).

Honadle (2003) posited that maintaining government/corporate institutions financial sustainability requires regular assessment process and cogent steps to address early warning of financial trouble. In other words, achieving financial sustainability must be based on the PADC model of resource recovery which entails Plan, Act, Do and Check processes. Plan aspect of the model can be conceptualized as surveying and assessing the entire steps and stages of goals involving financial expenditure. This streamlines the efficiency of each stage to ensure the attainment of goals. "Act" on the other hand refers to the process of reviewing the entire process to assess the strength and weakness as well as current and future needs as required to be implemented with the available financial resources. This step/process brings to the fore the areas of importance of the institution and the area that require urgent attention for the implementation of organizational goals.

In the same vein, the "Do" process refers to building institutions operational system that can handle processes/activities and ensure effectiveness and efficiency. In essence, "Do" process entails building effective internal control mechanisms that can check each stages of the process undertaken by institution financially. Meanwhile, the "Check" aspect of the model connotes routing auditing of the institution's performance which is the most vital part of the model as every institution established has target of ensuring achievement of a programmed performance. This underscores the importance of forensic auditing in institution's financial sustainability.

3 Theoretical Assessment of Forensic Auditing Optimization

The 21st century institutional porosity has brought the urgent need of routing coordination of forensic auditing if cases of bankruptcy and huge financial losses must be avoided. Forensic auditing as stated by Eyisi and Ezuwore (2014) involves fact finding process that allows the examination of knowing whether an event has actually taken place, the place, amount involve, collection of evidence, computation of the asset involve and above all, initiation of court proceedings. This connotes forensic auditing as the scientific checking of the daily process and engagements entered into by institution in a bit to attaining target as may be required for investigation, confirmation and or recommendation in the court of jurisprudence. Put differently, Institute for Forensic Auditors explains the forensic auditing to include activities of gathering, verifying, processing, analyzing of and reporting on data in order to obtain facts and or evidence in a predefined context in the area of legal financial disputes and or regulation (including fraud) and giving preventative advice (IFA, 2014). In other words, forensic auditing entails searching for fact and figures on the processes undertaken by human resource factor of an institution to cross-check the evidence of implementation of organizational/institution's target goals.

Highlighting on the objectives of forensic auditing, Eyisi and Abgaeze (2014) opined that its include

- i. improving management accountability;
- ii. improving corporate governance and the statutory audit function;
- iii. improving financial reporting system;
- iv. helping in detecting financial fraud;
- v. helping in strengthening auditors' independence;
- vi. providing additional assurance for audit committees;
- vii. assisting financial statement auditors to take greater responsibility for the detection of fraud and illegal acts when auditing financial statement due to the fact that another set of auditors (forensic auditors) would be critically evaluating their role;
- viii. giving the audit committees better tools to evaluate the quality of the financial statement audit by the external auditor.

It is worthy of mention that every institution managed by humans requires thorough forensic gap checking to ensure that opportunity is not created for fraud to take place. This is in retrospect of Donald Cressey fraud triangle model of 1953 which specify that no fraud or financial malpractices can take place without the presence of three elements of pressure, opportunity and

rationalization. Analyzing from Cressey's perspective, it could be induced that any financial failure or unsustainability act can only exist in an institution that has created opportunity for such malpractices. Erols and Congee (2011) considered opportunity in the fraud triangle as the ability to commit fraud and financial malpractices resulting from weak control system, lack of strong management oversight and failure to establish adequate procedure to detect fraudulent activity. In essence, if opportunity is not created, the pressure and rationalization of committing financial malpractice is impossible. Hence, the need for forensic auditing.

Adducing from the Cressey's theory blueprint is the fact that if one of the prominent phenomena (opportunity) exists, then a conclusion can be drawn about another phenomenon (financial malpractice or misappropriation). This implies that the best way of designing organizational structure is contingent upon the internal and external control efficiency that can lend credence to detecting financial fraud, compelling comprehensive financial statement as well as providing useful users accounting information. The resultant implications of this internal and external control efficiency are offering of highest level of assurance; provision of more accurate and scientific perspective in credibility and transparency; as well as; streamlining human resource performance optimization. This position is supported by the studies conducted by various scholars which indicated that forensic auditing offers legal review in a scientific fashion; impact on fraud prosecution and prescription of punishment for fraudsters, improve internal control system as well as financial reporting credibility and transparency (Zysman, 2004; Enofe, Idemuclia & Emmanuel, 2015).

In the same vein, Okoye, Segun and Nwankwo (2019) determined the effect of Forensic auditing on the financial performance of quoted food and beverage firms in Nigeria for the period of six years ranging from 2010-2016. The study revealed that forensic auditing has a positive and statistically significant effect on Return on Asset (ROA), Return on Equity (ROE), and Earnings Per Share (EPS) of food and beverage firms quoted on the floor of Nigerian stock exchange at 5% level of significance. Similarly, Ukoma (2019) examined the effect of forensic auditing in reducing fraud cases in Deposit Money Banks (DMBs) in Nigeria. The study sought to find out the effect forensic auditing have on internal control system, cash management system and loan processing and repayment system. Survey research design was adopted in the study and it was found that forensic auditing services is significantly associated with the internal control systems and cash management systems of DMBs but not

significantly associated with loan processing and repayment system. The studies aligned with the previous study conducted by Ogiriki and Appall (2018) that empirically analyzed the effect of forensic accounting and auditing techniques on public sector fraud detection, investigation and prevention in Nigeria. Specifically, the study sought to establish the effect of the various techniques of forensic accounting on public sector fraud and secondly, to determine the effect of forensic auditing on fraud detection, investigation and prevention. The study revealed that the relationship between forensic accounting and auditing techniques and public sector fraud detection, investigation and prevention in Nigeria is quite significant. The study therefore concludes that forensic accounting and auditing techniques is a major panacea to the fraudulent activities experienced in the Nigerian public sector. It was recommended among others that government should consider providing more fraud hotlines, improve the whistleblowing policy and establish forensic accounting department in the public sector in order to enhance the fraud detection, investigation and prevention mechanism in the public sector.

Onodi, Okafor and Onyali (2015) researched on the impact of forensic investigative methods on corporate fraud deterrence in Nigerian banks using primary and secondary data sourced from reports on fraud and forgery in the banking sector. The result revealed that there is a significant relationship between the forensic investigative methods and corporate fraud deterrence; that expert services of forensic investigators are normally required in the prosecution of fraud, but majority of the audit and accounting personnel in Nigeria are suffering from poor perception and knowledge of forensic investigative methods. Adeniyi (2015) examined the effect of forensic auditing on financial fraud in Nigerian (DMBs) banks and audit firms in Abeokuta, Ogun State. The results of the study revealed that forensic audit has significant effect on financial fraud control in Nigerian (DMBs) and that forensic audit reports significantly enhances court adjudication on financial fraud in Nigeria. The study concluded that the application of forensic audit to tackle financial fraud in Nigerian (DMBs) is still at the infant stage, and recommended that organisations should have a strong internal control system in place to reduce the recurrence of fraud.

Nevertheless, efficiency in the operational process and effectiveness in the part of personnel is essential for professionalism to be optimized in forensic auditing. Therefore, optimization of forensic auditing considers:

- i. Availability and accessibility to detail information.
- ii. Comprehensibility in the presentation of details and facts

- iii. Independency in the gathering and compilations of details.
- iv. Credibility in the analytical steps taken to arrive at a presentable conclusion.
- v. Thoroughness in the process of the investigation and reporting.

It is contingent on these optimization conditions/consideration that audit expectation gap that exposes corporate institutions to opportunity to committers of financial malpractices and failure can be avoided.

4 Forensic Auditors Roles in Financial Resource Sustainability

The pervasiveness of financial malpractice/failure in every facet of Nigerian economy has led to unsustainability in institutional, infrastructural and human capital development. Kasum (2007) exaggerates that "from the common man in the street to the politician; from organizational directors/executives to the flow cleaner; from the legal officers to the law enforcement personnel; from the civil servants to the school teacher from the trader in the market to the hawkers on the street, the tendency for fraud and fraud related crime is never ending". This describes the extent of existence of fraud or financial malpractices in the society, thus calling for the pertinent roles of forensic auditors.

Forensic auditors are considered as the guarantors of financial resource sustainability. They are persons with expertise and skills for investigation on financial matter which may be used in law COUH (Eyisi and Ezuwore, 2014). In this respect, forensic auditors can be categorized as train personnel with requisite skills to conduct investigation and analyzing financial transaction authenticity, alteration or counterfeiting for accurate reporting for litigation. Boritz, Kotchetora and Robinson (2008) while analyzing on the duties of organization's internal auditors and their limitations inferred that forensic auditors give credence to financial appropriation and reporting, conduct fraud detection, calculate economic damages and expert witness, as such stand better chance of detecting fraud than the conventional auditors. Messier (2000) considered forensic auditors as fraud examiners trained by Association of Certified Fraud Examiners on areas which covers fraudulent financial transactions, legal elements of fraud investigation, criminology and ethics. Thus, they are trained to investigate, guide and restore the investors' confidence on the operation optimization as well as building credibility of the institutions. Be that as it may, building a sustainable future in financial appropriation and management requires forensic auditors that can:

- I. investigate issues/cases both objectively and from the point of organizational establishment to professional conclusion.

- ii. render services above self-interest.
- iii. Align fact with figures using diverse financial security protocols.
- iv. ensure strict consistency and adherence to principles of independency.
- v. ensure highest level of loyalty to the exposure of any fraudulent gap that can deter implementation of institutional goals.
- vi. ensure specificity in the assessment of tasks assign and adhere to the obligation of utmost responsibilities.

The aforementioned disposition of the forensic auditor has the potency of implementing the PADC models in minimizing (if not completely eradicating) fraud and tactics that stamped good governance.

5 Conclusion and Recommendations

The actualization of good governance as well as ensuring sustainability in the provision of quality services through absolute implementation of led clown plans of any institution is subject to the level of thoroughness in "planning, acting, doing and checking" processes by forensic auditors. In essence, the sustainability of future development of any institution or system depends on forensic auditors with creativity that is closely related and individual ability to connect the dots and swift understanding of information ambiguity as well as recognize any emerging patterns of fraud. This underscores the essentialities and the roles of the forensic auditors in protecting the plans and programmes implementation of an institution.

