7th NATIONAL CONFERENCE ON POLITICAL STABILITY, SECURITY & ECONOMIC DEVELOPMENT

THEME: *Addressing the Challenges of* **SECURITY, GOVERNANCE & ECONOMIC DEVELOPMENT** *in Nigeria*

CONFERENCE PROCEEDINGS

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THEME: Addressing the Challenges of Security, Governance & Economic Development in Nigeria

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7TH NATIONAL CONFERENCE ON POLITICAL STABILITY, SECURITY & ECONOMIC DEVELOPMENT

CONFERENCE PROGRAMME

DAY ONE – Wednesday 6th December, 2023

Arrival of Conferees, Guest & Delegates

DAY ONE – Thursday 7th December, 2023

OPENING SESSION/PLENARY

Registration/Research Collaboration Discuss	- 9:00am – 11:00am
Opening Prayer/Welcome Remark	- 11:00am – 11:15am
Institutional Brief/Chairman's Opening Remark	- 11:15am – 11:30am
Research Workshop Training	- 11:30am – 12noon
Launch Break/Group Photograph	- 12noon – 12:30pm
Plenary Session	- 12:30pm – 5:00pm
Policy Review Session	- 5:00pm – 6:00pm

DAY TWO – Friday 8th December, 2023

Departure of Conferees, Guest & Delegates

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Book of Proceedings

THEORY AND CRITICISM AS PARADIGMS FOR CHANGE MANAGEMENT AND GOOD GOVERNANCE IN NIGERIA

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Abstract

At the mention of theory and criticism of the work of arts and social sciences, what rightly comes to mind is the bastardization of that work. To a lame man, criticism, whether constructive or destructive is geared towards destructive tendencies of the work of arts. On the contrary however, the position of theory and criticism in praxis is to reconstruct, redirect, recreate and reposition the work of arts for the betterment of it. The paper holds that criticism is to lend a resounding opinion or voice to a work. This implies that, we marry the idea of the original owner to the idea of the critic for a work to be achieved and receive a greater appreciation. To this perspective, this paper takes the stand that the criticism is geared towards lending a resounding and reasoned stance and also geared towards the changing phase of that particular work- be it in arts or social sciences. The study adopts the quantitative research method and applies the survey design approach to expatiate more on the position of criticism practice and its adaptability to good governance and change management. The paper, therefore, opines that such criticisms of the work towards the better and understanding of change in it can be explored and applied to a best change management and good governance in Nigeria.

Keywords: *Constructive, Basterdization, Democracy, Destructive and Appreciation*

Background to the Study

There is no gainsaying that one thing that is constant in life is change. Thus, change is pervasive in any society, particularly in that which attempts to fulfil human wants and needs. What is difficult is how to attain a concrete and structured change in the society. Especially, a society like Nigeria which lacks focused and committed leaderships. It takes committed leaders, leaders who really know the plights of the people to be committed to good governance and change. According to Victor Dike "it takes a committed leadership to accomplish a propitious change in a society" (1999: p. 2). This implies that for any society to experience what we call change; the leadership of such society should be a committed kind of leadership. That is, the leadership that really has the people or the led at heart. Those who really know the predicaments of the people. Deducing from Dike above, it is apparent that, for substantive change and good governance to be accomplished in any given society, the leaders of such society would have to be up and doing.

From the primordial era down to colonial era and now to the post-colonial and neo-colonial era, one thing that has led Nigeria to this place today is the quest for good governance and change. It is the quest for change that brought the Whiteman to Nigeria. Again, it is the longing for change and betterment of themselves that made Nigerians to refuse the colonialists or better still, the imperialists. As Dike opines that: "Nigeria's short life has been packed with successions of social changes" (1999, 2). However, these researchers make bold to contend with Dike that from 1960 when we got our independence may not be referred to as "Nigeria's short life". Because the period between 1960 and 2015 cannot be seen as short. But of utmost interest to us is the fact that this period has witnessed a tremendous period of successions of different leaderships in interest for governance and change.

It is worthy of note that Nigeria is multi-ethnic society. Simply put, Nigeria is a heterogeneous community with different ethnic groups and diverse tribes. According to Dike: "Nigeria is a nation of many ethnic and religious groups; and for this, governing the society is an enormous job" (1999: 1). Perhaps, this may be seen as one of the reasons why there has not been a stable government, good governance and leadership in Nigeria. This alone could equally be the reason why the leaders after avalanche of promises during campaigns, would turn around as soon as they get into power; there must be a diverse of plans and attention. On this, Dike further opines that:

> *To lead a multi-ethnic society while remaining committed to democratic principles or norms is an uphill task. This is because incorporating several ethnic groups into a single political system means bringing together the basic problem of ethnic conflict as well. Group loyalties dividing a multi-ethnic society can, and do undermine, a common identity, national culture, or consensus on democratic values. (1999, 1-2)*

This menace has consciously brought to the fore some political analysts, lawyers and critics who have saddled themselves with sole responsibility of criticizing and critiquing of the government at all levels-Federal, State and Local. This is done not to kill the government of the day, rather, it is geared to spur the government of the day to do more for the people.

Despite the aforementioned challenges that could hinder good governance and leadership focus, leaders have duties and responsibilities to perform for the led too. John Gardner has point out some of the tasks of leaders as to aid societies: "understand the problems that all must face, to aid in the setting of goals and priorities, to work with others in finding paths to those goals chosen, maintaining public morale, and motivation and nurturing a workable level of public unity" (Gardner 2000: pp. 132-5).Therefore, leaders must stimulate existing institutions in pursuit of the society's goals or, when necessary, help redesign institutions to achieve that result. Gardner goes further to say leaders must also help people know how they can be at their best: "...with malice toward none, with charity for all..." (p. 135). In a free society, leaders perform these functions within a framework of constraints..." (p. 135) and, all of the above mentioned are gravitated towards good governance and leadership.

But in Nigeria the story is a different thing. There is no focused leadership. The leaders do not put the masses at heart. As a result, they do whatever they want or like as soon as they get into the corridor of power. They quickly forget that they own the people provision of good governance. Most of the things they do are things that will favour them and their folks and families. Thereby invoking criticism from all spheres of life. The working class are criticizing, lawyers are critiquing government and governance in their own way, and by extension the theatre artists in the bid to correct incongruities in the society through the showcasing of dramatic piece, end up in criticizing the government. This can be seen in the plays of Soyinka, JP Clark, Osofisan, Osudare, Nwabueze, Nwadigwe, Asigbo, Utoh-Ezeajugh and a host of others.

Elucidating the Concept of Change and Good Governance

Change happens to everyone. When you mature with age, your attitude towards life changes, your physical appearance changes, your brain capacity changes, and nothing you do can impede it from happening. When change is imposed on us, our experience of the change is likely to be quite different. Well, we all face change in our life, some changes are great, others are small but neither less there will always be change. Change, what is change? To these researchers, the working definition or meaning of change is, something new and you experience changes throughout your life. It implies that everyone has experienced change and will experience many more in the future because change is a natural part of life.

As individuals we face change, as community we face change, as local or state or federal government we face change. For instance, as a nation, we have faced changes from different government to another government in search of good governance. That is, from the pre-colonial (time before colonialism) to colonialism (the colonial period) and post-colonialism (time after colonial period) are all forms of changes that have transpired in the bid to locate good governance in the history of Nigeria. Even the neo-colonial madness too is a change in disguise. More related to us are the different moves from military governments to civilian governments to military governments and to civilian governments are all geared towards good governance and changes that have happened in the history of this great nation. The transition between Obasanjo and Yar'Adua is a change and in search of good governance because the later has not ruled this nation before. The transition between Goodluck Jonathan and Muhammadu Buhari is a change from 'New' to 'Old'. It is equally in bid to locate good governance. The rhetorical question is to whether these changes that have transpired in the history of Nigeria have really helped in the development and providing good governance of/for the great nation. Perhaps, what we have witnessed is a retrogressive movement in history of Nigeria. Because as they change and look for good governance, people wish that this was better than the former, but the reverse was always the case.

Change. This word is very popular now that we have a 'new' political party ruling Nigeria. APC as political party uses 'CHANGE' as their slogan. In this vein, Josiah Kente 2008, opines that: “This slogan which forms the basis of All Progressive Congress (APC) party's philosophy-a party” (p. 46). A party that at the beginning people see as the party that will take the people to the promise land (providing good governance) but the opposite is the case. Once there is a shout of APC! What one hears is CHANGE! This menace makes change and good governance more pronounced that the people of this nation now attribute the way the government is going as 'change'. The subsidy removal is also referred to as 'change'. That again has helped in the perceptions of the people on the ground of change as having different connotation than its orthodox meaning. This perhaps attests to President Muhammed Buhari's denotation to change as: “not business as usual”. Thus, a study of varied texts reveals that the journey to changes in perspective may be gradual or instantaneous, a significant event often prompting an epiphanic recognition of change. This is equally in line with President Muhammadu Buhari's taking over speech:

> *Our change slogan is not campaign gimmick but a promise that must be kept. We are determined to bring about tangible changes in the lives of our people. In this regard, efforts will be intensified to recover stolen funds, block revenue leakages and enthrone due process, transparency and accountability. (The Nation, 2015, 6)*

In tandem with Kente that Buhari's 'not business as usual' “points to principality, accountability, transparency and steadfastness as operating parameters of the regime” (2016, 47). May be, this is one of the sole reasons why President Muhammadu Buhari sticks to recovering and revealing stolen funds and looters respectively. Which is also seen as step towards good governance in Nigeria. The Transformation Agenda is also a change in another form and we witnessed PDP's transformation tendencies and hegemony. This equally accounts for the creation of Treasury Single Account (TSA) where all government revenue is being deposited. This may help government monitor the inflow of cash and outflow of cash.

A Discourse on Criticism and Theory

Theory is seen an assumption or system of assumptions, accepted principles, and rules of procedure based on limited information or knowledge, devised to analyze, predict, or otherwise explain the nature or behavior of a specified set of phenomena, abstract reasoning. They may equally be set rules, principles and procedures that sets the basement for empirical and verifiable study of a set of phenomena.

Criticism on the other hand, according to Kenneth Kanu's opinion is: “the art of judging or evaluating the beauties and the faults in a work of art objectively, without partiality, without the intrusion of our personal feelings, personal liking or disliking of either the work or the author” (2008, 26). More strictly construed, the term covers only what has been called “practical criticism,” the interpretation of meaning and the judgment of quality. Criticism in this narrow sense can be distinguished not only from aesthetics, but also from other matters that may concern the teacher and student of literature: biographical questions, bibliography, historical knowledge, sources and influences, and problems of method. Thus, especially in academic studies, "criticism" is often considered to be separate from "scholarship." In practice, however, this distinction often proves artificial, and even the most single-minded concentration on a text may be informed by outside knowledge, while many notable works of criticism combine discussion of texts with broad arguments about the nature of literature and the principles of assessing it.

Criticism is here taken to cover all phases of literary comprehension and understanding. It applies, as a term, to any argumentation about literature, whether or not specific works are analyzed. Plato's cautions against the risky consequences of poetic inspiration in general in his *Republic* and Aristotle's exploration on the elements of a good play and tragedy in *Poetics* are thus often taken as the earliest important examples of literary criticism.

Deducting from the aforementioned, it is crystal clear that criticism in theatre practice; ranging from both the play as in text and the play as in production is geared towards the greatness of the work. Hence, a critic is: "one who expresses a reasoned opinion on any matter especially involving a judgment of its value, truth, righteousness, beauty and technique" (Kanu 2008: p.27). For instance, if one is a true theatre goer, there is every tendency perhaps that he has witnessed a viva/assessment session in the theatre. The viva session is a situation where the gurus/critics in the profession lend their reasoned opinions to the production and the opinions give it a changing face; befitting face. Sometimes, such plays are being referred for a reproduction, where the dusted areas would be corrected and effected. When the play comes up again it will be superb. That is exactly what theory and criticism does in the praxis of theatre. We see various theories metamorphosing from one stage to another. A typical example is modernism to postmodernism and in Africa, Afro postmodernism. All of these geared towards the betterment of the society. The title of Canice Nwosu' *Postmodernism and Paradigm Shift in Theory and practice of Theatre* is a good example. This alone signifies a move away from one concept to another to perhaps solve a problem. Ziky Kofoworola asserts succinctly that:

> *Trends in the theory and criticism of African drama can also be considered as a form of academic exercise which will continue to generate interest among the African and the African intellectuals for a long time to come. This is because drama provides an exciting forum for dissecting societal ills and problems with the ultimate aim of finding solution. (2015, 160)*

Therefore, theory will continue albeit to change from one form to another. Likewise criticism. As Ameh Akoh (2007) cites Eagleton that human existence: "is itself to some extent theoretical and theory becomes a daily activity ..." (1). Especially the one that has to do with political ideologies and party manifestos to move the society forward or to the next level by creating good governance. To this realm. Akoh (2007) also posits that: "theory aids the stability of (human) signs by which communication is largely carried out..." (p.1). These explicate vividly the position occupied or the place of/by theory and criticism in the existence of human, all facets of human existence.

Change Management and Good Governance in Nigeria

The management of change by the Nigerian government can be deduced from this illustration: as companies continue to strive for excellence, the need for change becomes more and more of a factor. Hence as Nigeria continues to crave for good governance, the need for change becomes more and more critical. Thus, the thoughts of this study is how change and good governance can occur and why the need for planning to change and for good governance was necessary. The study believes change and good governance is inevitable and all organization must change to survive. Consequently, Nigerian government just like top management must be committed to listening and change and provide good governance in accordance with the wishes of the people. That is Nigeria must strive for excellence too through the abovementioned route. For the current federal government to be able to bring to bear her change mantra, the yearnings of the people that is, the led must first and foremost be considered. They must listen to criticisms of various type as the critic is seen as anyone who articulates a reasoned/ resounded opinion on any matter (whether politics) involving judgment of its (political) value, truth, righteousness, beauty and (political) technique.

Subsequently, the critic in the political realm is in fact a teacher, prophet, philosopher, who must exercise his ingenuity and prowess through the assumption of stage to lead his audience/people or populace to appropriate comprehension, understanding and realization and recognition of the levels of ideas and the niceties of emotions and aesthetics of various political parties as they assume power and their manifestos. Essentially therefore, the political critic as a teacher and prophet should be knowledgeable and honest in that perspective to avoid misinformation and misconceptions by the society and the people therein.

Owing to the above, The Macquarie Dictionary defines "change" as revolutionizing, substituting, altering, and modification. Change is every shift that occurs in a person, in an environment, and in a state of any kind. All these changes take place around us that impact us directly and indirectly. It is a time of significant change in one's life. It will impact how we relate to concepts and issues. Hence Nigeria and Nigerians too must plan on how to manage change because change itself is inevitable. The inevitability of change makes it a vital organ in the existence of mankind. Now that it has been identified that man cannot do without change, there is the need for man to therefore prepare for how to manage change for good governance as soon as it comes in his existence.

The following concept can be adopted for a meaningful change and good governance in Nigeria. The concept of problem posing is what helps us better to see reality and its true characteristics. This concept is the teacher and student learning from one another whereas the banking concept of education is the teachers knowing all and teaching all. These two concepts are very different. Without meaningful change, we would no longer progress in our lives; in fact, we would never be able to change for the better. Trees that do not change die, people that do not change die. No one thing can change by itself. If the environment around someone does not change, they may find it hard to change and provide good governance. If an environment changes throughout time people may not notice the change until they look back as they have changed with the changing scene. Therefore, one can categorically say that democracy and good governance are geared towards evolvement of different slogans as one party succeeds the other. Even in the same party as one person succeeds another person, they may hold different ideologies which is change in itself. This is succinctly captured by Eni (2014):

> *Questions concerning the nature and conditions of democracy continues to dominate discourse in developing countries as new groups and movements mobilizing for political reforms continue to emerge in contradictory circumstances either to challenge the existing political and democratic system or to foist a new one on the masses. (11)*

The position above by Eni explains concisely why there will always be change and the quest for good governance in the political terrain like Nigeria. This is because members of the society cannot hold the same political or economic ideology. Examples can aptly be deduced from the time of President Olusegun Obasanjo to President Musa Yar'adua to President Goodluck Jonathan down to President Muhammadu Buhari Buhari. In the time of brief stay of President Yar'adua it was 7-point agenda. Then came President Jonathan, despite that he is flying the same flag with Yar'adua changed his slogan to Transformation Agenda, under the same political party. The coming of All Progressive Congress (APC) with President Muhammadu Buhari as flag bearer used 'change' as its slogan. The year 2023 marks another historical epoch making in the history of Nigeria with change of government from one civilian government to another one. As it is in the tradition of Nigeria, every leader with their own mantra. The current leadership in place in Nigeria came up with the mantra of good governance and inclusive government. Governance is much more than administration. Yet a good administration must include the principles of Good Governance.

This is exactly the argument of Eni above. Where Eni (2014) further opines that, "These conditions have led to the emergence of conflict zones within the body polity of Nigerian nation" (p.11). Corroborating this, Dike opines that: "winning party guides or influences policies, and the distribution of resources in that polity" (Dike 1999: p.19). That is why Fairchild (1988) defines change as "variations or modifications in any aspect of social process, pattern, or form;" (p.277). Lauer (1982) also defines change as: "any modification in established patterns of inter-human relationships and standards of conducts" (4). Yes, the political ideological variations should be seen within democratic concomitant that you find out people in attempt to condemn democracy use democracy. Concisely, Soremekun (2016) observes that: "Democracy and its concomitant essence have continued to be the prime issue in scholarship" (p.1).

The change witnessed in the different eras of playwriting is a change towards a betterment of play and the society. This was embraced to the extent that in theatre praxis, we have different generations of playwrights with different ideologies, theories and criticisms. Examples of theory and criticisms can be cited from the time of Plato, Aristotle as Ameh Akoh (2007) succinctly asserts that: "...theory had always existed since Plato-Aristotle, or even earlier in its orality, in no other period in history has it so vigorously been a subject of academic discourse than the last three decades of the twentieth Century up to date" (p.1). Hegel, down to more recent theorists like Sigmund Freud, Karl Marx and a host of others. This trend has equally galvanized playwrights from different spheres of life to adopt any theory that best explain his or her thought appropriate exploration. That is why if you pick Sophocles' *Oedipus Rex* and Rotimi's *The Gods Are not to Blame.* They follow Aristotelian conventions to suit that time. While if you take a critical mien into Author Miller's *Death of a Salesman,* this follows Hegelian concept. But when you critically look at a more recent plays like that of Osofisan *Red is the Freedom Road*, Nwabueze's *A Parliament of Vultures* they tilt more to Marxian Aesthetics for the deconstruction of older conventions and the reconstruction of new society through the change and the provision of good governance. This too can be adopted in the political terrain. And if they exist, there should be plans towards the reexamination of them for a better society.

Conclusion

Deducting from the discourse above, there is need for this researcher to take a stand. It is apparent from the study that theory and criticism in the theatre parlance is highly encouraged to help in fine tuning the play text or play production. If that is the case in theatre practice, then it is hoped that when applied, institutions like politics outside the theatre, it will equally help in reconstructing, redesigning, reshaping and reorganizing the society. Especially, when theory and criticism is adopted in the political arena, political parties would begin to take shape in their ideologies and manifestos. Criticism as opined above, is clearly towards a sound position of the work. Therefore, criticism will help greatly in the reshaping and management of change mantra and the provision of good governance for the current ruling party (APC).

Change has taken over the lip of every average Nigerian. Especially now that it seems that change is happening on the negative pedestal. Every commodity's price is going up, ranging from Kerosene, petrol and the prices of food items in the market have gone higher drastically and people begin to see change from a different dimension. What one hears is, 'this is not the kind of change we voted for'. However, this is correct. Equally, this is criticism of some sort. Our leaders should listen and look at how they can alleviate the suffering being faced by the people that voted them into power. If they do this, then political criticism or policy criticism has taken place for a better life. On the above-mentioned, it can be observed that theory and criticism would have helped in managing change and providing good governance in Nigeria. Since democracy is seen as government of the people, by the people and for the people. Because as the government observes, listens and tilts to the kind of change they want, then we can say that there is change management and the provision of good governance in Nigeria. At the end, people will have the cause to glorify and gratify the government of the day. This is not to say messiah party has come as rightly observed by Tinubu:

> *The past century has seen the expansion of forms of democratic governance throughout the world including Africa. Democracy is well considered the most legitimate form of government that no one dare publicly speak ill of it. The lack of vocalization does not mean lack of enmity. It would be premature*

> *and naïve to conclude that true democracy has emerged triumphant. History is still being shaped and verdict is yet to be rendered. (Tinubu 2016, 2-3)*

Another erudite scholar opines that: "The political culture in Nigeria is not one that can produce the kind of leaders that would be committed to serve the people that elected them into office." (Ayakoroma 2014, 8). This is to say that we may optimistically have a long way to ply, to get to the promise land. But with the adoption of political theory and criticism, the journey may become shorter than expected.

Recommendations

Based on the discussions and various scholastic opinions above, it becomes imperative to give a handful of recommendations that could assist in the reconstruction of the political situation of Nigeria if the change and good governance must be well managed. Theory and criticism should be seen from the perspective that they are in existence to help in the reconstruction and reposition of ideas and thoughts. They help in reshaping political manifestos and ideologies for a betterment of it. If this is done then we are on our way to good governance.

Political leaders should listen to different forms of criticism to enable the government meet up with the needs and wants of the led or populace. Criticism, whether constructive or destructive should be adhered to, so that government would do what exactly the problems of the people are at the moment. Political parties and flag bearers or leaders should lend listening ears to the criticism by political critic and analysts and the people to enable them do what the people want (good governance) and lead well. The led or the subjects or the populace should put into consideration that the leaders are human beings, and as such they are not perfect. Therefore, they must understand that most of their promises during electioneering campaigns are mere gimmicks to win elections. Thus, for lack of sincerity and confidence, they make empty promises.

On the other hand, too, leaders should deviate from making unfulfilled and empty promises. They should run away from what they cannot achieve to things that are achievable in a short time. They should know fully well that there are things that are not achievable within a short time. There is the need for political ideologies. And if there exist political ideologies that can help in the change mantra and provision of good governance, they should exhume and put them into practice. If there is none, they should try to evolve one.

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PRACTICALITY OF ENTREPRENEUERSHIP EDUCATION AS A CATALYST TO POLITICAL STABILITY, INSECURITY AND ECONOMIC DEVELOPMENT IN NIGERIA

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School of Vocational Education
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Abstract

The level of unemployment and insecurity in Nigeria today in not only alarming but required a declaration of 'National Emergency'. There two vices are resultant of lack of practical skills training of our graduates for self-reliance. The National Commission of Colleges of Education (NCCE) and the National University Commission (NUC) have seen the light in the tunnel. The introduction of Entrepreneurship Training Centres in our Tertiary Institutions is long overdue. This paper therefore attempts to examine the need for practical skills acquisition by our graduates and the roles practical skills acquisition might play, in mitigating insecurity, unemployment, political stability and the resultant economic development. The paper wish to suggest that the Federal Government should as a matter of national importance tax all private sector within Nigeria to fund these skills acquisition centres in our Tertiary Institutions through TEDFund Systems.

***Keywords**: Practicality, Entrepreneurship, Training and National Development.*

Background to the Study

Rashid (2022), asserts that it is a valid point that the world today is attracted to ideas and practical steps that communicate and inspire change and bring developmental outcome. Therefore Vocational, Technical and Science Education (VTSE) is increasingly recognized globally as effective means of empowering young people to engage in productive and sustainable skills that engenders development. This statement gives light to what productive skills acquisition will be to a nation. But the white colar job syndrome and the theoretical framework of our learning institutions guided the formulation of our institutional syllabus. The overwhelming population of our developing economy has call for a re-think in our educational system. Our olden day's philosophy of – "whether pass or fail – man must wakk" does not see the light of the day in our modern society. The hidden ingenuity, creativity and innovative ideas that young graduate have, can only be tapped if given the opportunity to show case them. Most developed economy today excel as a result of the opportunity avail to their citizens to exhibits their hidden talents. Today we are benefactors of these hidden talents Bill Gate to mention but few.

Practical acquired skills is the bedrock of a gendering entrepreneurship development. Okolie and Ogbaekirigwe (2014) asserted that becoming self-employed would not be easy if the individual has no sellable skills. When she/he has such skills, she/he is empowered, and this brings the need for skills acquisition and manpower development. To sum up the need of skill acquisition as opined by Mgbonyebi and Olaniyi (2019) as in Okoro (2021) Educating people on the need for making their own business decision, acquiring some basic vocational skills and using them with the knowledge gained in school is a bedrock of economic empowerment and development which is urgently needed. In similar vein Okereke and Okafor (2011) as asserted in Okoro (2021) that entrepreneurship skills have been acknowledged worldwide as a pertinent and rewarding tools for job creation, self-employment and economic survival of any nation.

This needs has been acknowledge by both the National Commission of Colleges of Education (NCCE) and the National University Commission (NUC), The National Commission of Colleges of Education (NCCE) have mandated all Colleges of Education through its minimum standard for NCE (2020) to incorporate skills acquisition training and possibly establish a centre to handle this, while the National University Commission (NUC) has introduced a course in the school of General Studies to handle practical skills training in different trades of students choice. The primary motive is towards provide multiple opportunities to students who will acquire skills related to a particular profession along with general education. It is also geared towards helping students tap their capabilities, develop real-life skills and prepared themselves to be successful in the careers of their choice.

Conceptualization of Entrepreneurship

To dwell into the concept of entrepreneurship, is to re-write the historical advancement of man on the planet. Entrepreneurship is as old as man himself. But for the purpose of this paper lets borrow leave from current prominent scholar on what they conceptualize on entrepreneurship. Sousa (2018) conceives entrepreneurship as an individual or collective system that are internal or external to the organizational structure, developing something new from the conception of ideas to the creation of a business. Drunker (1985) in Sousa (2018) defined entrepreneurship as a systematic innovation which consists of a purposeful and organized search for change, and it is a systematic analysis of the opportunities in which such changes might offer economic and social innovation. In Okoro (2021) words Entrepreneurship Education is a programme of study that has to do with imparting skills on individuals on how to make a business successful. The Concept of entrepreneurship are built on skills. While skills is that aspect of physical ability of an individual to excel in a particular trade. Mork et al (2013) in their research work Entrepreneurship and practical skills gave meaning to skills to be skill is the learned capacity to carry out pre-determined results and that knowledge can be articulated, codified and stored in certain media and it can be readily transmitted to others. This paper attempt to discuss entrepreneurship from its practical aspect of acquiring skills that will mitigate insecurity.

The problems of youth involving in criminal acts are as a result of lack of skills that will make them gainfully employed. Most graduates roam the streets in search of white-collar jobs which in today's world are not readily available. Entrepreneurship skills are very vital for the economic survival of graduate in today world. Mgbonyebi and Olaniyi (2019) said educating people on the need for making their own business decision, acquiring some basic vocational skills and using them with the knowledge gained in school is the bedrock of economic empowerment and development which urgently needed. Okereke and Okoroafor (2011) in Okoro (2021) asserted that entrepreneurship skills have been acknowledge worldwide as the pertinent and rewarding tools for job creation, self-employment and economic survival of any nation. In Okoro (2021) words effective and efficient skills development systems which connect education to entrepreneurship skills acquisition can help a nation system productive growth and development and when improved upon can lead to creation of good jobs which in turn enhances the people standard of living. Entrepreneurship skills therefore are skills acquired by individual to enable him to function effectively as an entrepreneur in a buriners environment.

In the management world, there are three basic general skills required by any individual who attempt to manage an organization. These are Technical Skills, human skills and conceptual skills. These skills are paramount in any management situation and are required by any entrepreneur.

Entrepreneurship Skills – The Practical Framework

Apart from the general skills that are required by any to be a manager/entrepreneur i.e technical skills, human skills and conceptual skills, these also exist skills that are prevenient in entrepreneurship development. These skills gives the individual relevance at both national and global entrepreneurship. Okoro (2021) asserted that these skills will give the individual global relevance. She said they include:

I. **Accounting Skills:** This includes skills that enable assessment, documentation and communication of relevant economic reports to interested individuals and business concern.
ii. **Marketing Skills:** As competition for customers become intensified, business owners must be cognizant of the urgent need to develop creative marketing strategies, knowing full well that the survival and success of the enterprises depends on it (marketing).
iii. **Managerial Skills:** Management skills is competencies obtained to enhance the process running, directing or administering one organization. These skills include planning skills, directing skills and controlling skills. Planning skills in the process

of setting up targets or objectives to be achieved in the future and outline appropriate means of accomplish them. Directing skills is the exterting of influence on people to work towards the organizational goals. While controlling is the process of ensuring the organizational objectives are being attained and correcting lapse where they occurs. While Okolie and Ogbaekirigwe (2014) added others to include:

iv. **Innovative Skills:** They are skills that graduate are expected to have acquired to enable him innovate, create or introduce something new that may be capable of sustaining them and others within the society. This enable you to think deeper on innovative products, goods and services that are of more benefits to the society which were not in existence.

v. **Practical Skills:** They are skills that enable one to handle tools, equipment and at same time know how to mix objects or join object or two object to produce another. He/she should be able to transform materials into products and services. This is the core aspect that every graduate need in life.

vi. **Self -Motivation Skills:** Is the ability to be moved such that the practical and innovative skills acquired can be put to production of goods and services. Self-motivation is the ability to be self confident with extra drive and commitment to make sure necessary steps are taken to make dreams of success.

vii. **Professional Skill**: It involve ethical behavior, code of conduct, customer care technique and opportunity recognition and exploitation.

viii. **Time Management Skills:** The ability to plan and manage time effectively with the clear idea of what to do, at what time and day.

To summaries entrepreneurship skills, I wish to borrow from Chell (2013) as sited in Hill University Business School research (2015) skill refers to proficiency in performance and maybe enhanced by practice and training. She went further to say skills are multidimensional constricts; they comprise the cognitive - knowledge and what it learnt; the effective - emotional expression and what is experienced; the behavior action at strategic, tactical and personal levels and the context – sectoral, occupation, job and task levels. From the background of what are skills and the types of skills required by an entrepreneur varies according to situations. Skills are pertinent in the entrepreneurship development, the way they are acquired plays a significant role in the success of an entrepreneur. In a nutshell, experiential learning linked to specific situations/issues is more likely to be successful in developing entrepreneurship skills than classroom-based learning.

The Need for Practical Skills Acquisition in Nigeria Tertiary Institution

Development of skills acquisition into the Nigeria higher institutions is not a new issue. One of the primary objectives of Industrial Training Fund (ITF) was to link most vocational and technical learning institutions to practical work experience scheme with both private and public institution for student practical (on the job experience). This idea is not only outdated but does not faces the reality of today's economic world. The students/graduate population coupled with unavailable white-collar jobs call for a rethink in this trainings system. This with no prove, the paper assumed that lead the National Commission for College of Education (NCCE) and the National University Commission (NUC) to see the need of establishing a skills acquisition center in all their tertiary institutions. This idea has long been overdue. The youth unemployment is a resultant of lack of skill trained jobs after graduation. The student work experience scheme supported by the Industrial Training Fund (ITF) is not sufficient enough to give our graduate trainings that will enable them stand on their own. The unemployment rate of our youths (graduates) have led to all vice, including of recent time, kidnapping, arm banditry and political toggeries. Our institutions of higher learning have and is still concentrating on the theoretical and abstract instructional deliveries. The labour force are still imbibe to paper qualifications rather than experience and what one can practically do.

The practical skills Centre will contribute to new wealth creation, new markets, new industries, new technology, new establishments, new job creation, and give rise to higher productivity and resultant rise in standard of living. As rightly opined by Olasunkanmi (2016) the inculcation of entrepreneurship skills in the students of tertiary institution will lead to the creation of awareness and understanding of the socio-economic and environment situation for sustainable national development. He went future to say it will ensure stable national growth in the provision of employment options for Nigerian graduates. This he says will lead to capacity building of the beneficiaries mentally, physically and intellectually, there by placing them on the advantage of acquiring, interpreting, extrapolating information and consequently applying such capacities in building self in particular and nation in general.