In view of the findings and conclusion above, the following recommendations are hereby made:

- i. Forensic auditors should acquire the tactics of exploring social networking as a potent tool for information gathering necessary for opportunity identification; planned and systematic research,
- ii. Institution that employs the services of forensic auditors must accept absolute adherence to the principle of outright independency of the auditors to ensure stringent implementation of forensic duties according to the PADC model.
- iii. The procedure of selecting forensic auditors should be handle by institutional independent unit that is not directly involved in institution's financial implementation programmes.

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COMMUNICATION AS AN ADMINISTRATIVE PRACTICE OF SCHOOL PRINCIPALS AND TEACHERS' JOB PERFORMANCE IN PUBLIC SECONDARY SCHOOLS IN AKWA IBOM STATE, NIGERIA

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Abstract

The study examined how principals' administrative practice of communication predicts the job performance of teachers in public secondary schools in Akwa Ibom State, Nigeria. The Job Characteristics Model Theory of Hackman and Oldham (1976) was used to guide the study. One research question and a corresponding null hypothesis were formulated to guide the study. A correlational research design was adopted for the study. The population consisted of 254 school principals and 7388 teachers of the public secondary schools in Akwa Ibom State. The sample was 739 teachers from the three Senatorial Districts, selected through the clustered sampling technique. Two research instruments tagged "Principals' Administrative Practice of Communication Questionnaire" (PAPCQ) and Teachers' Job Performance Questionnaire (TJPQ)" were used for data collection. The instruments were validated by three experts from the Faculty of Education, University of Uyo. The questionnaires were administered and the data generated in this study were analyzed using Simple Linear Regression analysis. The research hypothesis was tested at a 0.05 level of significance. The results showed that principals' administrative practice of communication significantly predicts teachers' job performance in lesson preparation, lesson delivery, classroom management, use of instructional materials and students' assessment in public secondary schools in Akwa Ibom State, Nigeria. Based on the finding of the study, it is recommended among other things that Principals of schools should be effective and efficient communicators. Instructions and directives should be unambiguously sent to teachers through effective means of communication as agreed upon by the members of the school system.

Keywords: Communication, Job Performance, Classroom Management, Instructional Materials

1 Introduction

Communication, according to Yalokwu (2002), is the effective transmission of common understanding among people through speech, writing, or other means. The author claims that communication does not occur unless a perfect understanding is achieved through the transmission of verbal or nonverbal symbols. Likewise, Communication, according to Eze and Ndukwu (2016), is a compelled effort by persons involved in the school system to express their personal sentiments, purposes, and information, as well as to appreciate the feelings, intentions, and knowledge of others. Egwuasi (2004) from another perspective considers effective communication as one based on face-to-face interactions, between people working to establish and maintain mutual trust and understanding. From the view of Obisi (2003), communication is generally understood as spoken or written words. But in reality, it is more than that. It is the sum total of directly or indirectly, unconsciously or consciously transmitted words, attitudes, feelings, actions, gestures, and tones. Even silence is an effective way of communication. Similar to this, Nwosu (2017) stressed that communication is a managerial tool frequently used to share information with members of staff, coordinate activities, reduce unnecessary managerial burdens and rules, and ultimately improve organizational performance. It is also a means by which staff is informed of various duties and how to perform it. Communication helps in coordinating the efforts of staff in school. Akinnubi, Gbadeyan, Fashiku and Kayode (2012) pointed out that communication is essential for understanding roles and assignments; planning and carrying out activities; coordinating approaches with students; providing information to teachers on students' progress and behaviours; and building a positive relationship with students, teachers and other staff. In the same vein, Ejeh and Okoro (2016) asserted that through communication, management can establish mutual understanding and exchange of ideas, information, experience and innovation for peaceful co-existence, conflict resolution, cumulative development, progress and well-being of the organizational structure. A problem or misunderstanding may arise if there is a breakdown in communication or the principal fails to provide timely information to members of staff. Iskandar, Ahmad, and Martua (2014) asserted that managers who are involved in the communication process need to possess both basic skills and abilities; otherwise, the information could be misunderstood.

According to Jay (2014), teachers' job performance is the ability of teachers to combine relevant inputs for the enhancement of teaching and learning processes. Bolarinwa (2016) observes that, the indicator of teachers' job performance is evaluated in the teachers' ability to make a deliberate effort to

enhance students' academic performance, possession and display of in-depth knowledge of subject matter, lesson presentation, effective classroom organization and control, and participation in the school curriculum activities. Other indicators of teachers' job performance according to the author include regularity and punctuality in the school, maintenance of good interpersonal relationship with subordinates and superiors, discipline, motivation, and counseling of students as well as compliance to teachers' professional codes of conducts among others. In other words, teachers' job performance is the degree to which teachers successfully accomplish their instructional responsibilities. A teacher can be said to have performed when the teacher plans his/her lessons according to standards, delivers lessons comprehensively, manages the classroom well, uses instructional materials to facilitate teaching, carries out formative and summative assessments regularly, keep records of students' progress, participates in sporting activities as well as all other functions of the school for the attainment of the set goals of the school.

Education is a vital tool for the development of man socially, economically, politically and otherwise for his well-being and opportunities for better living. It ensures the acquisition of knowledge and skills that enable people to increase their level of productivity and improve their quality of life. This increased productivity leads to new sources of earning which enhances the economic growth and the development of a country. The process of education begins and ends with communication because communication indisputably is as old as man and the smooth running of every system, organization, or establishment that leads to the attainment of the set objectives is only possible if there is effective communication.

The administration of the public secondary schools in Nigeria with emphasis on Akwa Ibom State is faced with a lot of problems like teachers' consistent cases of defaulting in lesson preparation, persistent lateness to school and classes, irregular and unauthorized movement from duty post, failure to mark and correct students' work, non-utilization of instructional materials, inability to convincingly explain difficult concepts to students and above all, poor classroom management skill amongst others. Embarrassingly too, students are no longer studious. They do not come early to school, most default in homework and some even engage in cultism. As a result, failure is recorded in both their internal and external examinations.

"Could the negative attitude of teachers toward the performance of their job, which is currently harming student performance, be as a result of the

administrators' administrative practice of communication in public secondary schools?" it is reasonable to inquire. This is an important question since teachers are the major drivers in the educational system, and their effective job performance determines the system's success or failure. It is against this background that the researcher decided to investigate how principals' administrative practice of communication predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria. In other words, what is the extent to which principals' administrative practice of communication predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria?

The study was designed to examine the extent to which principals' administrative practice of communication predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria. this objective is driven from key questions like:

To what extent does principals' administrative practice of communication predict teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria?

The null hypothesis to be tested is stated thus;

The extent to which principals' administrative practice of communication predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria, is not significant.

The scope of this study covered all the public secondary schools in Akwa Ibom State, Nigeria during the 2020/2021 academic year which ended in July 2021. The investigation centered on the principals' administrative practice of communication. Job performance of teachers was measured in terms of lesson preparation, lesson delivery, use of instructional materials, classroom management, and students' evaluation in public secondary schools in Akwa Ibom State, Nigeria.

2 Theoretical Framework.

2.1 The Job Characteristics Model Theory: Hackman and Oldham (1976)

The Job Characteristics Model Theory aims to specify conditions under which people are satisfied by their work and motivated to perform effectively. Hackman and Oldham (1976) identified five core characteristics, along with

three psychological states acting as a sort of ‘gateway’ to satisfaction. The five core characteristics are:

- i. Skill variety: As the name implies, this characteristic refers to the presence of different kinds of challenges at work.
- ii. Task identity: The degree to which a job calls for completion of discrete, ‘whole’ pieces of work.
- iii. Task significance: Whether the job has substantial impact on the lives/work of other people.
- iv. Autonomy: The degree of freedom or independence the job provides.
- v. Feedback: How clearly an individual is told about their performance.

The relevance of the theory to this study is that, for teachers to perform their duties as required, principals as school administrators should recognize the challenges that teachers encounter while performing their duties and also break the goals and objectives of the school system into short and long term achievable parts. Likewise, teachers deserve some level of independence while carrying out their responsibilities and should be provided feedback on their job performance from time to time as a way of motivating them.

2.2 Principals’ Administrative Practice of Communication and Teachers’ Job Performance

Communication to Osabiya (2015) probably is one of the most frequently cited sources of interpersonal conflict when it is poorly carried out. It is equally an important lifeline in every organization. Many of the problems that occur in organizations are the direct result of people failing to communicate. Lack of effective communication is a serious problem within an organization, and this can lead to confusion and can cause a good plan to fail. Communication is the source of information used by administrators in making decisions that affect the organization. Administrators depend on their communication skills to get the information required to make decisions and to transmit the results and intention of the decisions to other people.

Communication remains one of the most important aspect of human existence and very important in any organization (School inclusive) for the achievement of its set goals and objectives. Communication helps improve effective management of any organization this is because it improves the mutual understanding between the management and subordinates. Effective communication increases staff involvement and commitment in the organization for a better result. Yalokwu, (2002) sees communication as the effective transmission of common understanding among people through

speaking, writing or the other methods. The author asserts that unless there is a perfect understanding result from transmission of verbal or nonverbal symbols, otherwise communication has not taken place.

Egwuasi (2004) from another perspective sees effective communication as one based on face-to-face interactions, between people working to establish and maintain mutual trust and understanding. Think about it for a minute: what would a school be like without communication? My guess is that it would be very lonely not only could teams not co-ordinate their efforts and individuals seek feedback from and communicate their success to their supervisors, but also services would have tough time being delivered. If you could not communicate with co-workers, team members, customers and others with whom you routinely do business, you really would not have an organization at all. In Anderson (2012), when we fail to communicate we fail. What we communicate may not always be immediately applicable, but it can be a tool both for heading off potential problems and for laying the foundation of future growth. The role of effective communication skills is stressed as a primary mechanism for effective organizational improvement.

There are a range of verbal and non-verbal forms of communication. Verbal communication is a spoken communication. Information is exchanged from one person to another through spoken language. Non-verbal communication describes the process of conveying meaning in the form of non-word messages. For the supervisor to have a smooth career in the field of teaching, it is essential to group, practice and display high levels of communication skills. Effective communication acts as ladder to the principals for quick progression in their career.