These skills acquisition center will lead to viable economy with more employers rather than employees. Young men and women will create jobs and, in some cases, hired others. Using school of vocational education for instance there are skills and jobs that could be created which are over bound. These include skills like Modern Crop Production Technique's, Modern Animal Production Technique's, Animal Feed Production, Fisheries and Fish Feeds Making in Agricultural Education Department. In Home Economics Education we have skills like Needle Craft, Confectionaries, (snacks, and drinks midauction) Restaurant Management, Garment Marking, Beads Making, Knitting and Crocheting, Cosmetic Production and Interior Decoration and Event Management. While the Fine and Applied Art Education will have skills to include Greeting Card Design, Lettering Construction and Three-Dimensional Construction, Flex Design and Production. The Business Education trained all on the entrepreneurship financial control, which include Book - Keeping and Records, Management of Resources, Business Plan Development and other needed skills in Business Management.

Challenges to Practical Skills Acquisition Centres Within Our Tertiary Institution

Higher institution in Nigeria today is yearning to the call of their supervisory bodies like the NCCE and NUC by establishing skill acquisition centres within their institution. But the basic challenges facing these centres are the possible recognition of these centres into the institutional budget of the State or Federal Government. The centres are left on their own to source fund from the already exhausted students fees. Also the institutions are left to their personal will to see how they could integrate this learning programme into the already chope up academic calendar of the institutions. Bye and large there are no provision of private trade/skill instructor(s) to be brought in from the outside the institution for training. There are no provisions for their payment in the institutional budget. All these and others to be uncovered can help the success of these centers in their institutions.

Conclusion

Practical skills acquisitions can become the main solution to our perennial unemployment problems in Nigeria. An emty mind is a devil workshop as the saying goes, acquired skills can remedy the alarming rate of kidnapping, banditry and political toggeries within our society. Young graduates will be willing to attest their acquired skills by creating jobs for themselves and possible employed others within their communities. These skills centres can also be a remedy to withdrawn students who will acquire skills to make their personal living. The centers should also be a community base needs by establishing skill/training in trade that are must sellable within their environment (Local Government, State and the Nation at large).

Recommendations

This paper wish to re-emphasized that the need for this skill acquisition center is long overdue within our tertiary institutions. The paper suggests that:

1. The Industrial Training Fund (ITF) objectives should be re-defined to incorporate the Skill Acquisition Training Center into their mandate. The ITF should abolish the SIWES Programme.
2. A ONE YEAR Skill Training Program be incorporated for all tertiary institutions either after 200 level for NCE, Diploma or HND and 300 level for undergraduates. This should be made mandatory just as the NYSC. Provision should be made for students training allowance throughout the period of training.
3. A tax fund for this centre should be charged on private sector of our economy to finance these centres just like the TEDFund is today. Such fund could be added to the mandate of TEDFund or an independent fund created to oversee the disbursement to the institutional centres.
4. Special fund/financing facilities should be created for all graduates seeking financial support in the Bank of Commerce and Industry with minimal bottle neck of collateral. The trade skills certificate and graduate certificates could be used as their collateral.

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CHEMISTRY EDUCATION FOR GOOD GOVERNANCE AND ECONOMIC DEVELOPMENT IN NIGERIA: REVIEW

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Abstract

This Paper takes an in depth look at the issues and challenges surrounding the use of chemistry education for good governance and economic development in Nigeria. It reviews the various aspect of this topics, including the need for improved knowledge and understanding the chemical science in Nigeria, the current state of chemistry education and its role in Nigerian economy, the impact of environment and culture on the effectiveness of chemistry education, and the current efforts being made to improve the quality of chemistry education in the country. The paper reviews some of the several factors which are the key obstacles to achieving good governance and economic development in Nigeria through chemistry education. These include policy gaps, lack of reliable data for evaluation, inadequate funding, and absence of a comprehensive and coordinated national strategy. The paper concludes with suggestions on how to overcome these obstacles and improve the use of chemistry education for good governance and economic development in Nigeria. These recommendations include development of national chemistry education strategy, increased investment in research and development, and promotion of public-private collaborations. By implementing the suggested strategies, Nigeria can take advantage of potential economic benefits of chemistry education and, in turn, achieve greater good governance and economic development.

***Keywords**: chemistry, education, Chemistry Education, Economic development, good governance.*

Background to the Study

Science and technology make immense contributions to the material wellbeing of any country, if certain requisites are met. But in most developing countries, lack of scientific and technological knowledge is often a critical limitation to economic progress. This fact is borne out by the experiences of developing countries which are ready to acquire, adopt and apply techniques derived from scientific knowledge. There is a clear need to improve on science subjects in our schools if the country is to meet the rising expectations of the people. With the goal to increase the materials wellbeing of the expanding population, there is a need to improve in scientific knowledge. Therefore, all students at all levels of Education must have unrestricted access to the knowledge of science to gain insight into the foundation of many of the achievements of humanity (Emendu, 2014). The keywords chemistry, education, good governance and economic development are defined accordingly as Chemistry is typically an investigative and experimental science involving the study of nature and properties of all forms of matter coupled with the changes these matters undergo under different conditions. Education is the process of training and institution especially of children and young people in school and colleges which is designed to give knowledge and develop skills (Erinosho, 2005). Economic development is programs, policies or activities that seek to improve the economic well-being and quality of life for a community and each community has its own opportunities, challenges, and priorities.

Aim of the Review

The current review aimed to highlight the role of chemistry education for good governance and economic development in Nigeria.

Objective of the Review

This research is a review article describing chemistry education, sustainable development and its impact on the economy. Also to understand and provide an elaborate discussion on the importance of chemistry education for economic improvement

Material and Method

Search Strategy

To carry out this review we searched out the articles from various databases. Literature review is a method of collecting data in a way looking for information through books, newspapers, magazines, and other literature. The review articles in the research sourced from several journal studies related to chemistry education and its economic impact as well as role of good governance. Furthermore, the keywords included: Chemistry, education, chemistry education, good governance and economic impacts.

Discussion of Review

Chemistry Concept

Chemistry has been one of the cornerstones of science, technology and industry, it is apparent that chemistry plays a greater role in national development through industry in the world. As such it helps to provide some social amenities and has been the pivot of science and hence the most needed tool, scientifically, for human, capital and economic development. The concept of chemistry as a science is centered on life and this encompasses the three states of matter-solid, liquid and gas in a give and take processes (Bugaje, 2013).

According to Uwague and Ojebah (2008), chemistry is one of the naturally and well-established means through which the nation's abundant natural resources can be harnessed into useful ventures for the overall economic and socio-political wellbeing of its citizenry. Okieimen (2007) equally asserted that chemistry is all about everything in the world. He added that chemistry is the nucleus of science which ultimately is the foundation upon which any nation is developed. Chemistry certainly cannot be divorced from any today human activities.

Concept of Education

Education began in prehistory, as adults trained the young in the knowledge and skills deemed necessary in their society. In pre-literate societies, this was achieved orally and through imitation. Storytelling passed knowledge, values, and skills from one generation to the next, as cultures began to extend their knowledge beyond skills that could be readily learned through imitation. Education is performing two majors' functions in advanced industrial societies transmitting the shared values of society and simultaneously the specialized skills for an Economy development.

Adesola (2015), states that education is a process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. Educational methods include storytelling, discussion, teaching, training, and directed research. Further he stated that education frequently takes place under the guidance of educators, but learners may also educate themselves. Education can take place in formal or informal settings and any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. The methodology of teaching is called pedagogy. Adesola. A. (2011) The contributions of education on Economic development unpublished paper university of Ibadan

Concept of Chemistry Education

Chemistry is a popular subject among senior secondary school students in Nigeria due to its nature. It addresses the needs of majority through its relevance and functionality in content, practice and application. What many nations like Nigeria need now is a functional chemistry education that will assist in national development. Chemistry education has been identified to be one of the major bedrocks for the transformation of our national economy (Emmanuel, 2013).

Chemistry education is the study of the teaching and learning of chemistry in all schools, colleges and universities. Chemistry education also includes the understanding of how students learn chemistry, how best to teach chemistry, and how to improve learning outcomes by changing teaching methods and appropriate training of chemistry instructors (Okon, 2008). Moreover, Chemistry Education has been identified to be one of the major bedrock for the transformation of a nation's economy. It is needed for the production of the needed technologists, technicians, engineers, medical practitioners who are required to turn the nation's economy around and usher in the desired technological advancement which is very much required for sustainable development (Uwague & Ojebah, 2008).

Concept of Good Governance

Good governance is a system of government based on good leadership, respect for the rule of law and due process, the accountability of the political leadership to the electorate as well as transparency in the operations of government (Odock, 2006). It is governance that provokes and defines the nature of security. When there is governance failure, the security framework deteriorates. Good governance is able to provide growth and structural change which result in development. Such structure includes schools, judiciary, military, and parliament. When the resulted structural change performs their roles properly, there will be security and the good governance will further be enhanced. Governance is defined as "the way in which socio-economic power is exercised in managing affairs within a nation" (Manu, 2002). In this light, governance of education implies the way in which education institutions affairs is managed within the developing nations. In order to achieve this, rule of law must be adherent to in totality. Rules and policies must guide any governance of education system and made enforceable by all and sundries within the system.

Function of Good Governance for sustainable Chemistry Education

Good governance has 8 major characteristics. It is participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law. It assures that corruption is minimized, the views of minorities are taken into account and that the voices of the most vulnerable in society are heard in decision-making. It is also responsive to the present and future needs of society.

i. **Accountability:** In governance of Education, government should be able and willing to show the extent to which its actions and decisions are consistent with clearly defined and agreed-upon education set policies, objectives and vision for development of the nation and making her nation a global reference. Feedback mechanism on regular interval should be given perquisite.
ii. **Transparency:** Governance of education requires motions, decisions and decision-making processes as open and transparent at appropriate level for scrutiny by internal stakeholders, civil society and, external stakeholders in some instances should have access to information relating to the administration processes.
iii. **Efficiency and Effectiveness Policies: G**overnance of education involved strives to produce quality education policies outputs, bordered on services delivered to citizens, at the best cost, and ensures that outputs meet the original intentions of set goals.
iv. **Responsiveness:** It should have the capacity and flexibility to respond rapidly to primary education trend changes across the globe, takes into account the expectations of civil society and other stakeholders in identifying the general public interest, and is willing to critically evaluate the role of government.
v. **Forward vision**: It should entail a system that government can be able to anticipate, project and forecast any future problem, repositioning and rebranding on the issues based on current data, trends and globalization developmental policies-Sustainable Development Goals (SDG) concerning educational development (Oyedobe, 2007) should be taken into account, such as future costs and anticipated changes e.g. demographic, economic, environmental.

vi. **Policies and Laws Handling:** In governance of education in Nigeria, government intensifies equally transparent laws, policies, regulations and codes; coupled with check and balance to ensure its compliance.

Chemistry Education and Good Governance

The issue of governance is very critical to the development, sustenance and advancement of chemistry education especially at both secondary and tertiary level. This is because good governance holds the key to good performance and sustainability of education institutions (Obanya, 2003). There is a linear relationship between good governance and a functional chemistry education. There cannot be a functional chemistry education where country's resources and power are not well utilized for the citizen of the nation. Florence et al. (2015) viewed governance as the use of State resources and power in an accountable way to achieve and promote the well-being of the citizenry. It therefore, implies that when the power and resources are not well managed for the welfare of the citizen, there is bound to be a problem

The Nature of the Nigerian Economy

There is no doubt that Nigeria is endowed with enormous human and natural resources. As rightly observed by Matthew-Danial (2013), human and natural resources endowment are not enough for wealth creation and economic development of any nation, but the knowledge of how these raw materials can be transformed into valuable goods and services for economic development and improved quality of life. Modern science education holds the key to the rapid transformation of Nigeria. The Nigerian economy is one of the most developed economies in Africa (Economy watch content (EWC), 2010). It has been observed that Nigeria is a middle-income nation with developed financial and communication among others and that Nigeria has the second largest stock exchange market in the African continent (EWC, 2010).

Contribution of Chemistry Education to the Economic Development of Nigeria

Chemistry education plays a pivotal role in the overall development of a nation. It is not a subject confined laboratories and textbooks but has profound impacts on various aspects of society. It plays the major roles in food (fertilizers and insecticides), clothing (textile fibers), housing (cement, concrete, steel, bricks), Medicine (drugs), Transportation (fuel, alloy materials). Presently, man is experiencing an era in scientific and technological development that affects his life in one way or the other. Virtually everything we use daily involves science (Yusuf, *et al.,* 2018).

Chemistry education holds immense importance in national development. By enhancing scientific knowledge and research capabilities, addressing environmental challenges, and meeting industrial demands, chemistry education becomes a driving force for progress. It empowers individuals to make meaningful contributions to society, fostering innovation, and paving the way for brighter future. Therefore, investing in chemistry education is essential for a nation's overall growth and prosperity.

Achieving a high level of economic development through transforming the country real sectors will not only reduce poverty by providing food security, increased in agricultural and industrial exports, but will also bring about improved literacy and a healthy workforce. Chemical research has contributed to economic prosperity and financial security in the country. Products from chemical companies, such as polymers, coatings, pharmaceuticals, and pesticides, play an important role in everyday life. The chemical production companies have a large portion of various specialists who have contribute to the development of the country (Ekpo, 1993).

Over the years chemistry has contributed through the following measures, which have helped in the economic development of many nations. These measures are.

Enhancing scientific knowledge and research

Chemistry education paves the way for a nation's scientific progress by imparting the fundamental knowledge required for scientific research. By understanding the principles, theories, and laws governing chemical reactions, aspiring chemists can delve into cutting edge research and make groundbreaking discoveries. Such research has the potential to revolutionize various sectors, from health care to agriculture, and boost the nation's development. For instance, the discovery of new drugs or materials through chemistry research can significantly impact the pharmaceutical industry, leading to better healthcare outcomes and economic growth.

i. Chemistry education equips individuals with a solid foundation in scientific principles and concepts.
ii. It fosters critical thinking skills and problem-solving abilities necessary for research and innovation.
iii. Promoting research and advancements in chemistry leads to the development of new materials, medicines and technologies that benefit society as a whole.

Addressing Environmental Challenges

Chemistry education has a significant role to play in addressing the pressing environmental challenges facing the world today. By instilling a sense of environmental responsibility and emphasizing sustainable practices, chemist can contribute to preserving and protecting the environment.

Understanding the chemical processes behind pollution or climate change enables experts to devise innovative solutions and develop environmentally friendly technologies. This not only benefits the nation's ecological balance but also creates opportunities for economic growth through the emergence of clean energy industry.

i. Chemistry education emphasizes the importance of sustainable development practices and environmental awareness.
ii. It equips individuals with the knowledge to develop greener technologies and mitigate environmental hazards.
iii. Chemist with a strong educational background can contribute to solutions for pollution, waste management, and climate change.

Meeting Industrial Demand

A robust chemistry education system plays a vital role in meeting the demands of the industrial sector. From pharmaceuticals to petrochemicals, numerous industries rely on chemists and chemical engineers to drive innovation and production. By equipping individuals with the necessary skills and knowledge, chemistry education facilitates the development of a skilled workforce capable of meeting the industry's requirements. A skilled chemistry workforce not only contributes to economic growth but also enhances a nation's competitiveness in global market.

i. Chemistry education prepares individuals for careers in various industrial sectors.
ii. It provides the necessary skills and knowledge to cater the demands of industries such as pharmaceuticals, chemicals, and materials.
iii. A well-educated chemistry workforce fuels economic growth and enhance a nations competitiveness in global market.

Chemistry Entrepreneurial Skill for Economic Development

Chemistry entrepreneurial education has the potential of changing the fortune of a nation and transforming it from underdeveloped to a developing and subsequently developed country. A chemist is an entrepreneur, and an entrepreneur is a person who evaluates business opportunities, gather necessary resources and initiate appropriate action to ensure success (Wushishi, 2013). The success of Nigeria in the 21st century, its wealth and welfare will depend on the ideas and entrepreneurial skills of its population. These have always been the nation most important assets (Iyun, 2013). Achieving chemistry entrepreneurial skills produce chemists who will create new ideas, new products and entirely new industries.

Innovation and Modernization

Technological innovation is dependent on chemistry education because, through chemistry research, newer and better methods of production are discovered for improved productivity. In addition, chemistry stimulates motivation and widens inquisitiveness. Furthermore, chemistry liberates the mind from the vestige of ignorance and superstition and makes a man willing to accept change. Chemistry widens man's ideas and outlook; it breaks man conservatism and prepares the mind to accept modem and improved ideas and techniques. In the developed world, chemistry through its innovativeness has helped to transform indigenous technology for the holistic development of their countries.

Income Distribution

Efficient income distribution is a prerequisite for equity, rapid national growth, social and political stability. These can only be achieved if chemistry plays its role not necessarily in bridging the gap between the rich and the poor but in the redistribution of income between the people in the country. Thurow in Kene and Oguji (1997), rightly observed that an increase in the educational level of low-income workers is bound to have some beneficial benefit, including, increase in productivity and a consequent increase in earning, reduction in the number of low skill workers, which lead to an increase in their wages and increase in the number of high skill workers.

Agriculture

Chemical principles and products have been utilized to control pests and weeds and in fertilizer production for increased food production. Genetically improved crops based on pest protection. is used to improve crop production. The herbicide tolerance (HT) crops are tolerant to certain broad-spectrum herbicides such as glyphosate and glufosinate, which are more effective, less toxic, and usually cheaper than selective herbicides. By cutting the costs and labor of weed or insect control, these first-generation commercial pests and/or herbicide-tolerant crops have been shown to provide a tangible economic benefit to farmers. It is therefore critical that chemistry students be exposed to appropriate knowledge of chemistry in the areas of agrochemicals and chemical-based technologies to boost agricultural production environmental and economic sustainability of food security.

Contribution to improved Health and sanitation facilities

Drugs, which are products of chemistry abound and are used for various purposes including prevention and treatment of various diseases. Proserpine, a Yohimbe alkaloid, for example, has important clinical use in the treatment of high blood pressure (hypertension) and also as a tranquillizer for the emotionally disturbed. Ergot alkaloids are used chemically to induce contraction of the uterus in the last stages of pregnancy. Morphine and compounds are well-known pain relievers (Aniodoh, 2001).

Potable Water Supply

Water is chemically treated to kill germs, thus rendering it fit for human consumption and other domestic use. Chemical processes are exceptionally important in the treatment and delivery of drinking water and the treatment of wastewater. Analytical techniques (including the development of associated portable devices) are critical in verifying the quality of water, and where required chemicals and membranes are employed in simple disinfection treatment. Chemical science also plays a significant role in the remediation of the aquatic environment following pollution incidents. Chemistry research within the water sector is therefore playing a vital role in the transformations that are needed to achieve a sustainable freshwater supply, both domestically and on a global scale. Fundamental chemistry research is a necessary condition to support strategies that will provide the technological solutions needed to deliver new and improved methods of optimizing water use, treating contaminated water, recycling water, desalination water and preserving water in the soil, and harvesting water for irrigation (Odedokun & Abubakar, 2017).

Clothing

Some textile fibers used as clothing are obtained by modifying natural fibers of agricultural origin such as viscose rayon and cellulose acetate from cellulose. Other fibers such as nylons, ethylene, and acrylic fibers are all chemical synthetic derivatives from petroleum sources and are used as clothing (Okenyi et al., 2011).

Energy Supply

Coal is fuel and a source of energy. Fuel derived from petroleum is used to power automobiles, airplanes and ships. Gaseous fuel such as butane is used as cooking gas.

Kerosene, a derivative of petroleum, is a household name and is used in heating, cooking and lighting (Aniodoh, 2001). Chemistry Education provides solutions to our problems in the energy sector by developing sustainable biofuels (e.g. through optimization of biochemical conversion processes as well as thermochemical conversion and gasification process (Odedokun & Abubakar, 2017).

Major Areas of Influence of Bad Governance on Chemistry Education

The lack of good governance is impacting Nigeria educational system badly in all areas. However, there are specific areas it seriously affects chemistry education. The paper considers three critical areas. These are Research, Teacher Education, and Infrastructure.

Research in Chemistry

Research in the Nigerian universities has been rendered useless because of the paucity of fund. The government has money to build personal houses for the government officials but no money for research. They also have money to sponsor political party campaign and rally. Many of them are so naïve to have gone as far as buying properties in the developed countries and had bank accounts in foreign countries but no money for educational research. Most educational research institutes are mere names but can do nothing. Corruption of our government officials had killed and buried research in chemistry and science education for decades. Because of corruption resources from the national treasury meant for research are in the hands of a few individuals who are politically powerful (Otoghile et al., 2014).

Teachers' Education and Training

Teachers Education and Training in Nigeria is very poor when compared with other developing countries in Africa. Due to the lack of sound teacher education and training in Nigeria, the teaching and learning of science are perceived difficult by both the teachers and the students. Most teachers lack adequate pedagogical content knowledge (PCK) for science teaching. Many students at the end of their Junior Secondary School (JSS) preferred Art and Humanities courses to Science. Given the havoc the insurgency had caused to the Nigerian socio-economic development in the recent time by our youth, lack of governance is a menace in the nation. Many of these insurgents are science oriented that could be useful to this nation, but we lost them to the insurgency. These youth used improvised materials, and other complex weapon produced by themselves: these are great scientists.

Infrastructure

Infrastructure in the Nigerian educational institutions is in a terrible condition. It is worrisome and nasty for students to learn science under the tree in some part of the nation today. This is a reflection of the poor budgetary allocation to education by the government. Good governance requires that enough funds be made available for all educational programmes. The Nigeria experience shows that poor budgetary allocation to education is meager, and this against the UNESCO recommendations of 26% of the total allocation to the education sector (Akindutire and Ekundayo, 2010, p. 120). A visit to some of the Nigerian universities, polytechnics, and colleges of education reveals that the Nigerian government is not serious about education. There are poor office accommodations for lecturers and working conditions. Science is a cognitive course that requires a conducive environment for its teaching and learning.

Inadequate Manpower

A significant problem faced with science and chemistry education in Nigerian today is the issue of inadequate manpower. It is doubtful if Nigeria has sufficient and qualified number of indigenous science and chemistry teachers. This has in no small way hindered the growth of chemistry education and by extension affected self-reliance and national development. In most of the tertiary institutions, the number of senior lecturers with Ph.D qualifications is low. Rather, we have most of them in the cadre of Assistant lecturers, Graduate Assistant and lecturer III-I. These crops of lecturers are still learning the rudiments of teaching by the reason of their qualifications and training (Uwague and Ojebah, 2008, Emumejaye, 2006). Only few of those in the professional rank are available. Poor salary scale/remuneration is equally associated with teaching job in Nigeria compared with the elected/politically appointed officers. This has led to long period of strike actions by teaching and non-teaching personnel across the educational sector. Teachers reward against all odds is often said to be in Heaven. These are negative factors on the growth of chemistry education, self-reliance and national development. The quality of education rests more on the quality of its teachers (Akubudike, 2003).

Associated Hazards

No sane person will live his home for work and anticipate accident. The greatest inherent problem associated with chemistry and its education is hazard. Hazard effects from poisonous emission of gases / fumes, corrosive chemicals, fire burnt, explosion, obsolete apparatus, poor laboratory sanitary condition etc. are very often recorded in chemistry laboratory. Lack of safety awareness due to unsafe acts and unsafe working conditions results to accidents. Victims of chemicals or fire burnt usually present ugly scenes. Often times, large casualties are recorded when accident occur in the field of chemistry. This cannot promote chemistry education, Good governance and economic development.

Defective Curriculum

School curriculum in the pre-independent Nigeria was not for all-round development of the child as the aspects of science and technology which would have created entrepreneurial skills for self-reliance were ignored (Sabina, 2009). It rather kept on producing subservient Nigerians who were tied to the apron string of white-collar jobs viz: gardeners, stewards, interpreters, catechists, clerks and house-keepers (Etuk, 1984). All these make the people parasitic consumers rather than creative and efficient producers (Eya, 1949). The curriculum for science and chemistry education in particular is such that is overloaded with much emphasis on theoretical teaching. There is an obvious relationship between development and the type of educational structures available in any country.

Conclusion

Let it be re-iterated here again that chemistry is all about every hinge in the world (Okieimen, 2007). The importance of chemistry education to the nation and the world at large cannot be glossed over. If the afore-mentioned factors militating against its recognition and propagation are eliminated, Nigeria as a nation would certainly be great and ranked among the first world developed nations economically in the next fifteen years. All hands must be on deck.

Recommendations

From the fore going, it is quite obvious to say that if these factors among others are well tackled, Nigeria would have started laying concrete foundation towards becoming a first world developed nation.

Efficient Power and Infrastructure

Chemistry education requires a well-designed and equipped laboratory to achieve its primary goals of observation and investigation. A functioning laboratory is such that have the most basic facilities like power and water supply, chemical reagents and apparatus, current analytical instruments, adequate space and ventilation. The laboratory should also be manned by a highly skilled and competent technologist, for effective and rewarding application. This will enhance self-reliance and national development.

Primary Education

The enhanced concrete foundation should start at the primary school level. Since primary education is seen as the bedrock of all forms of education in any nation, Nigeria should not be left out (Umoh 2007). Every Nigerian child has the right to proper education and even science education. At this level, teaching should be based on demonstration and all participatory learning.

Quality Manpower

Science and chemistry education in particular will be meaningless for self-reliance and national development if the qualities of the teachers cannot be guaranteed. Chemistry education requires specialist, competent and dedicated teachers. To ensure self-reliance and national development, chemistry teachers should be given appropriate professional training by professional bodies. Science and chemistry teachers should be trained and retrained through seminars, workshops, and conferences on innovative teaching.

Accident and Hazards Free

Teachers and students are to be well educated of the need to be safety conscious especially in the laboratory at all times. Prevention is often said to be a better cure from an accident. Precaution signs should be pasted/posted at strategic positions in the laboratory. The laboratory should also be well illuminated and ventilated coupled with strategically located firefighting equipment,

Beneficial School Curriculum

School curriculum in the sciences, particularly chemistry should be reviewed and restructured to meet up with the need and aspirations of the people. A curriculum that is practically driven and achievable should be put in place. Members of the curriculum drafting committee should be drawn from professional bodies like the Chemical Society of Nigeria (CSN), Institute of Chartered Chemists of Nigeria (ICCON),etc, to enable them restructure the curriculum with the view of meeting the present day reality

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INFLUENCE OF ICT IN EDUCATION ON ECONOMY IN BORNO STATE, NIGERIA

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Abstract

ICT as a revolution left no area of life untouched. ICTs play a vital role in educational institutions. It enhances productivity, facilitates communication, and enables innovation across various industries. With the technological advancements and benefits of ICT in the modern world, our educational system is not gearing up to tap from those enormous benefits. This paper explored the influence of ICT in Education in Borno state, Nigeria. Qualitative research approach was used in this study, where survey and 120 questionnaires were administered to instructors, administrators and students from randomly selected schools and simple frequency count in MS Excel was used to analyze the sampled data. The study found out that; increased digital literacy skills among students lead to improved employability, improved efficiency and productivity in educational institutions through the use of ICT tools and platforms increased innovation and entrepreneurship among students, contributing to economic growth, and the study further revealed the inadequate and poorly implemented ICT facilities in most of the school, with unqualified ICT tools instructors. Hence, educational institutions should have easy access to facilities, and resource materials as well as emphasis on and recognition of ICT integration in education and the knowledge and abilities needed to oversee ICT resources should be provided to educators and administrators.

Keywords: *Economic, Education, ICT, Implementation, Influence and Learning*

Background to the Study

Today's world is a global village that every dealings of our day to day activities has to do with technology. Advanced technology has greatly bestowed a lot to the development of human being in recent years. Information and Communication Technology (ICT) is greatly transforming the activities in our societies on a daily basis, the impacts are felt very much in education. This is because ICT provides more opportunities to both teachers and students in adapting educational activities of their needs. It enhances productivity, facilitates communication, and enables innovation across various industries. With ICT, businesses can streamline operations, reach a wider customer, and create new opportunities. It contributes to economic growth by driving digital transformation and fostering entrepreneurship.

Nation spends money in education because it can produce unquantifiable benefits for society, individuals or organization in this global age. ICT is very vital in the development of any nation; no nation will aspire to develop without embracing ICT. In respect of this, educational systems need to be nurtured to match this endeavor. With the technological advancement and the need for modernization in a society, there is a system of education to meet up with the trends. Education is the process of imparting or improving knowledge and developing skills.

Education prepares individuals for the challenges in life. (Dauda, et al, 2015), opined that citizens who well educated contribute meaningfully to the country/society, they are major determinants of the production of goods and services as well as the standard of living for the successful development of the nation. It is therefore significant to subdue the factors affecting school performances so as to develop and improve the student's learning skills.

Citizens of any nation need quality education to improve in its nations' capacity building. With the technological advancement of the world today, education needs ICT to be more effective in increasing the student's knowledge because its role in incorporating technology into teaching and learning activities cannot be overemphasized. Aarti and Sunita (2016) stated that ICT provides a variety of tools that can open up new possibilities in the classroom. It can particularly assist students to adjust to their individual demands as well as helps in building an individual's economic domain with the essential technological competences.

ICT as a revolution left no area of life untouched in this era. It is of tremendous help in all field of life. ICT is increasingly becoming compulsory in nearly all fields of studies, because of its accuracy and versatility. ICT can facilitate communication between students from diverse backgrounds by giving them access to instructional tools and the online resources. It can also enhance learning outcomes and improve job prospects for students.

> The Nigerian government developed an educational policy stating that "*in order to fully realize the goals of education in Nigeria and gain from its contribution to the rational economy, Government shall take necessary measures to ensure that teaching shall be practical, activity-based, experimental and IT supported*". Federal Republic of Nigeria National Policy on Education, 6th edition, 2013).

Imagine an amazing feature of ICT that facilitate easier and faster party communication. People can now communicate in real time, send instant messages, like the WhatsApp, use social networking sites, access websites like Twitter, Instagram, Facebook, and communicate online thanks to a wide range of new communication capabilities that technology has brought to society. That is to say, ICT assists individual to manipulate data and information as needed. People have been benefiting globally from Internet as an ICT tool, even at the grass root to make decision on issues involving the entire world that has to do with common interest. ICT is an extensive field of electronic technology that supports various methods of information processing, transmission, storage, and gathering.

The relevance of ICT in education cannot be overemphasized. The need to realizes beforehand the vital significant of technology in schools in order to equip the educational system is of great important due to the fact that the technology has taken over most of human functions. The usage of ICT in educational setting will contribute immensely in the production and improvement of human resources, (Lalitbhushan, et al, 2014). Peoples' attitudes towards how they live, work and the way manage the educational affair has changed due to the rate of changes and substantial effect emerged as a result of modern technologies. It is applied in every field of education curriculum. ICT improves learning, provides opportunity for distance learning country-wide with online educational materials, and helps to get more information easily, contributes meaningfully to the society and necessary in most of the activities of human endeavors, Itodo A. & Ojo O. (2018).

According to Chris, et al, (2015), below are some of the areas where ICT may interest the educational sector. They are;

1. **Access to variety of learning resources:** ICT helps in a great way in accessing plenty of resources to enhance teaching skills and learning ability. ICT has helped in the provision of audio visual education. It learners are encouraged to regard computers as tools to be used in all aspects of their studies. They make use of the new multimedia technologies to communicate ideas, describe projects and other information in their work.
2. **Immediacy of information:** In this time of computers and web networks the rate by which knowledge is imparted is very fast which also enhances education anywhere at any time. Information and data desired for any study are obtained at will and when needed.
3. **Anytime learning:** ICT aids one to study whenever he/she wills irrespective of whether it is day or night and whether the teacher is available or not.
4. **Multimedia approach to education:** These are audio-visual education, planning, preparation and use of devices and materials that involve sight, sound or both for educational purposes. These include; TV, audio tapes, records, computers, video discs. Information taken through multimedia are received simultaneously either by vision or hearing or both.
5. **Distance learning:** This enhances learning at a distance rather in a classroom. This replaces the home study, external study or correspondence study by mail of old. This type reduces costs per student. They save by studying at home on time and travel and other costs. This helps the students who wants to learn at the comfort of their zones".