Communication has four major functions within the organization (Osabiya, 2015). These include:

- i. Information: Communication facilitates decision making. It provides information that individuals and groups need to make decisions through the provision of data to identify and evaluate alternative choices.
- ii. Motivation: Communication fosters motivation by clarifying to employees what is to be done, how it will be done and what can be done. Communications and praises to employees also motivate and encourage commitment to organizational objectives.
- iii. Control: Communication acts to control member behaviour in various ways. Every organization has authority, hierarchies, Guidelines and Regulations that employees are required to follow For instance,

- employees know how to communicate their grievances, know which procedures to use to enjoy certain amenities or privileges and structures laid on how to process various requests.
- iv. Emotional Expression: Emotive uses of Communication allow for the expression of feelings and the satisfaction of social needs. Employees within their work groups Communicate among themselves to show their frustration or feelings of satisfaction which ultimately provides a release for their emotional expressions of feelings.

Communication can either be formal or informal. Communication is said to be formal, if the dissemination of information, messages and ideas are according to prescribed or fixed rules and customs. It is external rather than natural because it is notes a result of the intrinsic feelings of the actors but imposed on them by the organization (Obisi, 2003). Such

Communication is usually very rigid and follows definite pattern and it is official in nature. It may be oral or written, vertical or horizontal. They are usually bureaucratic in nature and the directives or instructions are to be carried out. Informal Communication is described as any interaction or relationship which exists in any organization which is not deliberate, rigid, or structured. Such interaction and relationship are as a result of natural feelings without any outside interference, constraint or premeditation (Obisi, 2003).

To improve communication in the school principals should:

- i. Regularly inform the ministry of the teachers' feelings, opinions, and ideas on important issues.
- ii. Involve teachers in decision making process.
- iii. Avoid blaming your subordinate when things go wrong.
- iv. Have a face to face discussion when dealing with a difficult situation.
- v. The principal should not let his opinion interfere with hearing what someone else is saying.
- vi. The supervisor should go out of his way to make teachers comfortable in approaching and speaking with him.

Nwoji (2006) found out that teachers' effectiveness in the performance of their duty is greatly influenced by the communication patterns of the school principal. He uses his communication skills to motivate, inform, suggest, warn, order, change behaviour, establish good relationship and make himself understood. There is no way a school can thrive without communication. Teachers' performance depends greatly on the supervisors' communication skills.

However, communication is very necessary in the organizational setting of secondary school system, but it does not provide solutions to all problems that border on school administration (Oleforo 2014). This was supported by Evans (2006) who revealed that leaders often fail to give feedback such as praise and redirection to those who trust in their leadership. She believes that feedback is a number one problem in interpersonal communication.

Okezue (2001), noted that communication gap resulted in misunderstand rumour, and counter-rumour, mistrust in schools administrations, lack of unity of purpose and suspicious among staff, which resulted in lack of commitment by the staff, lower standard of education, wastage in school management low morale, frustration among staff and indiscipline among staff and students.

In Communication, apart from the general distortions in the communication process, there are other barriers to effective Communication. These barriers could be examined from the four important levels of Communication, that is, Sender's levels, transmission/channels levels, receivers level and feedback level (Osabiya, 2015)

The sender of any particular message may not be particularly articulate either verbally or in writing, and will therefore fail to convey the information accurately. Where information is too scanty for the receiver to give adequate feedback or take a decision, it becomes a barrier. Many messages get lost because of the volume of information being passed to the receiver. When someone receives too many internal memoranda on relatively trivial issues, the important messages may get lost unless special attention is drawn to them in some way. When there is dislike between the sender and a receiver of a message, their emotional state will affect the way that message is perceived. Either the sender or the receiver may not listen or pay attention or may not be very objective to what is said on that topic. There is no doubt that communication itself is determined by our skills, knowledge and attitude and who we want to communicate with. Communication can only be effective when we adjust our knowledge and skills to the level of the receiver.

Physical Noise can easily distort communication flow. The more levels a message must go through to get to the bottom of the hierarchy, the more likely that a sizeable portion of the original information will be lost or substantially distorted. Selection of a poor channel of communication may also cause distortion of information.

Failure to understand the message by the receiver is a serious barrier. Where the receiver is threatened by the message or the receiver displays impatience for any reasons when receiving the message, communication may not be effective. When the receiver of the message is pre-occupied with other matters, the content of the message being received may not be fully appreciated. Where there is a negative attitude towards the receiver himself, the message and the sender, the communication may not likely be effective. Physical conditions or environmental factors may also prevent the receiver from understanding a message. Where the receiver does not understand certain "terms" used in the message, Communication becomes ineffective. When feedback not provided at all or is delayed, it may also affect effective Communication.

If an administrator desires to be a successful in the business of school administration, such school leader needs to be aware of the seven deadly sins of effective communication enumerated by Osabiya (2015). These include:

- i. Not realizing that the message may get a different response than you expect. People see the world differently, based on their experiences, values, attitudes, and perceptions. Expect to be misunderstood and adjust your message anticipating ways your ideas could be misinterpreted.
- ii. Impressing instead of expressing. First and foremost, the objective of communication is to transfer information, not exert power. Too often administrators are more concerned with sounding impressive and appearing knowledgeable than in making sure the ideas get across.
- iii. Choosing the wrong medium. It's easy to get in the habit of using the same medium over and over again. Administrators have choices: telephone, memos, letters, interviews, group meetings, electronic mail, etc. the one that will most effectively carry the message should be used.
- iv. Effective communication requires understanding by the recipient. Insist on feedback to be sure that the message received is the message sent.
- v. Studies show that as much as 78 percent of meaning is transmitted nonverbally through tone of voice, appearance, timing, and the like. Administrators should consider how the nonverbal messages might distort your intended message.
- vi. Administrators need to clarify the more important points in messages.
- vii. Communication is the essence of an administrator's job. It is not a morale booster. Good communication practices is not just a desirable quality; it is a requirement for effective administration.

In view of the barriers to communication identified and examined, it is expedient to consider what an administrator can do to minimize the problems

and attempt to overcome these barriers. The following suggestions/recommendations may be helpful in making Communication more effective.

- i. Administrators should be clear about the message to be conveyed and the reasons for the message.
- ii. The appropriate method of communication should be selected, having regard to content, timescale and target audience.
- iii. The message should be prepared in the appropriate format and language having particular regard to the nature and background of the people to be communicated.
- iv. Where possible, administrators should use more than one means of communication to reinforce the message and be prepared to repeat it if necessary.
- v. Administrators must maintain their integrity and credibility in the organization.
- vi. Administrators need to highlight the benefits of the message to the receiver.
- vii. Give examples, where appropriate to support the message.
- viii. Try to give factual information and careful explanation where required.
- ix. Structure any argument logically working up to the conclusions.
- x. Use any points that people will agree with to reinforce your statements.
- xi. Try to ensure that the message is interesting.
- xii. Avoid Communication overload and under load.
- xiii. Try to get and retain the receiver's attention.
- xiv. Use language that is at the experience level of the receiver.
- xv. Listen empathetically and make intelligent use of informal communication.

3 Methodology

3.1 Population of the Study

The population of the study consisted of the 254 public secondary school principals and all the 7388 teachers of the public secondary schools in the three Senatorial District of Akwa Ibom State.

3.2 Sample and Sampling Technique

The sample for this study was 739 teachers from the three senatorial districts (the thirty-three Local Government Area) which formed 10% of teachers of Akwa Ibom State. The sample was selected through the clustered sampling technique where the state was grouped into the three Senatorial Districts. 10% of the total number of teachers in each of the three Senatorial Districts was

further selected as sample through simple random sampling. Three students were also randomly selected to provide information on each teacher's job performance from each of the three Senatorial Districts in Akwa Ibom.

3.3 Instrumentation

Two instruments named Principals' Administrative Practice of Communication Questionnaire (PAPCQ) and Teachers' Job Performance Questionnaire (TJPQ) were used to collect data from respondents (Teachers and students)

3.4 Method of Data Analysis

The data generated in this study were analyzed using Simple Linear Regression analysis for research questions and null hypotheses. The hypothesis was tested at a 0.05 level of significance.

4 Results

4.1 Answering the Research Question

Research Question: To what extent does principals' administrative practice of communication predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria?

To answer this research question, Simple Linear Regression analysis was employed, and the data obtained is presented in Table 1.

Table 1: Simple linear regression analysis for the extent to which principals' communication predicts teachers' job performance in public secondary school in Akwa Ibom State, Nigeria

Variable	R	R-Squared	Extent of Prediction	Remark
Principals' Communication(x)	0.698	0.488	48.7%	Moderate Extent
Teachers' Job Performance(y)				

Source: Researcher Computation.

The entry in Table 1 reveals the R for the strength of the relationship and R^2 for the determination of the extent to which principals' communication predicts

teachers' job performance. The R-squared value of .698 indicates the extent to which the prediction occurs. The calculated R^2 of .488 which is the coefficient of determinant indicates that only 48.7% variability in effectiveness is predicted or contributed by principals' communication. This implies that principals' communication to a moderate extent, predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria.

4.2 Testing the Research Hypothesis

Hypothesis: The extent to which principals' administrative practice of communication predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria, is not significant.

Table 2: Simple linear regression analysis for the prediction between principals' communication and teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria

Source of Variation	Sum of square	df	Mean square	F-cal	Sig.
Regression	74990.825	1	74990.825	699.321	.000 ^b
Residual	78816.797	735	107.234		
Total	153807.623	736			

Source: Researcher Computation

The entries in Table 2 revealed that the calculated F-value of 699.32 is greater than the critical F-value of 3.86 at .05 level of significant with 1 and 736 degree of freedom. With this result, the null hypothesis which claims that the extent to which principals' communication predicts teachers' job performance is not significant is rejected. The result reveals that principals' communication significantly predicts teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria.

4.3 Discussion of Finding

The result shows that there is significant prediction between principals' communication and teachers' job performance in public secondary schools in Akwa Ibom State, Nigeria. This result implies that principals' ability to disperse information to teachers on time and without any ambiguity, give good feedback to teachers, being polite in speech and a good listener contributes to a moderate extent to teachers' job performance.