Furthermore, (Dauda, et al, 2015) opined that, "If government at all levels can adequately fund Adult Education programmes by incorporating ICT technologies, the issue of barriers to access education and learning would be a foregone conclusion. This would bring and enhance the principle of learner centeredness, lifelong learning, flexibility of learning provision, the recognition for credit of prior learning experience as we as the supply of learners' backup among others. The provision of educational computer studies and information technology in adult education learning centers would bring solid foundation for the development of our society".

Economy of every nation is of great Concern and quality Education is the key to success.

"Adult education is expected to address the socio-economic, cultural, political and environmental problems besieging humanity in their various societies. This is so because adults are the major occupants of the production sectors of the economy", (Victoria and Ewelum, 2016). They further maintained that "in this era of global technology, adult educators and adult learners are expected to be at least computer literate, adults in the community to be ICT compliant as well as adult learners". Adults are those who are matured, working and participating in nation's development, therefore, there is need to develop the skills of the adults who are capable of understanding nations' needs and predicament and are able to channel their endeavors towards the achievement of national goals.

Statement of the Problem

With the technological advancements and benefits of ICT in the modern world, our educational system is not gearing up to tap from those enormous benefits and this is mostly as a result of our current educational systems, to mention but few;

i. Poorly-resourced schools
ii. Populated classes
iii. Curriculum hardly relevant to current information-age
iv. Poorly ICT facilities implementation
v. Lack of qualified teachers,
vi. Inadequate workshops for teachers.

It is so pathetic such that, we are left far behind other countries like China, USA, where the well knowledge and use of ICT is contributing immensely to their socioeconomic development. Hardly can you see the secondary and tertiary schools having a computer lab or a computer in the classroom and where you find some, they are insufficient thereby having many students on a system. Step into almost all the ministries, department and other government agencies, almost all of their daily activities are paper-based systems.

Every aspect of our life deals with Information and Communication Technology, hence it demands to incorporate ICT in Education is essential so as to expose citizens to the efficiency and effectiveness of modern technological tools. Some of the factors affecting the implementation are, lack of provision and call for teachers to use ICT facilities for instruction, deficiency in financing the buying of some of the ICT instruments, inadequate workshop and training of the teachers, etc.

Objectives of the Study

This study is to investigate the usefulness of ICT in education and how much it helps or contributes to economy in a society or country at large.

The objectives of this study are;

1. To enhance digital literacy skills among students, which can lead to better job prospects and economic growth,
2. To improve access to education by utilizing technology, which can bridge the gap between urban and rural areas, and
3. Integration of ICT in education to foster innovation and entrepreneurship, which can contribute to economic development.

Significance of the Study

There is no qualm about education as a fundamental determinant of the achievement of any country/society, and ICT is a trending issue that contribute immensely to quality education. It is therefore necessary to dig into the vital role of modern technology in educational field to encourage government/private institutions to intensify the use of ICT in schools for quality education and the build of strong economy for its state.

Research Questions

The following research questions will be considered:

1. How does the integration of ICT in education impact digital literacy skills and their contribution to the economy?
2. In what ways does the use of ICT in education foster innovation and entrepreneurship, and how does this contribute to economy?
3. How does the efficiency and productivity gained through ICT adoption in educational institutions affect the economy?
4. Is ICT properly implemented in our educational system?

Methodology

This study adopted qualitative research approach. The population used for the study consisted of selected Instructors, administrators and students in Maiduguri. The sample size of 120 was randomly selected. A self-designed questionnaire was used to collect the data for the study. The questionnaires were administered and collected by the researcher. Personal contacts of the researcher with the respondents enhanced good and prompt response from the respondents. Data collected were analyzed using frequency counts and MicroSoft Excel.

Result/ Discussion

The data collected were analyzed and discussed below. There are three categories with items each;

A. The benefits of ICT in education: it has four items
    i. ICT improves student learning
    ii. ICT makes teaching easier
    iii. ICT facilitates easy access to variety of educational materials

   iv. ICT improves quality of education

B. ICT's benefit on economy: it has four items, which are;
   i. ICT influences career aspiration
   ii. ICT improves skills
   iii. ICT provides access to global resources
   iv. ICT enhances creativity

C. ICT implementation into schools: this contains three items, they are;
   i. There are adequate ICT facilities
   ii. Instructors use ICT tools to deliver lectures
   iii. There is access to lecture or communication with the school anywhere

Table 1. The benefits of ICT in education

s/no	Items	Yes	No	Not Decided
1	ICT improves student learning	99	18	3
2	ICT makes teaching easier	90	21	9
3	ICT facilitates easy access to variety of educational materials	101	17	2
4	ICT improves quality of education	115	5	0

It can be seen in table 1, item 1 above that, the majority of the respondents agreed that ICT supports learning. Mahisa and Anju (2014) in their study, revealed that ICT play vital role as a strong agent for change among many educational practices. It supports independent learning. Students become immersed in the learning process by using ICT. Habib and Ghulam (2017) study, also revealed that the internet facilitates co-operative learning, encourages dialogue and creates a more engaging classroom. Also, it can be seen from the respondents (item 2) that ICT makes teaching easier. "Education process is not only heavily influenced by means of communication content between teacher and student, but also by types of communication media and instruments/tools used in the education process", Damir (2014). Teacher's quality performance depends on some significant elements among which are the instructional materials at his disposal in passing information across to the students. Teacher shows more commitment to teaching where there is a teaching facility for effective teaching.

Majority of the respondents (items 3 and 4 respectively) also agreed that ICT facilitates easy access to variety of educational materials and improve quality education. Improved efficiency and productivity in educational institutions through the use of ICT tools and platforms.

Table 2. Benefits of ICT's education on economic growth

s/no	Items	Yes	No	Not Decided
1	ICT influences career aspiration	75	28	17
2	ICT improves skills	82	30	8
3	ICT provides access to global resources	112	8	0
4	ICT enhances creativity	109	1	5

From table 2, items 1 and 2 above, that majority of the respondents agreed that ICT influence career aspiration and skills; Incorporating computer education in schools can inspire students to undertake careers in technology and enhance their understanding on how computer technology impacts people's daily lives. Furthermore, computer education provides students with the basis and activities that have to do with computer software. For example, application of Microsoft office, creating data sheet and also the use of programming languages. Students can later in life, utilize these acquisitions to a variety of jobs.

Furthermore. It can be seen by their responses (items 3 & 4) that ICT enhance creativity and access to global resources. ICT allows students to put their creativity to use. For example, practical class can be organized which will involve how to maintain a computer, thereby dismantling and mantling computer system. This will enable the student to understand and think about how most of these parts operates. Hence, they can utilize their advanced creativities to other endeavors of their lives, including historical information which will help in an economy of a state. Also, ICT provides vast information that can simplify our decision process because of how it has diffused most of the dealing in our daily activities (work, learning, leisure, business and health).

Human capital influences economic growth. The advancement in technologies in the present days help in building humans with good skills and knowledge required to propel the economy of a country to a greater height. Human capital promotes technical advancement and helps to harmonize labor force use within technological development. Education and technological change are major determinant of economic, cultural, political, social, demographic changes. It must be borne in mind that considering the global aspect of the economic system, one should emphasize the importance of the inclusion of information and communication technologies (ICT) in education, which naturally result in the productivity of education outputs, (Tezcan, 2006). Hence, increased digital literacy skills among students leading to improved employability and productivity and also, increased innovation and entrepreneurship among students, contributing to economic growth.

Table 3. ICT Implementation into Schools

s/no	Items	Yes	No	Not Decided
1	There are adequate ICT facilities	41	74	5
2	Instructors use ICT tools to deliver lectures	20	98	2
3	There is access to lecture or communication with the school anywhere	5	114	1

From table 3, item 1, shows that there are no ICT facilities in most of the schools. (Onyinloye and Oluwalola, 2014) shows that "availability of educational facilities enhances students' learning by allowing them to be involved in demonstrations and practice which would increasingly develop their acquisitions". Item 2 from table 3 above shows that Instructors do not use ICT tools in delivering their lectures which may be due to many factors, among which are; lack of qualify teachers which may be due to lack of exposure to ICT training, poor practical skills in the use of ICT and perhaps, the readiness of the teacher in ICT usage. Furthermore, item 3 shows that there is no access to lecture or interaction with the school activities anywhere one find his/herself. The use of ICT today has given the opportunity to distance learning where you can run a program at the comfort of your zone.

Conclusion

Integrating ICT in education has a positive impact on the economy. The findings suggest that ICT enhances digital literacy skills, improves access to education, boosts innovation and entrepreneurship, and increases efficiency in educational institutions. These factors contribute to a more skilled workforce, higher employability, and economic growth. It highlights the importance of leveraging technology in education to foster economic development. It's pretty amazing how ICT can make such a difference! In order to fully benefit from the significant gains that ICT has made in educational activities, it is imperative that educational institutions be well-equipped with ICT resources and that teachers and instructors receive basic ICT competency training.

Recommendation

1. The majority of educational institutions should have easy access to reasonably priced physical structures, facilities, and resource materials as well as emphasis on and recognition of ICT integration in education.
2. To decide how new technologies can be used most effectively within a nation's cultural needs and economic circumstances, good leadership is required.
3. The government of Nigeria must improve the country's electrical and power supply conditions in order to create opportunities for notable advancements and raise ICT awareness among both urban and rural residents.
4. The knowledge and abilities needed to oversee ICT resources should be provided to educators and administrators. Individual gains from such training will be aided by this.
5. When it comes to the education sector, government organizations like the National Information and Technology Development should be in charge of enforcing and closely monitoring the nation's ICT policies. In order to create and support public-private partnerships for the integration of ICT into educational programs, the agency should work with other agencies.
6. The learning materials should be prioritized in order to meet the needs of the state.
7. The government should routinely host workshops, seminars, and training sessions to inform educators and other ICT users about current trends in ICT and also ensures that there learning is put into practice.
8. It is necessary to educate ICT users about their responsibilities which any nation's economic development highly depends on.
9. It is recommended that policy makers and educators develop more robust guidelines regarding the use of ICT.

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EFFECT OF TERRORISM ON THE GROWTH OF NIGERIAN ECONOMY

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Abstract

Over two decades, Nigerian economy is ravaged with dreadful occurrence of terrorist attacks orchestrated and unleashed by dreaded Boko Haram and some upcoming terrorist organizations which have consumed thousands of lives and properties worth trillions of naira. On this premise, this study is aimed at investigating the effect of terrorism on the growth of Nigerian economy. The study adopted econometrics analytical method centered on Autoregressive Distributed Lag (ARDL) and the technique rooted on the time series data from 1990-2022. The empirical results from ARDL revealed that terrorism has a negative effect on the growth of Nigeria economy. Meanwhile, foreign direct investment has significant negative impact. Revealing that increase in terrorism in Nigeria has reduced foreign direct investment. Also the results showed a positive and significant impact on government spending on defense and human capital, suggesting that as terrorism increases, government defense spending and humanitarian support also increases. The study recommended that government should pay more attention on improving the welfare of its citizen by creating more jobs.

Keywords: Terrorism, Boko-Haram, Growth, Economy

Background to the Study

Terrorism is global enemies and cankerworm infestation that have frustrated the growth and development of world economics, mostly African economy. Its devastation is highly unquantifiable and immeasurable regarding to loss of properties and lives. Despite government and non-governmental organizations efforts around the world to mitigate this menace, the surge has not been abated. Terrorism consists of any activity planned or coordinated by individuals or group to bring fear, intimidation and harm to non-combatants via the use of violence in other to execute predetermined goal (United Nation, 2015). It includes the use of unlawful force and violence by the said individual or group to accomplish religious, political and economic goals by applying intimidation and fear (Imuetinyan & Emily, 2019).

Over the years, the world is engulfed with terrorist act which has led to massive destruction of properties and loss of lives (United Nation, 2020). Terrorism is a global occurrence, but for the past decade, the terrorist activities have increased tremendously in the Sub-Sahara African nations than other part of the world (Global Terrorism Index, 2022). This could be attributed to five major factors: resistance to neo-colonization, ethnic separation/agitation movement, internal political factors, support for external factors and ideological belief (Adebayo, 2018). Across the world, several terrorist group or organizations has emerged, among the deadly one is Taliban, Al-Qaida, Al-Shabaab, Islamic state of Iraq and Syria (ISIS), Islamic State in West Africa (ISWA) and Boko Haram. These organizations have claim responsibility for the number of deaths and attacks in several countries of the world (Igbuzor, 2011). Statistics shows that in 2021, Taliban recorded 7417 deaths due to terrorist attack worldwide, whereas Al-shabaab, ISIS, ISWA and Boko-Haram recorded 2637, 1435, 1286 and 1393 death due to terrorist attack worldwide respectively (Global Terrorism Index, 2021). The Global Terrorism Index (GTI) in the year 2021 thoroughly ranks countries of the world based on the activity of the terrorist. Afghanistan ranked as the most affected country affected by terrorism on earth surface with a score of 9.11 points. Afghanistan was documented as the most terrorist attacks in 2020 with 1722 attacks recording about 8514 fatalities from terrorist attack (GTI, 2021). Among the top 50 countries ranked by the global terrorism index in 2021, Nigeria is ranked 6th highest impact of terrorism after Syria that ranked 5th (GTI, 2021).

Surprisingly, in 2022 the Sub-Sahara Africa surfaced as the global epicenter of terrorism, accounted for 48% of global deaths (GTI, 2022). The Islamic state (IS) overtook the Taliban as the world's deathly terror group in 2021 with 15 deaths per attack in Niger Republic (GTI, 2021). Interestingly, the activity of Boko Haram organization has significantly decreased as a result of the counter insurgency introduced by the Nigerian government. The organization recorded only 64 attacks in 2021 and less than 20 attacks in 2022, death dropped by approximately 92% from 2131 in 2015 to 178 in 2021 (GTI,2022). The decline of Boko Haram activities added significantly to Nigeria recorded as the second largest reduction in terrorism death with the number decreasing by 47% to 44% in 2021 (GTI, 2022).

The effect of terrorism on food security in Nigeria cannot be underestimated. The activities of the terror groups (Boko Haram, herdsmen militias, and armed bandit/kidnappers) have significantly affected the farming communities in Nigeria, incidentally, causing food insecurity and reducing the contribution of agriculture and other sectors to the gross domestic product (GDP). Terrorism has reduced the flow of domestic and foreign investments drastically mostly, the regions that was ravaged by terrorist attack (Saidatulakmal, 2022).

Chuku, Dominic & Ima-Abasi, (2019) assert that the “risk and uncertainty associated with rising level of insecurity causes foreign direct investment (FDI) to be redirected away from countries with higher security risk to countries with lower risk”. The diversion will transmit to unemployment, reduced investment return, low human capital development as well as reducing the country capacity to attract FDI and portfolio investment. To address this ugly incidence, government has committed its limited resources that would have been used for infrastructural development to fight terror. More so, government initiated Anti-terrorism Act in 2011 in order to cub terrorism in Nigeria. Inspite of these commitments, the country is still faced with various challenges of kidnapping, banditry, herdsmen attack etc. This study is planned to empirically look at the effect of terrorism on the growth of Nigerian economy. The work tests the hypothesis that: Terrorism does not affect the growth of Nigerian economy.

Literature review

The study attached its theoretical framework from the conflict theory put forward by Karl Max in 1847. Max's anchored its theory on dynamic struggle in the sharing and allocation of scarce resources among two competitive social classes (proletariats and bourgeoisie). The proletariats are the poor working classes who are exploited by the bourgeoisies the owners of means of production, the scenario create class difference in the society. The imbalance status between the oppressed or subjugated majority poor working class and the influential minority class create class conflict. The minority rich (bourgeoisie) class who are the acclaim owners of means of production oppress, subjugate and impoverish the majority poor class (proletariat). Marx maintained that the poor class who work and carry out the actual production process can hardly feed and perpetually living miserable and wretched. The bourgeoisie who only invest their capital were living in affluence whereas the proletariats who provide the labour are languishing in poverty and obscured life. Linking this theory to Nigeria situation as it endeavors to explain the struggle among the social classes, how state and non-state actors fight in the distribution and allocation of commonwealth to their advantage. In Nigeria the so-called politicians and power brokers employed and use the state machineries to corner the common wealth, oppress, overpower and take the advantage on the poor and vulnerable citizens for their selfish gain. The vulnerable and oppressed are left with no other options than to cry, complain and protest which at the long run led to fighting.