Nwoji (2006) in support of this finding found out that teachers' effectiveness in the performance of their duty is greatly influenced by the communication patterns of the school principal. The principal uses his communication skills to motivate, inform, suggest, warn, order, change behaviour, establish good relationship and make himself understood. There is no way a school can thrive without communication. Teachers' performance depends greatly on the supervisors' communication skills. Evans (2006) revealed that leaders often fail to give feedback such as praise and redirection to those who trust in their leadership. The author believes that feedback is a number one problem in interpersonal communication. Likewise, Okezue (2001), noted that communication gap resulted in misunderstanding, rumour, and counter-rumour, mistrust in schools administrations, lack of unity of purpose and suspicious among staff, which resulted in lack of commitment by the staff, lower standard of education, wastage in school management low morale, frustration among staff and indiscipline among staff and students.

Abiodun-Oyebanji (2019) postulated that principals' application of different communication patterns in the administration of their schools' would lead to effectiveness of the school system. This then implies that, secondary school principals should be open to the usage of any of the communication patterns' suitable for their schools' situation, (most especially the face-to-face) since no communication pattern is independent of others; and this may facilitate the achievements of vision 2030. In support, Tyler (2016) uncovered five themes of communication in leadership which include a student-centered approach to decision-making, transparency of decision-making, shared decision-making with principal and teachers, the role of faculty trust, and principal preparation. Specific principal communication behaviors with teachers were implemented in motivating teachers toward earning high-performing status. These included frequent face-to-face and personal communications, minimal use of whole-school meetings, and weekly principal participation in grade level meetings. Nakpodia (2010) advised that in communication process principals should know that communication can never be over-emphasized in the daily running of the schools; as a result, principals should ensure that communication is effectively carried out to enhance discipline and to maintain law and order.

Osabiya (2015) opined that if an administrator desires to be a successful in the business of school administration, such school leader needs to be aware of the seven deadly sins of effective communication which are: i. Not realizing that the message may get a different response than you expect. ii. Impressing instead of expressing. iv. Effective communication requires understanding by

the recipient. v. Studies show that as much as 78 percent of meaning is transmitted nonverbally through tone of voice, appearance, timing, and the like.vi. Administrators need to clarify the more important points in messages. vii. Communication is the essence of an administrator's job.

5 Recommendation

Based on the finding of the study, it is recommended among other things that Principals of schools should be effective and efficient communicators. Instructions and directives should be unambiguously sent to teachers through effective means of communication as agreed upon by the members of the school system.

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PUBLIC FINANCIAL MANAGEMENT AND THE NEXUS OF IPPIS IN NIGERIAN FEDERAL UNIVERSITIES: A CASE ANALYSIS OF UNIVERSITY OF UYO

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Abstract

The fact of its topical and sensitive objectives which are to ensure that public funds are frugally managed according to laid down principles is rather paradoxical as far as public financial management and integrated payroll and personnel information system are concerned. Due to the paradox, this study was set to unravel the nexus between the two variables and thereby proffer solutions to the systemic payroll dis-functions occurring in the public financial system in the Nigerian Federal Universities. The study aimed at achieving three subsidiary objectives, among others was to establish whether the intention of government was right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria. In order to achieve this, the study asked three research questions and postulated three null hypotheses to empirically test the responses of respondents and arrive at findings. Over 175 academic and non-academic staff of University of Uyo were observed, interviewed or served with structured questionnaire, respectively. The study adopted a qualitative research paradigm, which helped the researcher to carry out the combination of explanatory, descriptive and contextual approaches in arriving at the conclusion of the research. Frustration-Aggression theory. At the end of the research, three findings were made, among others included: that government intention was actually right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria, but the pains associated with it far outweigh the gains of IPPIS, as an attempt to frustrate staff welfare which is tantamount to bad governance. Based on the findings, three recommendations were proffered that the Federal Government should listen to the complains of ASUU and endeavour to reduce to the barest minimum, the pains associated with IPPIS, or otherwise should replace IPPIS with UTAS.

Keywords: Public Financial Management, Nexus, IPPIS, Federal Universities, University of Uyo, UTAS.

1. Introduction

In the early stage, the concept of ‘public financial management’ is pivotal or paramount in all spheres of economic endeavours in our contemporary society today, be it in the developed, developing or even in the underdeveloped worlds. Like Ime T. Akpan has stated in his foreword in Nwaeze (2009), “its topical and sensitive objectives are to ensure that public funds are frugally managed according to laid down principles”. Folorunso, *et al* (2021) are worried that, ‘in Nigeria, the issue of public service salary has been at the forefront right from early stage of Nigerian nationhood. While the mode of payment evolved from time to time, the minimum wage was a subject of unending debates between labour and government in Nigeria.

In earlier the stage, payments were done through cash payment, cheque, bank overdraft and later bank transfer after the bank’s reconsolidation. Unlike America and Europe, period of salary payment in Nigeria is usually a month and this is a popular practice in the public service. Being a federal state, the issue of minimum wages and method of payment implementation had generated a lot of crises between states and the federal government. Most times, the states refused to pay the new implemented minimum wage on the excuse of not being economically buoyant to do so thus leaving state employees pauperized.

Interestingly, every administration, be it public or private is faced with the issues of financial management in government, institutions or corporate organizations. In the light of this, every administrator is duty-bound to manage the scarce resources at his disposal in such a manner as it is equitable and in accordance with the laid down principles. But, in this study our focus will be particularly on the public sector financial management which comprises basically the governments, civil service and public institutions or agencies. Public financial management is an important aspect of governance and public affairs. It has to do with the proper financial book-keeping or the administration of the spending of government funds. Without finance, government cannot function. The functioning of government is in the public sphere, therefore, its finance is public finance. It should be noted that public finance requires proper management. Public finance requires judicious spending in order to guide against fraud, misappropriation, corruption and financial improprieties.

On the other hand, the financial system of IPPIS which is the acronym of Integrated Payroll and Personnel Information System was conceptualized in October, 2006 by the Federal Government. This was to serve as one of its

reform programmes to improve the effectiveness and efficiency in the storage of personnel records and administration of monthly payroll in such a way to enhance confidence in staff members of Nigerian Federal Universities.

“Since the return of civil rule 1999, lots of reforms have been carried out in the Nigerian public service which has revolutionized salary administration. The recent salary administration reform came with the introduction of electronic payment system which was designed to replace the cumbersome obsolete process that has characterized salary payment. It was on this basis that the federal government introduced the Integrated Payroll and Personnel Information System (IPPIS) to efficiently and effectively meet the needs of public servants in Nigeria and to block leakages and corruption in public service through payroll system, although, the introduction and implementation of IPPIS were faced with slight resistance from few segments of the federal government Ministry, Department and Agency” (Folorunso and Simeon, 2021).

The concept of Public Financial Management is pivotal or paramount in all spheres of economic endeavours in our contemporary society today, be it in the developed, developing or even in the underdeveloped worlds. In an attempt to unbundle the subject of public financial management, one would have to concentrate on the economic processes and activities of sourcing for funds, utilizing and managing them effectively and efficiently in order to achieve the desired economic goals and objectives as:

- (i) Resource allocation in the economy.
- (ii) Economic stabilization through price stability, exchange rate stability, interest rate stability,
- (iii) Promotion of equity in income and wealth distribution in the economy.
- (iv) Stimulation of growth and development in the economy to ensure high level employment, per capita income and standard of living.

In Nigeria, Public Financial Management has gone through series of phases. Such financial practices as Integrated Payroll and Personnel Information System (IPPIS), University Transparency and Accountability Solution (UTAS) as an alternative to IPPIS, International Public Sector Accounting Standards (IPSAs), e-banking, e-payment and Treasury Single Account (TSA) of the President Mohammadu Buhari’s administration, etc. which should be able to curb the excesses of public financial management seem not to be very effective in the Nigeria financial sector.

As Folorunso, *et al.* (2021) have held that, ‘‘Since the return of civil rule 1999, lots of reforms have been carried out in the Nigerian public service which has revolutionized salary administration. The recent salary administration reform came with the introduction of electronic payment system which was designed to replace the cumbersome obsolete process that has characterized salary payment. It was on this basis that the federal government introduced the Integrated Payroll and Personnel Information System (IPPIS) to efficiently and effectively meet the needs of public servants in Nigeria and to block leakages and corruption in public service through payroll system, although, the introduction and implementation of IPPIS were faced with slight resistance from few segments of the federal government Ministry, Department and Agency’’.

The major benefits of IPPIS to participants which are supposed to include: accurate and reliable personnel information, reduction or elimination of corrupt and sharp practices, facilitation of modern scientific and accurate budgeting and forecasting have rather than provide the aforementioned major benefits to staff of Nigerian Federal Universities, but seems to have become more problematic than problem-solving. IPPIS seems to have suddenly become more patient than the physician that it was conceptualized to be.

It is quite unfortunate that the level of expected results is not at any time commensurate with the efforts of government in the aspect of devising the most appropriate public financial management method to solve its age-long public financial problems. Rather, the various government methods, as mentioned above have suffered the problem of implementation, mismanagement, corruption, or outright rejection like IPPIS by Academic Staff Union of Universities (ASUU). So far, it is on record that ‘‘there are 696 MDAs on IPPIS Platform as at June, 2020. The department is responsible for processing and payment of salary to over one million (1,139,633) Federal Government Employees across the 696 MDAs. Yet, the salaries of 243 workers have been suspended for failure to update their records online on the Integrated Payroll and Personnel Information System (IPPIS).

Also, in attempting to find the nexus of IPPIS with Public Financial Management it will raise a need to ex-ray the cardinal objectives of IPPIS, which according to the Office of Accountant General of the Federation, (2020) in Folorunso, *et al.* (2021) include, but not limited to the following:

- i. To facilitate human resource planning and by providing information for decision making;

- ii. To provide a platform for accurate budgeting of annual recurrent expenditure on staff emoluments;
- iii. To monitor monthly payment of staff emoluments against FGN's annual Budget to ensure minimal wastage and leakage;
- iv. To facilitate easy storage, updating and retrieval of personnel record for administrative and pension processing;
- v. To ensure database integrity such that, data once entered cannot be manipulated by unauthorized users;
- vi. To eliminate payroll fraud such as multiple payment of emoluments to a single employee or payment of monthly salary to a non-existent employee;
- vii. To ascertain actual personnel emoluments of the Federal Government employee; etc.