Empirical Literature

Studies conducted by various scholars revealed that terrorism has adverse consequences on economic growth (Chuku et al, 2019; Wen & Haseeb, 2019; Cinar, 2017). For example, Chuku et al (2019) employed annual time series data within 1985 and 2018 to investigate the effect of terrorism on growth in Nigeria using the ARDL as well as Structural Vector Auto regression (SVAR) approach. The outcome revealed that terrorism adversely influenced growth.

Muhammed and Yunusa (2020), uncovered that the monster terrorism is associated to loss of human capital, decrease in employment, loss of farmer's income and government revenue. Similarly, Muhammad, Wen and Haseeb (2019) adopted the generalized method of moment (GMM) to examine the impact of terrorism on growth in Pakistan. The study exposed that terrorism had significant adverse effect on growth. In the same vein, Ndubuisi and Anigbuogu (2019) conducted a study in Nigeria to ascertain the impact of terrorism on sustainable development using exploratory research design. Their results revealed that terrorism retard growth. Also, Adofu And Alhassan (2018) "scrutinizes the repercussion of insecurity on economic development in Nigeria using the trend analysis, descriptive statistics and Pearson correlation of failed state index, human development index and Legatum's prosperity index, the study reveal an inverse relationship between insecurity and economic development in the country. The study recommends a range of measures of limiting insecurity including "preventive community policing, human development centered growth perspective, equitable distribution of resources as well as channeling of resources to frontline sectors of the economy among others". In the same light, Nkwatoh and Hiikyaa (2018) studied the effect of insecurity on economic growth in Nigeria applying the vector autoregressive model using quarterly data from 2009Q1 to 2016Q4 and came out with findings that "economic growth and investment activities tend to increase during periods of insecurity. Also the rate of unemployment reduced during periods of insecurity. This implies that insecurity only threatens economic activities with no negative effect on the entire economy as conjectured by various economic theories. Thus, to continuously sustain the Nigeria's economic growth rate, the government needs to protect domestic and foreign investments by stepping up its national security".

Furthermore, Abdulkarim and Saidatulakmal (2022) argued that "In spite of government counter-terrorism expenditure and efforts, the prevalence of insecurity in Nigeria appears to be rising and fast evolving into an existential crisis that is shaking the foundation of its nationhood". Employing the annual time-series data from 1980 to 2019 and the ARDL techniques to analyze the work on fiscal effects of insecurity on Nigerian economy, findings indicates that high unemployment rate, domestic capital formation, foreign direct investment, government spending on education and security are negatively affected by insecurity and consequently retarded growth in the long and short run. On the contrary, improved health services, equitable income distribution and productive use of public borrowing were positively correlated with security and, therefore, stimulated growth in the long and short run. The study suggests that good governance, provision of a safe and secured environment for human capital development and businesses, improved access to social and economic services will curb violent tendencies, create jobs, reduce poverty, increase government revenue and engender long-term inclusive growth". In the same token, Nwagboso (2012) and Edeme and Nkanu (2019) observed that insecurity had negative effect on growth.

To buttress the effect of terrorism on growth, Wen, Muhammad and Haseeb (2019), examine the effect of terrorism in Pakistan from 1972- 2014. Their finding revealed that terrorism had significant negative effect on Pakistan economy. Aminu, Hamza and Ali (2015) studied the impact of insecurity on economic development in Nigeria from 1986 to 2012. The study employed the OLS techniques to analysis the data. Their results clearly revealed that terrorism negatively influenced growth. Furthermore, Callistar (2015) investigated the effect of insecurity in Nigeria from 1990 to 2012. The outcome of the result had shown a negative effect of terrorism on economic development in Nigeria. Also, Cinar (2017) make use of panel data for 115 less developed countries (LDCs) from 2000 to 2015 employing the ARDL model. The findings showed that terrorism negatively affected economic growth of the countries. More so, Gassebner and Luechinger (2011) evaluated the effect of terrorism in previous scholarly studies on terrorism ranging over seventy works using the bound test to examine the effect. Findings displayed that economic activity had a negative association with terrorism. In support of the view above, Shabir, Naeem and Ihtsham (2015) looked at the impact of terrorism on economic development of Pakistan from 1981 to 2012 employing co-integration and error correction method on variables used in the model. Findings revealed an adverse effect of terrorism on Pakistan economic growth. In addition, Aynur and Paul (2012) discovered a negative relationship between military expenditure and economic growth.

Methodology

The work used the Autoregressive Distribution Lag (ARDL) model developed by Pesaran, Shin and Smith (2001) and Granger causality method to analysis the work. Augmented Dickey-Fuller (ADF) unit root test was employed to test for stationarity of the data. Also the bounds test and Granger causality test were utilized to determine the presence of long-run relationship and the direction of causality among the variables respectively.

Mode Specification

For simplicity the study settled in model used by Wen, et al (2019) and some modification was made to suit the current reality.

$GDP = f(TER, FDI, GSD, HUK)$ .... (1)

Econometrically, the model in equation (1) can be re-organized as follows:

$GDP = \beta_o + \beta_1 TER + \beta_2 FDI + \beta_3 GSD + \beta_4 HUK + \varepsilon_t$....................................... (2)

In reference to equation (2) the long run ARDL model is specified as:

$\Delta InGPDt = \beta_o + \beta_1 \Delta lnTER_{t-1} + \beta_2 \Delta lnFDI_{t-1} + \beta_3 \Delta lnGSD_{t-1} + \beta_4 \Delta lnHUK_{t-1} + \varepsilon_t$ .... (3)

The short run dynamic model is presented as thus:

$\Delta lnGPDt = \beta_o + \beta_1 \Delta lnTER_{t-1} + \beta_2 \Delta lnFDI_{t-1} + \beta_3 \Delta lnGSD_{t-1} + \beta_4 \Delta lnHUK_{t-1} + \beta_5 \Delta ECT_{t-1} + \varepsilon_t$ ... (4)

Where:

GDP = Economic growth

TER = Terrorism index

FDI = Foreign direct investment

GSD = Government spending on defense

HUK = Human capital

While, ε = Error term. β_o is the constant and $\beta_1 - \beta_4$ are estimated coefficients.

The Granger causality equation is specified as follows:

$$Y_t = \alpha i + \sum \alpha i A_{t-i} + \sum \beta_t B_{t-j} + U_{1t} \quad (4)$$

$$X_t = bi + \sum \lambda_i A_{t-i} + \sum \delta_j B_{j-1} + U_{2t} \quad (5)$$

Where B and A represents terrorism index and economic growth respectively. It was assumed that the disturbances U1t and U2t are uncorrelated. The Granger causality test can produce three outcomes. The first is bidirectional which occur when we reject both null hypotheses, which shows that terrorism index and economic growth coefficients are statistically significant. Second is the unidirectional causality which occurs when we accept one of the null hypotheses and reject other, showing that either the causality runs from terrorism and economic growth. Thirdly occurs when we accept both null hypotheses, it means that there is independence. This revealed that the coefficient of the set of the independent and dependent are not statistically significant in both regressions (Gujarati & Sangeetha, 2008)

Data Sources, Measurement and A priori Expectation

The study exploited the annual time series data from 1990 to 2022 fiscal year. The data were sourced from the National Bureau of Statistics and Central Bank of Nigeria Statistical Bulletin. Terrorism index were proxy as indicator for terrorist activities. GDP growth rate was proxy as indicator for economic growth while human capital was represented as gross fixed capital formation. Terrorism is assumed to reduce GDP growth rate, foreign direct investment as well as human capital. However, the expected signs of the coefficient of the variables are negative. In the same vein, the sign between terrorism and government expenditure on defense is expected to be positive. Meaning, a rise in terrorism results to increase in government expenditure on defense.

Estimation Procedure

The study adopted the Auto-regressive distribution lag (ARDL) method to test the existence of co-integration among variables. This technique is recommended over co-integration approaches developed by Engle and Granger 1987 and Johenson 1988 which require a large sample time and all variables to be stationary at first difference that is l(1). The methodology has the advantage of relieving the task of determining the order of integration among variables because variables are presumed to be stationary at level and first difference. Therefore testing for unit roots to determine l(0) and l(1) are not necessary for ARDL technique (Ewetan & Urhie, 2014). But according to Rahman and Islam (2020) it is necessary to conduct unit root test to ensure that no l(2) variable(s) is /are included in the model because it is assume that l(2) variable(s) may cause the system to collapse.

Results and Discussion

Stationarity Test

The study employed Augmented Dickey- Fuller (ADF) unit root test to test for the stationarity of the data. The results are displayed below.

Table 1: Stationarity Results

	At Levels		At 1st Difference	
Variables	ADF statistics	Critical ADF value statistics at 5%	Critical Order of value integration at 5 %	Decision
GDP	-1.683	-2.865 -9.213	-2.765 1(1)	Stationary
TER	-3.643	-2.965 -—	-— 1(0)	Stationary
FDI	-1.443	-2.912 -5.754	-2.954 1(1)	Stationary
GSD	-1.563	-2.965 -4.402	-2.874 1(1)	Stationary
HUK	-2.743	-2.961 -5.874	-2.954 1(1)	Stationary

Source: Author's computation (2023)

The unit root result indicates that all the variables used in the study are stationary at first difference 1(1) except TER (Terrorism index) that is stationary at level 1(0). The mixed order of integration by the variables supported the use of Autoregressive Distributed lag (ARDL) model.

ARDL Bounds Test for Co-integration

To verify if there is a long run relationship among the variables, the study employed bounds test.

Table 2: Bounds Test Co-integration Results

Test Statistics	Value	Sign Level	I(0)	I(1)
F-statiatics	3.3925410%	2.07	3.0	
K	5	5%	2.39	3.38
		2.5%	2.70	3.73
		1%	3.06	4.15

Source: Author's computation (2023)

Table 2 shows the results of the bound test for co-integration and the results revealed that the calculated F- statistic is 3.39254 which is greater than the 5 percent upper bounds critical value of 3.38. This discloses that there is a long run relationship among the variables under review.

Table 3: Estimated Long-run Co-efficient.

Dependent Variable: GDP

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
TER	-0.083562	0.044851	-1.863102	0.0418
FDI	-0.023821	0.025672	-0.927898	0.0312
GSD	-0.643578	12.26583	-0.052469	0.0032
HUK	0.621472	0.654322	0.949795	0.0918
C	212.8763	51.10984	4.165074	0.0000
R-squared	0.811231	F-statistic		8.021876
Adjusted R-squared	0.772154	Prob(F-statiatic)		0.000000
Durbin-Watson stat	1.91872			

Source: Author's computation (2023)

The estimated long-run results in table 3 above revealed that terrorism (TER) exhibit a negative and significant effect on Nigerian economic growth. The coefficients of foreign direct investment and government spending on defense were found to be negative and statistically significant at 5% level. While human capital is positive and statistically insignificant at 5% level. This result implies that one percent increase in terror activities would decrease growth by approximately 0.08 percent. The finding is in agreement with the study by Aminu, Hamza and Ali (2015) and Edeme and Nkanu (2019). The negative effect of foreign direct investment (FDI) on GDP could be associated with frequent terrorist attacks which prompted few foreign investors to fly away and unattractive for potential investors to come into the country. The result is in conformity with work by Web, et al (2019), Cinar (2017). Also the result indicates that one percent increase in government spending on defense would decrease growth by about 0.644 percent. This implies that the resources that would have been use to provide physical and social amenities are spent on fighting terror and bandit. Over the decades government defense spending has increase astronomically with obvious consequences on social service provision, crowding-out scare fiscal resources to other growth enhancing sectors of the economy. The study is in agreement with the work of Aynur and Paul (2012) and Chuku, Dominic and Ima-Abasi (2019) who discover a negative association of government spending on defense and economic growth. The inverse relationship between government security spending and economic growth in Nigeria can be linked to variety of factors such as the lack of transparency in military transactions, control and audits of the military budget, corruption and waste.

The R^2 is 0.81, showing that about 81 percent changes in the dependent variable is responsible by changes in the independent variables. The F-statistic of about 8.021 indicates that variables in the model are jointly significant. Durbin-Watson stat. of 1.9 revealed the nonexistence of autocorrelation. After the long run estimation of the coefficients, the ARDL model uses the lagged values of the variables in equation 1 (a linear combination denoted by the error-correction term (ECT) to estimate the short run models dynamics associated with long run relationship.

Table 4: Short-Run Estimated Results
Dependent Variable: GDP

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
D(GDP(-1))	2.816870	1.962185	1.736824	0.0333
D(TER(-1))	-0.648842	0.132210	-4.907661	0.0200
D(FDI(-1))	-0.401011	0.291765	-1.374431	0.0012
D(GSD(-1))	-0.324221	9.165183	-0.035373	0.0002
D(HUK(-1))	0.220072	0.114751	1.917822	0.1034
C	116.5434	43.76981	2.662698	0.0021
ECM(-1)	-0.223241	0.821563	-1.488919	0.0012
R-squared	0.75212	F-statistic	24.7539183	
Adjusted R-squared	0.73781	Prob(F-statiatic)	0.000000	Durbin-
Watson stat	1.81223			

Source: Author's computation (2023)

According to table 4, the model's error correction term is highly significant and appropriately signed. The ECT has a coefficient of 0.222, implying that around 22% of the deviations from the long run growth rate in output caused by previous years shocks converge back to long run equilibrium in the present year. It was also negative, significant, and less than one, signaling that the expected coefficients from the work can be utilized to make policy statement. The result supports the presence of a long run relationship between growth and terror. The result revealed that the lagged value of TER (terrorism) is negatively related with economic growth (GDP). Suggesting that one percent rise in terrorism, economic growth will decline approximately by 0.65 percent. The result is in agreement with the work of Chuku, et al (2021); Muhammad, Wen and Haseeb (2021). Similarly, government spending on defense (GSD) on growth was negative and significant. Meaning that, a percent rise in government spending on defense decrease growth by 0.324 percent. Furthermore, the result shows that FDI impact on growth was negative. The negative effect of foreign direct investment (FDI) on GDP could be associated with frequent terrorist attacks and various insecurity issues in country which prompted few foreign investors to fly away and unattractive for potential investors to come into the country. The result is in conformity with work done by Web, et al (2019) and Cinar (2017).

Table 5: Diagnostic Tests

Tests	F-statistics	Probability
Serial Correlation	0.621356	0.43543
Heteroscedasticity	2.391422	0.37650
Normality Test	4.763271	0.17234
Ramsey Test	0.131613	0.64444

Source: Author's computation (2023)

The diagnostic test results in table 5 above revealed that the model passes serial correlation, heteroscedasticity, Ramsey and normality test. The F-statistic and matching P-values appear greater than 5 percent indicating that the model is free from heteroscedascity, autocorrelation and misspecification bias.

Table 6: Granger causality Test

Tests	obs	F-statistic	Prob.
GDP does not Granger Cause TER	37	1.05236	0.0982
TER does not Granger Cause GDP		3.025030	0.0300
GSD does not Granger Cause TER	37	2.35421	0.0663
TER does not Granger Cause GSD		2.33322	0.2201
FDI does not Granger Cause TER	37	4.52134	0.0011
TER does not Granger Cause FDI		5.88672	0.0054
HUK does not Granger Cause TER	37	6.01112	0.0021
TER does not Granger Cause HUK		2.11012	0.0748

Source: Author's Computation (2023)

Recommendation

i. Government should provide good governance, improve access to social and economic services and create conducive environment for doing business.

ii. Government should be transparent in the distribution of commonwealth that will reduce protest and complain among citizens.

iii. Foreign direct investment should be a priority by the current administration in other to enhance job creation.

iv. Government should deploy artificial intelligence and highly sophisticated technology for information gathering to track the terrorist resources; this will reduce terrorism to a very large extent.