The various complains by participants of the Integrated Payroll and Personnel Information System (IPPIS) despite the clear objectives of the policy as stated above, particularly in the University of Uyo, have become the major reasons why this study is carried out. The study will show a connect between public financial management and Integrated Payroll and Personnel Information System (IPPIS) as regards the payment of monthly salaries of ASUU members in the Nigerian Federal Universities, particularly in Uniuyo.

The Objectives of this study will be in two-folds: the main and the subsidiary objectives.

The main objective of the study will be to unravel the nexus of the Integrated Payroll and Personnel Information System (IPPIS) as it relates to public financial management in Nigeria, with particular focus on the University of Uyo, Uyo, Akwa Ibom State, Nigeria.

The subsidiary objectives will be subdivided into three, as follows:

- i. To establish whether the intention of government was right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria;
- ii. To ascertain if the Integrated Payroll and Personnel Information System (IPPIS) has served the purpose in 696 MDAs who are on IPPIS Platform in Nigeria;
- iii. To find out the reasons for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU).

In order to elicit useful answers to aid the achievement of this study the three questions below were asked:

- i. Was the intention of government right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria?
- ii. How can the study ascertain if the Integrated Payroll and Personnel Information System (IPPIS) has served the purpose in 696 MDAs that are on IPPIS Platform in Nigeria?
- iii. What are the reasons for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU)?

For the purpose of making objective and accurate findings on the above topic, three (3) Null Hypotheses (Ho:) were postulated as follows:

- i. The intention of government did not seem right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria.
- ii. The study may not ascertain if the Integrated Payroll and Personnel Information System (IPPIS) has served the purpose in 696 MDAs that are on IPPIS Platform in Nigeria.
- iii. There is no cogent reason for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU).

The significance of the research on this all-important topic that bothers on public financial management and the nexus of IPPIS is enormous. The research will provide a useful guide to the public on why government came up with the policy, at the first instance, and what its intention was at the inception of the policy. With that, policy makers and implementers will know how to carry out their assigned duties to the betterment of the beneficiaries of the policy. On the other hand, the beneficiaries of the policy will also know their roles and the appropriate time to carry out their assigned roles.

Finally, the researchers, students and indeed, the general public will come to terms with the reasons why IPPIS could be working for up to 696 MDAs and not working for ASUU.

Operationalization of Concepts:

- i. **Public Financial Management:** Public financial management is an important aspect of governance and public affairs. It has to do with the proper financial book-keeping or the administration of the spending of government funds.
- ii. **Nexus:** The word, 'nexus' means a connection or series of connections linking two or more things, e.g. 'the nexus between industry and political power; or, in our own sense, 'the nexus between public

financial management and IPPIS.

- iii. **IPPIS:** This is the acronym of the Integrated Payroll and Personnel Information System. It is one of the reform programmes to improve the effectiveness and efficiency in the storage of personnel records and administration of monthly payroll in such a way to enhance confidence in staff members of Nigerian Federal Universities.
- iv. **Federal Universities:** Federal Universities are those universities established and owned by the Federal Government of Nigeria. Some Federal Universities might also have been taken over from the original owners by the Federal Government, as the case may be. However, below are the names of the Federal Universities in Nigeria and their years of establishment.
- v. **University of Uyo:** The University of Uyo is located in Uyo, capital of Akwa Ibom State, Nigeria. The university was formally known as the University of Cross River State. On October, 1991 the Federal Government of Nigeria established it as a Federal University and the name was changed to the University of Uyo and abbreviated, Uniuyo.

2 Literature Review

2.1 Public Financial Management (PFM):

“Public Financial Management”, according to Nwaeze (2009), can be defined as “an aspect of finance which studies the effective and efficient sourcing and utilization of the financial resources of the public sector for the attainment of set objectives and goals”. The subject is highly related to public finance. While public finance deals with the various sources and uses of funds in the government or public sector, including the problems that results from the power of government to tax and statutory limitations on how political units may raise funds and what the funds may be used for; the objectives of public financial management is to fulfill certain basic financial obligations within the sector, which are necessary for the achievement of higher level income and employment; to promote some particular aspects of economic justice by income redistribution through taxes and other pending activities of government; and to ensure realistic provision and distribution of certain demanded social goods and services to the public.

The subject matter of public financial management today concentrates on the economic processes and activities of sourcing funds, utilizing and managing them effectively and efficiently in order to achieve the desired economic goals

and objectives as:

- i) Resource allocation in the economy.
- ii) Economic stabilization through price stability, exchange rate stability, interest rate stability,
- iii) Promotion of equity in income and wealth distribution in the economy.
- iv) Stimulation of growth and development in the economy to ensure high level employment, per capita income and standard of living.

All these are aimed at meeting the welfare needs of the citizenry through adequate provision of social goods. The economic processes and activities involved in public financial management centre around:

- a) **Financial Planning:** This involves preparing a course of action, setting out desired objectives, determining strategy and alternative courses of action to achieve set objectives.
- b) **Financial Decision:** This involves identification and selection of the appropriate (best) course of action that would help maximize objectives.
- c) **Financial Control:** This involves establishing standards on which actual performance could be compared and corrective action taken on deviations or variances noticed.

2.2 Integrated Payroll and Personnel Information System (IPPIS):

The Integrated Personnel Payroll System is a public payroll system developed by the World Bank and adopted by the federal government in 2007 to improve the transparency and accountability in the management of personnel payroll. The Integrated Personnel Payroll System operates under the office of the Accountant General of the Federation and is charged with the payment of salaries, removal of deductibles, and management of government's payroll.

The IPPIS has about 600 MDAs that have enrolled as of June 2020. The IPPIS department is charged with the processing of salaries of federal government workers in all MDAs that have been captured. The IPPIS has also been engaged in controversies recently especially with the Academic Staff Union of Universities who have blamed the platform for shortchanging them and removing deductibles that they did not subscribe to. The federal government of Nigeria in October 2006 introduced the Integrated Payroll and Personnel Information System (IPPIS) as one of its reform programmes to improve the effectiveness and efficiency in the storage of personnel records and administration of monthly payroll in such a way to enhance confidence in staff emolument costs and budgeting.

According to top government staff, the aim was to buttress the government's commitment to efficient and effective service delivery. "Our main aim is to pay accurately and on time within statutory and contractual regulations. We aim to provide a payroll service that is customer-focused and that utilizes technology wherever possible." As at June 2020, there were 696 ministries, departments, and agencies (MDAs) on the IPPIS platform. The department is responsible for processing and payment of salaries to over one million (1,139,633) federal government employees across the 696 MDAs. Our main aim is to pay accurately and on time within statutory and contractual regulations. We aim to provide a payroll service that is customer-focused and that utilizes technology wherever possible." The goal of IPPIS as a payment system is to enroll into the platform, all the federal government MDAs that draws personnel cost fund from the consolidated funds of the Federal Government of Nigeria.

The goal of IPPIS as a payment system is to enroll into the platform, all the federal government MDAs that draws personnel cost fund from the consolidated revenue fund. Since the inception of the IPPIS project in April 2007, the department has saved the federal government billions of Naira by eliminating thousands of ghost workers.

- i. violate the 2009 Agreement which was negotiated, agreed and signed by ASUU and FGN;
- ii. The IPPIS template is designed to phase out staff who are above (60) years, which contradicts the new policy of Professors retiring at (70) years;
- iii. IPPIS does not recognize payment of promotion arrears, rent allowances as it is now consolidated in our (academic staff) salary;
- iv. IPPIS does not capture the technicalities and peculiarities associated with the flexibility and mobility of academics in the university system;
- v. The IPPIS template adopts a tax payment system known as ptax2 which is inimical to our members on consolidated salary.

The federal government of Nigeria in October 2006 introduced the Integrated Payroll and Personnel Information System (IPPIS) as one of its reform programmes to improve the effectiveness and efficiency in the storage of personnel records and administration of monthly payroll in such a way to enhance confidence in staff emolument costs and budgeting. According to top government staff, the aim was to buttress the government's commitment to efficient and effective service delivery. "Our main aim is to pay accurately and on time within statutory and contractual regulations. But, on the contrary,

Lecturers working for Federal Universities currently face herculean tasks of embarking on sabbaticals as a result of the launch of the Integrated Payroll and Personnel Information System (IPPIS). The reason being that it does not offer the solution that it was meant to give, rather it has succeeded to bring thousands of University staff into poverty and untold hardship (Udoh, 2006).

The choice of IPPIS as a payment system is copied from what is obtainable in other parts of the world where Information Communication Technology (ICT) is used to improve management reporting. It was established to help the government track ghost workers in its payment system. The World Bank-financed the pilot phase in February 2006 upon the approval of the Federal Executive Council (FEC) for the Bureau of Public Service Reforms (BPSR). However, the project went live in April 2007 with seven pilot MDAs, with their management transferred to the Office of the Accountant General of the Federation (OAGF) in October 2008. The pilot MDAs are the federal ministry of education; federal ministry of transportation (works arm); federal ministry of finance; budget office of the federation; federal ministry of information; ministry of foreign affairs; and national planning commission. Prior to their registration, the nominal rolls of the seven pilot MDAs submitted indicated 55,000 staff, hence World Bank paid for 55,000 licenses. However, after their enrolment into the scheme, it was discovered that their total staff strength was 32,000, resulting to 11 MDAs being brought on board in July 2009 to optimize the 55,000 licenses purchased.

The federal executive council has seen the benefits of the scheme, especially in the area of savings to the government in its meeting on Wednesday 1 December 2010 approved the enrolment of all MDAs that draw their personnel cost from the consolidated revenue fund (CRF) into the IPPIS. The phase II service-wide implementation commenced under the platform of new software called Oracle Application in September 2011 in batches and is being financed by the federal government of Nigeria. As of April 2018, 490 MDAs, including the Nigeria Police and other paramilitary agencies have been enrolled into IPPIS with total staff strength of over 700,000 employees.

2.3 Reasons for ASUU and other MDAs' Resistance of IPPIS

According to Folorunso, *et al.* (2021), Academic Staff Union of University and other MDAs have shown displeasure over the plan to migrate them on IPPIS. According to the ASUU, enforcing IPPIS is an infringement on universities' right to autonomy. During a discussion with the Senate on the rejection, ASUU President, Professor Biodun Ogunyemi in ASUU Bulletin September, 2019 mentioned that the enforcement is not permitted under the law. "The

introduction of IPPIS is not backed by law. The Union's position is that there are extant legal provisions and negotiated agreements arising from the nature and peculiarities of Nigerian universities, which make IPPIS unnecessary and inapplicable to the universities".

As an entity, a Nigerian university is backed by an Act giving it the freedom to run itself and the introduction of a central payroll system is an infringement on this right. The IPPIS software is not robust enough to cater for the peculiarities of lecturers (ASUU Bulletin September, 2019). Outside universities, the Petroleum and Natural Gas Senior Staff Association of Nigeria (PENGASSAN) embarked on an industrial action earlier in November, 2020 over disagreements with the federal government on IPPIS.

In the series of resolutions ASUU published to its members and the press in November 2019, (ASUU, 27th November 2019 Resolutions in Folorunso, *et al.* (2021)) ASUU highlighted reasons why its Union refused to enroll on IPPIS to include:

- i. IPPIS violates university autonomy as enshrined in section 2AA of the University (Miscellaneous) provisions Amendment Act 2003 which states that the powers of Council shall be exercised as in the law and statutes of each University and to that extent establishment circulars that are inconsistent with the laws and statutes of the university shall not apply to the universities;
- ii. The peculiar nature of the appointment of the university academics.

Apart from ASUU, NNPC subsidiaries too opposed the plan to enroll on IPPIS. The affected agencies include the Department of Petroleum Resources (DPR), Petroleum Products Pricing Regulatory Agency (PPPRA), Petroleum Equalization Fund (PEF), Petroleum Trust Development Fund (PTDF), the Nigerian Content Development Monitoring Board (NCDMB), Nigerian Nuclear Regulatory Agency (NNRA) and Petroleum Training Institute (PTI). They accused the OAGF of insisting on enrolling their members on the IPPIS platform without taking into consideration the peculiarities of the oil and gas industry with regards to the Collective Bargaining Agreement (CBA) and approved pay structure between the unions and the federal government through the Salaries, Wages and Income Commission. Besides, they said the OAGF's insistence on the enrolment of the affected agencies on IPPIS did not consider that they were already enrolled on the revived Government Integrated Financial Management Information System (GIFMIS).

2.3 Theoretical Explication

This study adopts the Frustration-Aggression theory as the theoretical framework to substantiate this work. Postulated by Dollard, Doob, Mowrer, Miller and Seare (1939) the frustration aggression theory argues that people are motivated to act aggressively by a drive conducted by frustration. In proposing their frustration aggression theory, Dollard *et al.*, (1939) suggested that aggression is always a consequence of frustration... the existence of frustration always lead to some form of aggression. Thus, the central thrust of the theory is that aggression is always the result of frustration and anger, especially when we feel thwarted in our attempt to get our ambitions and objectives fulfilled.

The concept of frustration denotes condition that arises when goal attainment is blocked, while aggression constitutes actions aimed at harming perceived stumbling blocks (Jegede and Ajayi, 2008). It is implied that frustration will inevitably lead to some form of aggression. When the aggrieved do not have easy access to the stumbling block, they take out their violent response on symbolic representation of the imagined enemy and express in an indirect way (Hewstone and Stroebe, 2001; Cited in Jegede and Ajayi, 2008).

2.4 Empirical Verification of IPPIS

Through the primary methods used in gathering data in this study, over 275 academic and non-academic staff of University of Uyo were observed, interviewed or served with structured questionnaire, respectively in the course of this research. The number cuts across various departments majorly in the Town Campus of the University like: Political Science/Public Administration, Sociology, Economics, Geography, Communication Arts, Chemistry, Physics, Mathematics/ Statistics, Medicine, Pharmacy, Education, Law, Agriculture, etc.

In one of such interviews with a Professor (name anonymous) in the Department of Chemistry, University of Uyo, Uyo, Akwa Ibom State, Nigeria on the need to reflect his thoughts in this research, as an individual Lecturer in Uniuyo, and what he also thinks can serve as a representation of the general position of other Lecturers in his University, the Professor had this to say, *"I'm sure that there is no one that is embracing IPPIS as a payment platform"*.

In a similar vein, a Senior Civil Servant at the rank of Grade Level 12 in the Akwa Ibom State Civil Service (name also anonymous) who provided some

useful materials for this work revealed that,

IPPIS isn't implemented in Akwa Ibom State and I doubt its implementation by states in Nigeria – I'm not that conversant with its operation. Akwa Ibom utilizes a fully automated payroll system through which serves the purpose.

While Olumuyiwa (2018) studied the effectiveness of integrated payroll and personnel information system in addressing ghost worker syndrome in Nigerian public sector, Folorunso and Simeon (2021) took time to carry out comprehensive empirical investigations on what various scholars have extensively written about Integrated Payroll and Personnel Information System (IPPIS) within its short time of implementation in Nigeria as referred to some of them below.

According to Olumuyiwa (2018), the paper employed the use of primary and secondary data to explain the opinions of public servants in the Federal Inland Revenue Service (FIRS), with a population (450) consists of senior and junior workers of administrative, finance and audit departments comprise the population of the study. The three departments were directly sampled in human resources and salary administration in three senatorial districts in Lagos State. The finding of the study revealed that the strategies adopted by IPPIS addresses ghost worker in the public sector in Nigeria. It further showed that the introduction of IPPIS policy into the salary administration in Nigeria improved constant payment of employees, with observance that there are still challenges facing IPPIS in uploading monthly salary of the employees.

Micah and Moses (2018) examined IPPIS and the Ghost Workers' Syndrome in Nigeria's Public Sector. Adopting the historical research method, the study concluded that the introduction and its implementation of integrated personnel and payroll information system (IPPIS) have to a reasonable length mitigated the incentive, capacity and opportunity of fraudulent individuals to perpetrate payroll fraud at all levels. Nonetheless, few challenges were observed as technological barriers and that Major MDAs are yet to connect to the IPPIS platform over a virtual private network. Thus, it is recommended that MDAs at all levels should key into the IPPIS platform in line with the Federal Government Public sector reform agenda to minimize payroll fraud in Nigeria. Enakirerhi and Temile (2017) studied the challenges, benefits and prospects of IPPIS in Nigeria. The study submitted the benefits of IPPIS to include; accurate

and reliable personnel information, reduction or elimination of corrupt and sharp practices, facilitation of modern scientific and accurate budgeting and forecasting, streamlining payroll and personnel, confidence in payroll cost, prompt deductions and remittance to all third party funds, (PAFs, NHIS, NHF, FIRS, State Boards of Inland Revenue). Saving of funds to government from the ghost worker syndrome, improvement in management reporting and information and observed few challenges to skills transfer problem, poor supporting infrastructure, technological barriers for infer MDAs transfer, resistance from stakeholders and lack of will for accelerated implementation. Thus, concluding that the future looks bright with the implementation of IPPIS which is set to serve as an avenue for budgeting projection and planning as well as database for national statistics and reduction in government cost.

Haruna, Joseph and Samson (2015) examined integrated personnel payroll and information system (IPPIS) panacea for ghost worker's syndrome in Nigerian public service. Adopting the survey design and sampling 393 out of 24,671 staff of Kogi state local government commission. Simple percentages, means score and Spearman rank order correlation coefficient. The study observed that ghost worker's syndrome is highly imminent in the public service thus; recommends that the integrated personnel payroll and information system (IPPIS) should be adopted in the public service to ensure a virile economy through enhance productivity.

Effiong, Oro, Ogar, Raphael, Etop and Iroushu (2017) examined treasury single account (TSA), integrated payroll and personnel information system (IPPIS), and integrated financial management information system (IFMIS): application and implementation effects on fraud management in the public sector in Nigeria. Underpinning the study using Meta Theory Model, Circumvention Innovation Theory and Public Finance management theory, the descriptive research design was employed, and questionnaire administered on respondents randomly selected from the studied Ministries and linear regression model was employed in establishing the relationship between variables, the study concludes TSA, IPPIS, and IFMIS have positive and significant relationship with Fraud and fraud management as well as jointly impact the performances of Public Interest Entities. Thus, recommends that IPPIS be fully implemented to address the ghost worker's syndrome in Public Interest Entities and that public officers be technologically trained to effectively utilize TSA, IPPIS and IFMIS platforms.

2.5 Value Impact on the Nigerian Economy

Value is measurable, and in this context, value is monetized. IPPIS has come to stay as a mechanism to curtail mismanagements, misrepresentations and abuse of office in the public sector. Prior to the introduction and implementation of IPPIS several challenges have loomed the public sector environment making accountability and transparency difficult to assess in public finances. To mention, ghost workers which in most cases is perpetrated by top government officials, tax avoidance and evasion as a result of inefficient tax computation in government offices salary over and under payment issues and lack of accountability in government spending. This case has cost the government money. The pilot test of IPPIS in February 2006 showed a positive shift in the ministry case studied. Going on live in April 2007, the 7 ministries involved showed that IPPIS will provide a paradigm shift in government accountability.

Effong *et al* (2017) observed that the benefit of TSA, IPPIS and IFMIS is positively significant as it has proved to be a mechanism through which fraud in the public sector can be curbed and drastically reduced. Furthermore, Ekakirerho and Temile (2017) outlined that IPPIS provides accurate and reliable personnel information, reduces and eliminates corrupt sharp practices in public offices as well as facilitate modern scientific and accurate government budgeting and forecasting. One of the menaces prior to the emergence of IPPIS and still resident in many MDAs and other government parastatal is the “Ghost worker”. This problem usually perpetrated by top government officials to accumulate and receive salaries and other benefits on non-existing employees has continually increased personnel cost beyond the actual. IPPIS has since inception uncovered this fraudulent activity in the enrolled MDAs. Recently, 78,315 ghost personnel were revealed in the Nigerian Police Force (NPF). Evidence from Rivers state universal basic education board in July, 2011 reported an annual loss of ₦2.4billion to 1477 ghost workers.

Same way, the National Identity Management Commission uncovered 4,000 ghost workers in December 2011. The Niger state government discovered in 25 local government areas, not fewer than 20,000 ghost workers, the list goes on unending of the several discoveries made in MDAs of ghost workers and excessive payment of salaries and other benefits. Post implementation of IPPIS, the Federal government in July, 2013 identified 46,821 ghost workers in 215 MDAs (Micah and Moses 2018). Olumuyiwa (2018) study shows that IPPIS policy into payment administration has improved constant payment of salaries. Published reports showed that from 2007 to 2019, IPPIS

implementation in MDAs, NPF and other paramilitary agencies has saved the government over ₦ 600 billion (Armed, 2019). The quality of government payroll administration has vastly improved and an increasing number of MDAs are moving away from manual payroll administration.