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ANALYSIS OF DIALECTAL VARIATION IN JUKUN LANGUAGE

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Abstracts

The study investigates the analysis of dialectal variation in Jukun language. The study seeks to identify the similarities and the differences in the dialects of the Jukun language. Data for the research was gathered by the researcher through field linguistic method of data collection using observation, semi structured interview, note taking and the intuitive knowledge of the researcher as a native speaker in the process of gathering and analyzing the data used. Native speakers of Jukun language who are knowledgeable and acquainted with the rudiments of the language were visited, consulted and observed as they interact in social gatherings in Wukari, Takum, Donga, Ibi, Jalingo, Gombe, Plateau and Nasarawa. Secondary data were elicited from the already existing literature in relation to the subject under investigation. Data presented was glossed for the understanding of the readers. From the findings, the study holds that although similarities exist among the different dialect of the Jukun language, some vary in terms of sounds and meanings. The study also revealed that, some words in the selected dialects have different pronunciation and spellings; others have almost the same pronunciation with almost the same spellings while others have the same pronunciation with the same spellings. The study concludes that similarities do exist between some dialects of the Jukun language. The data presented and analyzed adopts the classical phonology theory because it is concerned with the representation of pronunciation of dialect. That is, alterations of what makes a particular dialect differ from other dialect of the same language.

Keywords: *Language, Language variation, Phonology and Morphology*

Background to the Study

Language changes overtime in the aspect of pronunciation as well as word formation. As human beings come in contact with one another, in different geo-political settings, their differences affect the way they communicate. As such, when different individuals with different language come in contact, the articulation of their words affects one another thereby affecting their language overtime. Jukun language is one of such language that came in contact with different languages. As such there have been a lot of influences on the language from other languages varying from borrowing, coinage and tonal change thereby occasioning the raise of different dialects. For example, the Wapan dialect of the Jukun people refer to géa as cut and so also the Yoruba people refer to géa as cut. From this example it can be deduced therefore that there is an act of borrowing that has affected the morphology as well as the phonology of the Wapan dialect and the Yoruba languages.

These are two components of language system that interact and affect each other in some ways (Morphology and Phonology). Due to interaction, pronunciation of a morpheme may get modified or changed. The change may be regular or irregular depending on the context of usage. As such, this study is significant in that it shall help to provide linguistic information on dialectal variation in Jukun language as the study shall contribute to the linguistic development of the language.

Linguistic Profile of the Jukun People

The Jukun language according to Joseph Greenberg (1963) is classified among the Niger-Congo family of African Language Family classification. The language is widely spoken by the Jukun people. There are different varieties of the Jukun language scattered all over Nigeria and beyond. These among others includes Wapan widely spoken in Wukari, Ekpan spoken in Takum and Donga, Wanu spoken in Ibi and Abinse, Kona spoken in Jalingo and Bali, Dampar, Wurbo and Bakundi spoken in (Wukari), Pindiga, Kisha, Agatu spoken in Nasarawa, Gwana spoken in Gombe, Wase and others spoken in Plateau. Most of these varieties are what are now considered as dialects of Jukun language.

Jukun are an ethno-Linguistic nation in West Africa who traced their origin to Kwararafa Kingdom. According to oral tradition the Jukun people came from Yamen into Nigeria through the Mamdara hills and Lake Chad. They first selttled in Ngazargamu, there they established a stronghold by fortifying their settlement which later became the capital of kanem Borno Empire, the present-day Maiduguri, Borno State. From Borno they moved to Upper Gongola Valley where they established a base for a very long period of time (known as Kwararafa Empire. The Kwararafa Empire extended its territory from far North to Cross-river around Calabar in the 17th century (1618AD). However, the kingdom collapsed in the 19th century due to internal forces.

Conceptual review

Language

Language is an organized or structured system of transference of ideas, thoughts or emotions to an individual or group of individuals. Language is aimed at convincing the hearer to accept whatever ideas, thoughts or emotions passed across to them. Language is an attribute of human existence, a core value in terms of human interaction. Suffice it to say here that language is a part of human existence which encompasses culture, tradition and beliefs. These aspects of human existence can only be passed to the next generation or the wider society through an instrument called language. It is difficult to conceive a human society without a language. This points us to the fact that language is an inevitable ingredient in the human society without which no society can survive. To this end, it is needful for us to understand how it works in terms of our behavior and contact to one another. Thomas and McDonagh (2013:48) observe that the expression of complete communication needs of a people is enhanced by the use of language. This is because, language enhance understanding among the people who share the same linguistic identity without which human society will definitely be chaotic and unimaginable. Holmes (2013:20) opines that people often use language to signal their membership in a particular group and to consent to different aspects of their social identities, social status, gender, age, ethnicity, and the kind of social networks that they belong to; turn out to be important dimension of identity in many communities. Suffice it to say here that, every human society has its own unique way of communication.

Language Variation

Language variation is a way of saying the same thing in a different way. Speakers of any language have variation in the way that they use language. This variation is demonstrated by linguistic differences in terms of sound (phonetics) and structure (grammar). There might be only a slight variation between forms of a language such as minor pronunciation of words or a slight change of grammatical structure that do not inhibit inter-group communication.

As pointed out in Richard (2019) that language can also be refers to as lect, to mean a distinctive form of a language. In the same vein, Magaji, (2017) observed that language variation is the range of difference between varieties of language. This variation can be sociolinguistic in nature. That is, as a result of how people distinguish themselves from each other, such as by accent and vocabulary. All varieties of language differ from one another in terms of their morphology, articulation of speech sounds and sentence structures. This variation may follow predictable patterns, or it may be as a result of group of people distinguishing themselves from other groups. It is customary for a language to have varieties distinguished in terms of users and uses. When group of speakers differ in their language, they are said to speak different dialects of the language.

Phonology

Phonology is the study of the sound system of a particular language and their meaning. Phonology describes the way in which sounds function within a given language and operate at the level of sound system. Lyons (1981) attests that the primary medium of human language is sounds; sounds have a role to play in human language because they are combined to produce meaningful ideas. For example, /p/, /i/ and /t/ are standing as individual sounds but when these sounds are brought together or combined, it forms a meaningful idea called "pit" to a native speaker of English. Meaning; Ditch or hole.

Phonology is concerned with how sound in a particular language behaves or changes as a result of modification or alteration of the sound. From our example of pit, if the sound /y/ is added to pit + y = pity, it automatically changes the meaning from Ditch to the feeling of compassion. In this regard, phonology seeks to consider the contrastive relationship among speech and sounds that constitute the fundamental components of a particular language. Ken (2009) observes that phonology is concerned with the difference of meaning that is signaled by a sound. That is to say, how sounds are organized in a particular language explaining the place of sound occurrences.

Morphology

Morphology is the study of word formation. It is concerned with how word is formed and structured. The formation of word changes the grammatical class from noun to verb, noun to adjective, verb to adverb, etc. At times depending on the process of word formation applied. At other times, the grammatical class of the word formed does not change but the surface structure of the word is being affected. The procedure employed in this aspect of word formation process helps to serve as a marker to the newly formed word, marker in terms of plural, tense, number, or gender. Matthew (1999:58) also defines morphology as the study of the internal structure of words and the roots by which words are formed. The key words in this definition are 'internal structure of words and the roots' by which words are formed. Internal structure entails the units of words that have their own meanings as ingredients in the formation of new words. When these units are brought together, by the help of affix process, new words are formed. For example: A unit of word: fool. Fool is a unit of word and at the same time a root word. That is, it can stand on its own and be meaningful or sensible. If another unit, for example, 'ish', a unit that cannot stand on its own and be sensible is added to it, the word becomes foolish. This word 'fool' has undergone the process of word formation through the process called an affix process of suffixation. The discussion on the term unit, leads to the phenomenon called Morpheme. Morphemes are components of words in their smallest forms.

Tomori (2004:47) defines morpheme as a minimal linguistic unit that carries grammatical or semantic meaning. From these definitions, it is clear that morphemes are; minimal or smallest units, these units are meaningful and they carry grammatical or semantic meanings. These components can be independent or dependent {free or bound). They are the smallest meaningful grammatical units of a language that are indivisible. Morpheme is categorized based on three criteria viz:

i. It is a word or part of a word that has meaning.
ii. It cannot be divided into smaller meaningful segments without changing its meaning or leaving a meaningless remainder.
iii. It has relatively the same stable meaning in different verbal environments.

There are types of morpheme viz: free and bound morphemes

Free morphemes are morphemes that can stand on their own and be meaningful. For example, boy, man, cut, is, end, come, etc. Bound morphemes are morphemes or units of words that cannot stand on their own and make meaning. For example: un, il, tion, ing, ment, en, etc.

Morpheme comprises two separate classes called. 'base', 'root', or 'stem' and affixes. Base is a morpheme that gives the word its principle meaning. An example of a free base, morpheme is boy in the word boys, 's' is a bound base morpheme which is an affix (suffixation). Abubakar (2001:12) defined the term morphology as the study of the word formation inflection. In this definition, it can be deduced that morphology is the study of how new words are formed by the changes that occur especially at the end of the word. For example the plural 's', the third person singular 's', the past tense -'d', -'ed', the negative particle 'nt' and the comparative –'er' etc.

Theoretical Framework

In the early 70s, Chomsky's attempt to describe the phonology of tonal system and the differences of sound in phonological description led to the classical phonology theory. The major concern of the theory is on speech sounds (Phonetics and Phonology). Phonetics and phonology are related levels of linguistic investigation which deal with the study of speech sounds though in different dimensions. Phonetics deals with the study of speech sounds in general whether distinctive or not. While Phonology deals with the study of speech sounds in respective languages and the combination of the pattern of sounds in such languages and how they are structured in their respective languages. Phonology is concerned with studying the speech sound that can bring change in meaning in respective languages and how these sounds function in a natural language.

Mbah (2016:1) observes that classical phonology states that no two sounds considered physically and objectively are exactly alike even those that occur in corresponding positions in utterances. Classical phonology is concerned with the representation of pronunciation of dialect. That is, some alterations of what makes a particular dialect differ from other dialect of the same language. Ayo and Adesina (2011:156) assert that classical phonology is an offshoot of structural grammar, which emphasizes the study of the structure of languages. This they note, informed the emphasis that is placed on the dichotomy between substance and form, that is, the phonemic and morphemic status. For example,
pass you /pa:s # ju:/ -s#j→ʃ [pa:ʃu:]
would you /wʊd # ju:/ -d#j→ ʤ [wʊʤu:]
did you /did # ju:/ -d#j→ ʤ [diʤu:]
miss you /mis # ju:/ -s#j→ʃ [miʃu:]
last year /la:st # jɜ:/ -t#j→ʧ→ʃ [la:ʃɜ:]
first year /fɜ:st # jɜ:/ -t#j→ʧ→ʃ [fɜ:ʃɜ:]

From the above examples, it can be clearly seen that pronunciation is altered as a result of word boundary or the influence of the last letter on the initial letter of the next word without change in meaning. Sommerstein (1977:38) that the major goal of classical phonology is the investigation of the phonic features that brings about distinctions in utterances in a given language. The theory assumes that: every speech sound is distinctive in a given language. The feature of a given speech sound is capable of bringing about meaning distinctions between utterances in a natural language. This theory is relevant to this study because it deals with an aspect of pronunciation. It seeks to deal with the pronunciation of the same term differently as seen the example above.

Methodology

In this paper, the researcher visited selected areas and observed personally the people as they communicate or interacts with one another in Wukari, Takum, Donga, Ibi, Abinse, Jalingo, Gombe, Plateau and Nasarawa, so as to understand the structure of the Jukun language even without the knowledge of the speakers. In the cause of their communication, the utterances of the speakers, pitch (tone) as it initiates change in utterance of the speaker was also observed. The intuitive knowledge of the researcher as a native speaker was also used in the process of selecting utterances among the speakers of Jukun language in analyzing dialectal variation in Jukun descriptively.

Comparative Analysis
Comparison of some words in Jukun dialects

Gloss	Wapan	Ichen	Wanu	Kpanzun
Water	Jàpè	Mbur	Làpè	Nbèn
Urine	Shinzhàn	Sinbur	Shingya	Fúnúbèn
Oil	Abyiu	Byi	Abyiu	Úbú
Blood	Ásà	Nghn	Ásà	Ikyèn
Rain	Achú	Chú	Afyú	Uski
Man	Wúnú	Ndèhdon	Wònù	Bidùn
Woman	Wùwà	Ndèhgwà	Wòwà	Bindo
Father	Atà	Attàh	Adà	Atà
Girl	Nwù wà wuwa	Nwèhndehgwa	Angowowa	Mbàbindo
Brother	Nwùzà	Nwèhjùà	Angòyi	Mbàyùnàidùn

Source: *Magaji (2017:136).*

The analysis reveals that liquid nouns are the same in comparison, especially between Wapan and Wanu in the case of 'water', 'urine', 'oil' and rain with a slight difference in their pronunciation. The study observed that, similarities also occur between the Wapan, Ichen, and Wanu in the words for oil and rain while the Kpanzun have different words for all the liquid nouns. Also, 'man' and 'woman' are similar between Wapan and Wanu. The word for 'father' is similar in the four dialects as seen in the examples above with a slight difference in the consonant sound that appears in Wanu dialect.

Meek (1930:121) observes that there is a remarkable differentiating feature between the dialect spoken in Wukari and the dialects of the other groups. The Wapan dialect is characterized by the use of a pronominal prefix 'a' in naming items. The other dialects use suffixes instead. For example: *'na', 'ni' and 'ri', 'ru'*. These are suffixes among the Ichen/Chamba, Kona, Gwana and Pindiga. The Jibu vacillates between the two systems (Prefix and Suffix). In consonant with the orientation of Classical phonology theory, no two sounds are considered physically and objectively exactly alike even those that occur in corresponding positions in utterances. The theory is concerned with the representation of pronunciation of dialect. That is, some alterations of what makes a particular dialect differ from other dialect of the same language as seen below:

Gloss	**Wapan**	**Ichen/Chamber**	**Kona**	**Gwana**	**Jibu**	**Wase-Tofa**
Head	áchì	shí-nā	Kí-nì	Kí-nì	Shîn	Shîn
Hair	á-jì	hwē	Háwî	Ji-ni	á-jìn	Mwán-jìn
Tooth	á-nyì	já-nà	Já-rì	Jí-rì	íj-èn	íj-ìn
Leg	á-bè	bá-rà	Saî	Tsáî	í-bàr	Bàr
Man	á-pà	pē	Mpèr	Mpérd	Pérè	ápèr
Chief	á-kù	Kúrù	Kú-rù	á-kú-rù	Kùr	Nkìr
Moon	á-sò	Só-nà	Sá-nù	Sá-nò	Só-àn	á-sò
Water	á-jápè	Zápè	Zápèr	Zápérè	Zá	Jápèr
Salt	á-mà	Má-nà	Má-nà	Má-àn	í-mán	á-mùn
Room	á-tàn	Tá-nà	Táé-nù	Tá-nùj	Tá-nà	á-tùj
Pot	á-pè	Párà	Pá-rì	Pá-rà	á-pàr	á-púè
Knife	á-kwìn	Kú-nà	Kwí-nì	Kwí-rì	Kú-nà	á-kùn

Source: *Meek (1930:121)*

The study revealed that, similarities occur between the Kona and Gwana, Jibu and Wase-Tofa dialects in the words for head and while the Wapan and Ichen/Chamber dialects have different words for the head. Likenesses also occur between Wapan, Ichen/Chamber and Kona dialects for chief and salt. However, Wapan and Jibu dialects have almost the same articulation for salt with slight difference while Wase-Tofa has a different articulation for salt and chief. For room, similarities occur in Ichen/Chamber and Jibu dialects. In Ichen/Chamber and Gwana dialects, similarities exist for pot similarly, for Ichen/Chamber and Jibu, resemblances occur for Knife. In all, some words in the dialects presented have different articulation and spellings; others have almost the same articulation with almost the same spellings while others have the same articulation and spellings. For example, chief in Ichen/Chamber, Kona and Gwanna dialects, head in Jibu, Wase-Tofa dialects, and Kona, Gwana dialects, Moon in Wapan and Wase-Tofa dialects and so on.