The MDAs have the necessary information for planning their personnel costs. IPPIS has actually reduced corruption by virtually eliminating ghost-worker syndrome where applied, thereby reducing the cost of governance. The Scheme has, from its launch in 2007 to December 2014, saved the government ₦185 billion (about US\$1 billion), representing the difference between the money that government would have released to MDAs based on their estimated nominal roll submissions and the amount actually paid through the IPPIS platform. A breakdown of this show that ₦416 million was saved in its first month of operation and ₦12 billion at the end of its three years' pilot phase. The scheme now covers 359 MDAs and has successfully enrolled 237,917 members of staff and weeded out 60,450 'ghost workers'. Furthermore, it reduced the red tape involved in manual payroll administration (BPSR, 2015).

Other very many tangible beneficial impacts of IPPIS are already evident and gave credence to the fact that these reforms are not only desirable but also expedient has been recorded. The impacts include: Improved governance as reports are now timely and reliable. This has added a higher level of transparency to public finance management. For instance, the statutory financial statement for year ended 31st December 2018 has been forwarded to the auditor general for the Federation in line with constitutional provisions. Improvement in the reduction of cost of governance hitherto spent on manual processes. The massive financial losses occasion by payroll fraud and ghost-workers' syndromes are gradually being eliminated by the introduction of IPPIS in MDAs. Savings have been made, which is been used to enhance overhead capital expenditure in MDAs. The introduction of IPPIS has now brought greater confidence in the accuracy and reliability of government financial information and this has boosted and help encourage foreign and private owners of resources to do business with the Nigerian government.

For Folorunso and Simeon (2021), scholars have extensively written about Integrate Payroll and Personnel Information System (IPPIS) within its short time of implementation in Nigeria. For instance, Farajimakin and Anichebe (2017) studied the effects of Integrated Personal Payroll Information System on Employees' Welfare: Evidence from Federal Ministries in Nigeria the study was based on survey and descriptive research design and the data were

collected using questionnaire structured in hinaty format. Binary logistic regression analysis was employed. The result of the study showed that, the implementation of IPPIS had weak positive relationship with employee welfare but it was statistically significant.

In another study by Farajimakin and Anichebe (2017) on Integrated Payroll System and Government Recurrent Expenditure in Nigeria. The study used both qualitative and quantitative method of research. Data were collected through primary and secondary sources. The secondary was collected from annual reports of Bayelsa State Government, Nigeria and survey data were obtained from 30 respondents using researcher-designed questionnaire validated by experts and shown to have a reliability coefficient of 0.90. Descriptive and ordinary least square regression statistical techniques were used in analyzing the data with the aid of Statistical package for Social Sciences (SPSS) version 21. The study found that, there was positive and strong relationship between integrated payroll system and personnel cost and overhead cost.

In the study of Leyira and Temple (2018) on IPPIS and the Ghost Workers Syndrome in Nigeria's Public Sector. The study adopted a historical research method and its finding was that the implementation and deployment of Integrated Personnel and Payroll Management System (IPPIS) have to a great extent reduced the incentive, capacity and opportunity of fraudulent individuals to perpetrate payroll fraud at all levels.

While the study by Agboola (2018) on Effectiveness of Integrated Personnel and Payroll Information System in Addressing Ghost Worker Syndrome in Nigerian Public Sector was a survey research. The study utilized primary and secondary sources of data to elicit the opinions of public servants in the Federal Inland Revenue Service (FIRS). The study revealed that there were still challenges facing IPPIS in uploading monthly salary of the employees. The study concluded that with the introduction of the IPPIS scheme, if properly implemented and managed, it will go a long way in eradicating ghost workers in the Nigeria public service.

The study by Mela (2019) on the Implementation of IPPIS Policy in the Nigerian Universities by the Federal Government: Benefits and Challenges. The study was a qualitative research typed. The study revealed that, university system did not reject IPPIS but argued that IPPIS did not adequately capture university flexibility and peculiarities.

In their own study, Kaoje et al. (2020) which focused on Integrated Personnel and Payroll Information System (IPPIS) and Transparency in Government Payroll Administration in Nigerian Civil Service: A Unique Approach. The study was carried out with descriptive cross-sectional survey research design. The study found a significant moderate positive relationship between IPPIS, Transparency and Accountability.

Enakirerhi and Temmile study on IPPIS in Nigeria: Challenges, Benefits and Prospects. The study was a theoretical one that relied on various federal government announcement, opinions, stakeholders, presentations to international bodies and various articles and newspaper publications to reach its conclusion. The study found that accurate and reliable personnel, reduction or elimination of corrupt and sharp practices, facilitation of modern scientific and accurate budgeting and forecasting were major benefits of IPPIS. These benefits according to the study were however threatened by skills transfer problem, poor supporting infrastructure, technological barriers for inter MDAs transfer, resistance from stakeholders and lack of will for accelerated implementation.

Idris, Adaja and Audu (2015) study on Integrated Personnel Payroll and Information System (IPPIS) Panacea for Ghost Workers Syndrome in Nigerian Public Service. The study elicited data from both primary and secondary sources. The data were analyzed using the simple percentage, frequency tables, mean score and spearman rank order correlation technique. The study found that ghost-workers' syndrome was rampant in the public service and that the integrated personnel payroll and information system (IPPIS) if properly adopted in the public service, it would ensure a virile economy through enhance productivity.

Effiong et al. (2017) study which examined the Effects of Treasury Single Account (TSA), Integrated Payroll and Personnel Information System (IPPIS), and Integrated Financial Management Information System (IFMIS): Application and Implementation Effects on Fraud Management in the Public Sector in Nigeria. The study was conducted using descriptive research design with questionnaire administered on respondents randomly selected from the studied Ministries. The linear regression model was employed in establishing the relationship between variables and the study finding showed that TSA, IPPIS, and IFMIS have positive and significant relationship with Fraud and fraud management as well as jointly impact the performances of Public Interest Entities.

2.6 Justifications/Criticisms

The justifications or gains, from the government's point of view are the list of achievements agreed to have recorded over the short period that IPPIS has been piloted or test-run in the country, while on the other hand, the criticisms that trail the policy are mainly from those who have been affected by the process of implementation of IPPIS in the country, particularly, workers in the Federal Universities in Nigeria. In their eyes of criticisms, the supposed beneficiaries see such as challenges and 'pains' of IPPIS on workers in the country.

From the official records in the Office of Accountant General of the Federation, OAGF (2020) as cited in Folorunso, et al. (2021), below are the 'gains' and the 'pains' of IPPIS implementation in Nigeria:

The Gains of IPPIS are outlined as follows:

- i. Improved prompt and regular payment of salaries of MDAs;
- ii. Facilitation of prompt deductions and remittances to the accounts of all third-party stakeholders e.g., PFAs, NHIS etc.;
- iii. Over N361 Billion savings in personnel cost recorded between 2017 and 2019;
- iv. Financial/personnel variances trend is easily accessible and available;
- v. It makes personnel planning/budgeting easy since IPPIS is also a personnel management tool;
- vi. Enforcement of compliance with due process on employment;
- vii. IPPIS big data in various organizations are being transformed into a rich source of information which could be leveraged to make rich decision about government operations;
- viii. Many of the Departments and Agencies having realized that personnel cost was no longer coming to them for direct disbursement, embarked on recruitment to utilize their approved manpower/personnel budget; Between September, 2011 and 2020, so many Nigerians have been employed in the MDAs thereby reducing unemployment rate in the country; and,
- ix. MDAs are getting used to the application and many are currently managing their payroll at their respective offices without recourse to IPPIS Secretariat.

Others include:

- x. Elimination of unauthorized personnel workforce (ghost workers) from Government payroll;
- xi. Easy retrieval of personnel information of all public servants under the scheme;
- xii. Reduction in personnel records' falsification record of service (including age, length of service; etc.;

- xiii. Salary/monthly emoluments are paid to all public servants on the scheme same day no matter the location within the country without delay;
- xiv. Actual personnel cost paid monthly/annually are easily accessible with reason(s) for fluctuation easily given;
- xv. The scheme programmed automatic stoppage of payment to personnel due for retirement as a result of length of service, age and tenure thus reducing wastage or unauthorized payment;
- xvi. All third parties' payment (cooperative deduction, tax, NHF and Union dues, etc.) are affected from employee's salary and paid directly and promptly to beneficiaries account on behalf of payee with schedule of payment made available to the beneficiaries;
- xvii. Unapplied/unutilized fund are easily monitored;
- xviii. Planning/budgeting for training of personnel can now be done easily since IPPIS is also a personnel management tool;
- xix. Saving to government as a result of personnel cost over-budgeting.

The Pains of IPPIS include:

- i. Deliberate Institutional resistance by many MDAs in joining IPPIS in the face of set deadline for enrolment. Stiff resistance from the unions in the Tertiary Institutions more especially ASUU in the Universities and resort to incessant blackmail of IPPIS on the media for self-seeking objectives;
- ii. Inadequate Infrastructure: Poor internet connectivity to the Primary Data Centre (PDC) by MDAs on IPPIS and inadequate computer hardware for IPPIS Role Players. This inhibits efficiency and effectiveness in service delivery;
- iii. The IPPIS application has not been fully utilized. Of the seven modules on the software, only the payroll module is in appreciable use. The Human Resource modules, which are meant to manage staff recruitment, posting, promotion, training, discipline, and disengagement, are yet to be fully deployed for use by MDAs Service-Wide. The current vendor has not delivered everything contracted and paid for and the project management of the initiative has been weak;
- iv. Most of the IPPIS Staff in the MDAs have not been exposed to Oracle Training and some of the few that received the training have been deployed to other MDAs;
- v. Lack of Synergy between MDAs Desk Officers and OAGF: Finding revealed that lack of effective synergy between the two major partners

was a major setback for IPPIS implementation. The WhatsApp platform created for IPPIS Desk Officer by Office of the Accountant General of the Federation for the purpose of interacting about the challenges bedeviling the IPPIS implementation has not be active. It is ridiculous that members of the platform have never for once met to discuss about these challenges and there was no official meeting to interface with the officials of Office of the Accountant General of the Federation;

- vi. Delayed Response to complain and over-centralization: Public servant who is victims of under/over payment or complete omission of salary experienced a lot of difficulty in getting their cases addressed. Some who are working outside Abuja after series of unattended complaints from their MDAs Desk Officers resulted into travelling to OAGF in Abuja with more financial burden to shoulder. Often times, they were reversed to their MDAs Desk Officers from Abuja without solution while others get the problem fixed in Abuja. But the stress and timeline of getting the complaint addressed put such victims in more precarious condition because lots of unmet needs which might demotivate workers;
- vii. Lack of Technological Transfer: Most often, there are two-way technical hitches experience by the officials of the OAGF who claimed the consultants did not show them the complete technical know how to handle the platform properly while the MDAs Desk Officers on their own part alleged the OAGF of not giving them enough access to the platform as well as technical knowhow. The exact location of IPPIS server is shrouded in secrecy;
- viii. Sharp Practices by IPPIS Handlers: The IPPIS project has also had some scandals coming from it. Police inspectors and rank and file under the Akwa Ibom State Police Command and some personnel of the Nigeria Security and Civil Defense Corps have called on the authorities to investigate inconsistency in the payment of their salaries. They queried the operation of the IPPIS, saying they suspect fraud. The police officers involved have been suffering underpayment of their regular salary every month since 2018 when payment of police salaries and allowances was moved from Mechanized Salary Section (MSS) to the IPPIS (Nduka, 2019). In his own testimony, the former Chairman of Independent Corrupt Practices and other Related Offences Commission (ICPC), Ekpo Nta alleged that “by outsmarting the Federal Government Integrated Personnel Payroll Information System (IPPIS), some public servants

allegedly collected salaries from four different federal ministries. Some unidentified software developers have unhindered access to the database of IPPIS and usually set up new users and change live data, from time to time”;

- ix. IPPIS and Corruption: Issuing of payment slip without salary payment is another corrupt practice in IPPIS office. Once the payment slip is being issued out the money is gone and nothing can be done. Even after writing complaints letter Months after the letter was written, the affected workers were unable to get any response. It was also alleged that there are cabals in the finance section of the IPPIS that embezzle monies meant for workers in the federal civil service but issue pay slips to show salaries are paid (Sahara Reports July 27, 2019).

It is evident with these afore-mentioned challenges that IPPIS has created some other challenges while trying to solve others. In other words, it can be inferred that IPPIS implementation has resulted in creating some challenges that adversely affected public servants and government.

2.7 The Nexus between Public Financial Management and IPPIS

In a non-empirical sense, one can conclude that PFM has a serious connection with IPPIS because they both deal with finances, and public finances at that. But, in a more scientific and empirical terms, it is imperative to specifically unbundle the topic of this research and use the variables in PFM to compare with the cardinal objectives of IPPIS and arrive at the nexus (connection) between the two concepts.

For instance, it would be agreed that Public Financial Management involves the economic processes and activities of sourcing for funds and utilizing and managing them effectively and efficiently in order to achieve the desired economic goals and objectives. In nutshell, ‘sourcing for funds, utilizing and managing them effectively and efficiently’ is about being in charge or in control. Therefore, IPPIS encourages ‘saving to government as a result of personnel cost over-budgeting’ which had led to the realization of ‘over N361 Billion savings in personnel cost recorded between 2017 and 2019’. Being in control also helps in ‘planning/budgeting for training of personnel’ which ‘can now be done easily since IPPIS is also a personnel management tool’ and makes ‘unapplied/unutilized fund...easily monitored’. With the centripetal and osmotic picture between PFM and IPPIS above, the research will go a step further to analyze and test the relationship between the two variables using the

four (4) major PFM indices below. These include:

- i. Resource allocation in the economy principle;
- ii. Promotion of equity in income and wealth distribution in the economy;
- iii. Economic stabilization through price stability, exchange rate stability, interest rate stability; and,
- iv. Economic stabilization through price stability, exchange rate stability, interest rate stability.

First of all, based on the resource allocation in the economy principle, there is a nexus with IPPIS objective that is about remittances to third parties. ‘Facilitation of prompt deductions and remittances to the accounts of all third-party stakeholders e.g., PFAs, NHIS, etc.’ Secondly, the Promotion of equity in income and wealth distribution in the economy is in line with the ‘Improved prompt and regular payment of salaries of MDAs’ as one of the objectives of IPPIS is in line with the financial principle of income and wealth distribution in the economy. Once workers are paid, income so mobilized are distributed and wealth are circulated around the country. The third index of analysis is the Stimulation of growth and development in the economy to ensure high level employment, per capita income and standard of living which has a serious connection with the IPPIS objective that encourages employment in Departments and MDAs.

Thus, ‘many of the Departments and Agencies having realized that personnel cost was no longer coming to them for direct disbursement, embarked on recruitment to utilize their approved manpower/personnel budget; Between September, 2011 and 2020, so many Nigerians have been employed in the MDAs thereby reducing unemployment rate in the country’. But, fourthly however, the only PFM principle that does not seem to agree with IPPIS is the Economic stabilization through price stability, exchange rate stability, interest rate stability index. This may be so because IPPIS as a whole has no control of the economy vis-à-vis the market forces. IPPIS only receives and spend.

3. Methodology

In order to arrive at the nexus between public financial management and IPPIS, particularly as it relates to staff salaries in Federal Universities, with University of Uyo in specificity, the study adopted a qualitative research paradigm. This methodology helped the researcher to carry out the combination of explanatory, descriptive and contextual approaches in arriving at the conclusion of the research.

According to Babbie and Monton (2001), explanatory research is based on an

inductive approach towards arriving at a dense description of the phenomena under investigation. Descriptive research has to do with unfolding situations or events and implies that the representations of reality of participants should be clearly related. Finally, the Contextual approach is based on attempt to understand events, actions processes and practices in participants' context, instead of generalizing results.

4. Summary of Findings

The study was carried out to investigate the nexus between public financial management and IPPIS as regard academic staff salaries in the Federal Universities in Nigeria, with a particular focus on the University of Uyo, Uyo, NIigeria. With three subsidiary objectives and appropriate research questions, the research arrived at three findings using the following null hypotheses to carry out empirical tests. The null hypotheses include:

- i. The intention of government did not seem right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria;
- ii. The study may not ascertain if the Integrated Payroll and Personnel Information System (IPPIS) has served the purpose in 696 MDAs that are on IPPIS Platform in Nigeria;
- iii. There is no cogent reason for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU).

At the end of the study, it was found that government intention was actually right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria, but the pains associated with it far outweigh the gains of IPPIS, as an attempt to frustrate staff welfare which is tantamount to bad governance. Secondly, the study actually ascertained that not only ASUU kicked against IPPIS due to the fact that Integrated Payroll and Personnel Information System (IPPIS) has not served its purpose in 696 MDAs that are on IPPIS Platform in Nigeria, talk less of those of the Federal Universities, with the case of University of Uyo, in particular. Finally, the study found that there were very many cogent reasons for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU), otherwise, other outstanding government agencies would not have followed suit as evidently shown below.

“Apart from ASUU, NNPC subsidiaries too opposed the plan to enroll on IPPIS. The affected agencies include the Department of Petroleum Resources (DPR), Petroleum Products Pricing Regulatory Agency (PPPRA), Petroleum Equalization Fund (PEF), Petroleum Trust Development Fund (PTDF), the Nigerian Content Development Monitoring Board (NCDMB), Nigerian

Nuclear Regulatory Agency (NNRA) and Petroleum Training Institute (PTI). They accused the OAGF of insisting on enrolling their members on the IPPIS platform without taking into consideration the peculiarities of the oil and gas industry with regards to the Collective Bargaining Agreement (CBA) and approved pay structure between the unions and the federal government through the Salaries, Wages and Income Commission. Besides, they said the OAGF's insistence on the enrolment of the affected agencies on IPPIS did not consider that they were already enrolled on the revived Government Integrated Financial Management Information System (GIFMIS)".

5. Conclusion and Recommendations

5.1 Conclusion

At the end of the study, it is safe to conclude that based on the findings made in this research through the testing of the following null hypotheses:

- i. The intention of government did not seem right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria;
- ii. The study may not ascertain if the Integrated Payroll and Personnel Information System (IPPIS) has served the purpose in 696 MDAs that are on IPPIS Platform in Nigeria;
- iii. There is no cogent reason for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU).

The researcher concluded that first and foremost, government intention was actually right at the inception of the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria, although the pains associated with it far outweighed the gains of IPPIS. Secondly, not only ASUU kicked against IPPIS due to the fact that Integrated Payroll and Personnel Information System (IPPIS) has not served its purpose in 696 MDAs that are on IPPIS Platform in Nigeria, talk less of those of the Federal Universities, with the case of University of Uyo, in particular but a number of other outstanding government agencies also follow suit. On the final conclusion, there were very many cogent reasons for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU), otherwise, other outstanding government agencies would not have followed suit as evidently shown in the summary of findings above.

5.2 Recommendations

Based on the above findings, the following recommendations were made:

1. The Federal Government should listen to the complains of ASUU and endeavour to reduce to the barest minimum, the pains associated with IPPIS, or otherwise should replace IPPIS with UTAS. This is in line with

Micah and Moses (2018) who admitted that few challenges were observed as technological barriers.

2. The Academic Staff Union of Universities (ASUU) should follow dialogue with government and continue with persuasion to present UTAS as the alternative platform for payroll management rather than out-rightly kicking against IPPIS due to the fact that it has not served the purpose in 696 MDAs that are on IPPIS Platform in Nigeria, talk less of those of the Federal Universities, with the case of University of Uyo, in particular. Micah and Moses (2018) also observed that Major MDAs are yet to connect to the IPPIS platform over a virtual private network.
3. The Federal government should adopt the reasons for the outright rejection of IPPIS by Academic Staff Union of Universities (ASUU), as the University is a research ground, and would have experimented on IPPIS and found that it is not the most efficient payroll system for the country. Hence, other outstanding government agencies would not have followed suit as evidently stated earlier. Enakirerhi and Temile (2017) studied the challenges, benefits and prospects of IPPIS in Nigeria and encountered resistance from stakeholders and lack of will for accelerated implementation.

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