Comparison of numerals in Jukun individual dialects

Langu age	Diale cts	1	2	3	4	5	6	7	8	9	10
Jukun	Hõne (Pindiga/Gwana)	Zùŋ	pyèːnè	sáːré	nyẽ̄	sənɛ	Sùnjé	nè	Hūnnè	Sīnyáu	Dùb
Jukun	Jibu	Zyun	Pyànà	Sàra	Yina	Swana	Sùnjin	Sùmpyà nn	Awùyin	Ajunnd úbi	Dwib
Jukun	Wapa (Wãpha)	Zùŋ	Pyĩ̄	sā / sārā	Nyìnā	swãnā	ʃẽ̆ʒí	Sémpyè	sẽsá	Sínyáu	Ádùb
Jukun	Jiba (Jibe / Kona)	zũ̄ː	pyèːnà	sàːr	Nyè	Són	sùnʒé	nà	è	nì	Dùb
Jukun	Wapan Jukun	Dzun	Pyìnà	Tsara	Nyena	Tswana	cìnjen / ʃizen	tsùpyìn	tsùntsa	tsùnyò	Dzwe
Jukun	Tigon Mbembe	Nzo	Pya	Sra	nyɛ	tʃwɔ́	tʃwɔ́mb azo	tʃwɔ́mb apya	ɛ́nyɛnyɛ	tʃwɔ́mn vɛ	dʒé

Source: ***Blench*** *(2012) list of Jukun dialects, and numerals*

The table above reveals the similarities in the comparison of numerals in the individual Jukun dialects. The words which sound similar in Hone (Pindiga/Gwana), Jibu, Wapa (Wapha), Jiba (Jibe/Kona), Wapan and Tigon Mbembe dialects have the same origin. Greenberg (1963:1) asserts that languages with the same origin have resemblance in sound and meaning in specific form. This is the true picture of the Jukun language in relation to its individual dialects. For example, one (1) represent "Zùŋ" in Hone (Pindiga/Gwana) dialect, "Zyun" in Jibu dialect, "Zun" in Wapa (Wapha) dialect, "Zu" in Jiba (Jibe/Kona) dialect dialect, "Dzun" in Wapan dialect and "Nzo" in Tigon Mbembe dialect. This shows that, all these dailects are parts of the Jukunoid based on their origin.

Conclusion

Effort has been made in the course of this research to establish that among the dialects compared, there exist some similarities and differences in the dialects of the Jukun language as some words have different articulation and spellings while others have almost the same articulation with almost the same spellings. The similarities signal the fact that these dialects belong to the same genetic origin. In harmony with Greenberg assertion, languages with the same origin have similarity in sound and meaning in specific form. This is the true of the Jukun language in relation to its individual dialects. While their differences signal their uniqueness in distinguishing their selves from each other because of their topographical origin, shift in cultural values that resulted into social grouping thereby influenced their speech which subsequently gave rise to dialectal differences of the same language.

Contribution to Knowledge

The work is anticipated to project the Jukun language to an enviable position as it is expected to serve as a guide towards the development of models for the linguistic development of the dialects of the Jukun language where other dialects not captured in this study can draw inspirations in respect to the development of their individual dialects.

More so, the study will serve as a reference material for schools and other organizations like language developers who are willing to promote local languages, give awareness to see some features that are identical in other languages thus tracing their genetic origin to the same language family. In learning indigenous African language, a research work as this is of a great benefit to interested linguists who have a drive for developing minority languages, especially those that are on the verge of going into extinction. The government also stands to benefit from this work as it serves as a reading material which will enhance literacy among the Jukun speakers and therefore reduce the level of illiteracy in the society.

Recommendations

It is important to note that, this study has not exhausted all aspects of dialectal variation in Jukun language. As such, the researcher does not claim to have exhaustively treated the subject. There is therefore, a need for other researchers to explore other areas on dialectal variation that have not been covered in regards to the Jukun language. In so doing, this will reveal the riches embedded in Jukun language and promote the status of the language to an enviable position. The Jukun Language Development Committee (JLDC) should expand their scope to accommodate research work especially, academic research work on Jukun language. Researchers should be encouraged to focus their research on dialectal studies ranging from exploratory, classification, to causal research so as to work towards building the dialects of the Jukun language. To this effect, it is important that conferences and workshops be organized with the aim of promoting the Jukun language dialects. Discussions and reviews on research findings on Jukun language dialects should be done. On this note, the Wukari Traditional council and Wukari Local Government Chairman should endeavor to give financial support to the Jukun Language Development Committee as they work towards the development of Jukun language and the dialects of the Jukun language.

More so, the Taraba State Government should train teachers to master and teach indigenous languages thereby promoting our indigenous languages. Television programs that promote local dialects and languages within the state should be encouraged with awards and handsome gifts not only to the best performer but to all participants so as to encourage more people to participate in programs that promote local dialects and languages thereby preserving our local dialects and languages.

Parents and teachers should be advised in churches, mosques and social gatherings to teach their wards their local dialects at home thereby revealing to their children the importance of their cultural values and heritage given by the Almighty. This is in line with the statement given by Mr. Ignatius Lawson, an educationist and proprietor of Easy way Nursery and Primary School in Port Harcourt on the 5th August, 2022 at the speech and prize giving Day of the school. In his statement, he said: the diminishing number of children who speak mother tongue in the name of globalization is alarming. Lawson laments that, "...a situation where children are restrained from speaking their mother tongue even outside the classrooms during their breaks and this has extended to our homes".

The Nigerian government should shift grounds from plans, suggestions and proposals to promoting indigenous dialects to the implementation of the same. Efforts have been made by the government over the years to promote local dialects ranging from: National Policy on Education, Lagos: Federal Ministry of Information , (1977, revised in 1981) to the Philosophy of Nigerian Education 1988, Language and Literacy in Nigeria 1985, Language in Formal (pre- tertiary) Education 1985, The Status of Languages in Education, Beyond The Policy: Towards Implementation of the Policy 1989, The Strategies for Implementation of the Policy 1982,1984, The Language, Teachers and the Policy 1973, Prospects for Language Education; suggestions and recommendations, The Federal Government and her Agencies. The language policy has been modified time and time again until the 30th of November, 2022 when the Federal Executive Council (FEC) approved a new national language policy that Nigerian students from primary one to six must be taught in their mother tongue. All these programs are in a bid to support local dialects but they are yet to see the full light of the day. Considering that every dialect belongs to a specific culture; government's effort to developing a dialect entail developing the culture of the people hence developing the people therefore the government should work towards the implementation of the policies already formulated.

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CYTOTOXICITY EFFECT, ISOLATION AND CHARACTERIZATION OF CHEMICAL CONSTITUENT OF *EUPHORBIA MILII*

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Abstract

Most of Sarawak's indigenous plants are still underutilized and studies on this plant species are a potential and interesting field to be implored. Euphorbia milii, native to Madagascar, it is common to Malaysian house garden it belongs to spurge family Euphorbiaceae. In this research, phytochemical and cytotoxicity studies have been performed. Secondary metabolites from the crude extract of Euphorbia milii, was isolated and purified by using column chromatography, whereas structural elucidation was performed by using various spectroscopic information especially Mass Spectrometry (MS), Nuclear Magnetic Resonance (NMR) and Fourier Transform Infrared (FTIR). The cytotoxicity using brine shrimp (Artemia salina) to evaluate crude extract and the isolated compound. A secondary metabolite vitexin has been purified and characterization of the leaves' crude extract of Euphorbia milii. Brine shrimp toxicity assay using Artemia salina showed that methanol crude extracts and vitexin from Euphorbia milii gave higher cytotoxicity against Artemia salina with LC_{50} value of 34.59 µg/mL and 16.34 µg/mL respectively. The results obtained from this research work would extend our knowledge of potential antitumor or anticancer activities, and *pharmaceutical applications of crude extract and the isolated compound, vitexin as agents. Nevertheless, this is the first time this compound was isolated and characterized of the leaves' crude extract of Euphorbia milii.*

Keywords: *Cytotoxicity, Isolation, Characterization, Euphorbia milii, Artemia salina, Vitexin, NMR, FTIR, GC-MS.*

Background to the Study

Natural products (NP) coming from plants have been the focus of traditional medicine and they remain regularly in use up to today. The ethnomedicinal knowledge of plant throughout the ages, have served humans for innumerable therapeutic interventions, ranging from common headache to life-threatening conditions like diabetics, cancer, hypertension, etc. the development of modern medicines has, in many situations stemmed from ethnic medicinal uses and meticulous investigation of naturally occurring chemical constituents obtained from the plant screening reported by scientists and researchers. The value of phytomedicinal potentials of plant and plant products cannot be ever neglected. As plant-derived drugs contain a pool of metabolites with potential complementary pharmacological actions, their use in mitigating chronic diseases through synergism is an area of intense interest. In this light, indigenous knowledge can help to contribute to the rational drug discovery and development of new drugs from medicinal plants (Wagner & Ulrich-Merzenich, 2009; Normile *et al.*, 2003).

Euphorbia milii, native to Madagascar, it is the plant common to Malaysian house garden it belongs to spurge family *Euphorbiaceae* (Figure 1). The plant is upright branched shrub, a thorny succulent shrub that can reach 150 centimetres in height. Its stems, full of long thorns, end in a bouquet of leaves. Its leaves are bright green, oval, elongated. The plant is cylinder-shaped or indistinctly angled branches lined with rigid, thin, diversified spines. Leaves, pale green in colour and are limited in numbers, alternative, oblong-obviate, or short acuminate. The flowers, variably red, pink or white having size up to 12 mm broad, are small, subtended by a pair of conspicuous petal-like bracts. Inflorescences arise from the upper leaf axils and is peduncle with involucres, each involves with two spreading red kidney-shaped lobes.

Euphorbia milii is widely used as medicinal plant. The various biological activities have been thoroughly reviewed. The various extract of the plant and its parts have been found to possess antimicrobial, molluscicidal, antitumor and antinociceptive activity. The presence of terpenoids, tannins and flavonoids in crude extracts of aerial parts of plant was reported by Trivedi *et al.* (2016). Euphorbia milii widely used in folk medicine for the treatment of warts (South Brazil), cancer and hepatitis (china). It has been reported that Euphorbia milii possesses antifungal and antinociceptive property (Kamurthy & Dontha, 2015).

The objective of this study was to evaluate antioxidant potentials as well as extraction, isolation and characterized the active constituent from the plant leaves crude extract (Figure 1). This was the first time this study was carried out in this plant *Rhipsalis elliptica.*

Figure 1: *Euphorbia milii* leaves, flower and its stem of crown thorns

Material and Methods
The leaves of the selected plant *Euphorbia milii* (Figure 1) were collected in Kota-Samarahan in January and was identified as *Euphorbia milii* by Prof Hauwa A. Umaru School of pure and applied Science Moddibo Adama University of Technology Yola and Benedict Sambling Universiti Malaysia Sarawak

Chemical and Solvents
All chemicals and Drugs (Alloxan Monohydrate) used in this investigation were of analytical grade and were obtained from Sigma Chemical Co., St Louis, USA). Insulin (reference drug) was obtained from Medical Resource SDN BHD Kuching, Sarawak. DPPH, Brine shrimps

Preparation of the Extract
The plant part (leaves) were dried in a laboratory drying site, the dried leaves was made into powder using electric grander. The extraction was carried out by conventional extraction by soaking the powdered sample (1000 g) in ethanol 1:3 (sample: solvent) in a 5-litre flask at room temperature for 7 days. The resulting the methanol solution was filtered and the residue was again re-extracted with fresh methanol for 72 hrs, and filtered. Both the filtered were combined and evaporated to dryness with a rotary evaporator under reduced pressure 50 °C

Cytotoxicity Test
The LC_{50} of the plant extracts was determined using the brine shrimp lethality test. The test was conducted as reported by Umaru *et al*. (2018a). Exactly 4 mg of each extract was dissolved in 200 µL of DMSO (RCI Labscan limited) and a lower series of chosen concentration was prepared by serial dilution with DMSO, the positive control used is thymol. The assay system was prepared with 5 mL of filtered seawater containing chosen concentration of extract and 1% yeast extract (for feeding) in a pre-marked 6-well microplate

and 10 brine shrimps were carefully introduced into each microplate. This was done in triplicates making a total of 30 brine shrimps per concentration.

Filtered seawater was added to DMSO and 10 brine shrimps in triplicates and this was used as the control groups. If the brine shrimp in these microplates shows a rapid mortality rate, then the test is considered invalid as the nauplii might have died due to some reasons other than the cytotoxicity of the extracts. After 24 hrs under constant illumination of fluorescent, the number of surviving nauplii were counted with a hand lens. Based on the data obtained, the average death of the brine shrimp at different concentrations of the extract and the LC_{50} of the extract was calculated using probit regression by statistical software SPSS 22 and the result was expressed as mean ± SD at the 95% level of confidence ($p < 0.05$) (Umaru *et al.*, 2018b).

Isolation of active Chemical Constituent from Methanol extract using Column Chromatography

The crude extract from *Euphorbia milii* (20g) was chromatographed over silica gel 160-120 mesh of column of size 40/34 (large) was used for chromatography, Fractions which contain more than one the component was further isolated and purified by using a smaller glass column of sizes 24/29 (medium) or 14/23 (small) with suitable solvent systems (Umaru *et al.*, 2019a) TLC was carried out using the method described by Umaru *et al.* (2019b). A glass capillary tube was used to apply samples on the TLC plates (size 6.6 x 20 cm, 5 x 20 cm) repeatedly with a spot of about 0.3 mm in diameter. The TLC plates were then viewed directly for colored compounds, it was also viewed under UV box for UV fluorescent compound and stained with vanillin for the compound that is neither visible nor UV fluorescence. Fractions containing similar characteristics were combined and dried. The fractions that showed similar spots were combined. The fractions from 100-140 of 5ml eluted in hexane: ethyl acetate (2:4) gave a pale-yellow crystalline residue on concentration and showed one single spot. The yield, melting point, and R_f value was determined for isolated compounds.

Structural Elucidation by Characterization of Isolated Compound.

The isolated chemical constituent from methanol extract of *Euphorbia milii* was subjected to the following spectral analysis.

Gas Chromatography-Mass Spectrometry (GC-MS)

Gas chromatography (GC) analysis of fractions that were obtained from TLC as single the spot was performed using a Shimadzu GC-Mass Spectrometry model QP2010 plus, equipped with a BPX-5 column (5% phenyl polysylphenlenesiloxane) of 30 m in length, the film thickness of 0.25 µm and internal diameter of 0.25 mm. The operating method was based on the method described by Kalaiselvan *et al.* (2012). The ionization energy of 70 eV was used in the electron ionization energy system of the GC-MS for detection and carrier gas, helium (99.999%) at a constant flow rate of 1 mL per min was used. Exactly 1 µL of the purified sample was injected into the GC-MS using a syringe and sample were analyzed using split mode with a ratio of 25:1. Injection the temperature was set at 260 °C and the oven temperature was programmed from 60 °C with an increase of 10 °C per min, isothermal for 5 min, to 280 °C, ending with 10 min isothermal at 280 °C at 70 eV. Mass spectra were taken at a scan-interval of 0.5 sec and fragments from 45 to 450 Da. By matching its average peak area to the total areas, the relative percentage quantity of each component was acquired. Compound identification was obtained by matching the retention times of the compounds and the mass spectral obtained from the library data of the corresponding compound (Umaru *et al.*, 2020).

Nuclear Magnetic Resonance (NMR)

The ^{1}H-NMR and ^{13}C-NMR were recorded on JEOL JNM-ECA 500 Spectrometer using DELTA version 5.0.4 software by JEOL The identification of each ^{1}H-NMR and ^{13}C-NMR detected was based on the Table of Characteristic NMR absorptions published in Organic Chemistry (Janice, 2008) and with the guide of the possible proposed structure given by the NIST library.

Fourier Transform Infra-Red Spectrometry (FT-IR)

Fourier Transform Infra-Red (FT-IR) was performed using FTIR spectroscopy (Thermos Scientific, Nicolet iS10 SMART iTR) to detect the chemical bonds (functional groups) of the compounds. The Characteristic of the chemical bonds was read by spectrum produced through transmittance of the wavelength of light. The chemical bond in a molecule was detected by interpreting the infra-red transmittance spectrum and the functional groups.

Melting Point

The melting point of the compounds isolated was determined using a melting point apparatus (Stuart model SMP3). The small amount of the sample was put into a small capillary tube and was inserted into the machine melting point heating bath. The heating process was monitored and the temperature at which the sample begins to melt and completely melted was recorded.

Ethical Declaration

The work was carried out based on the ethical declaration of IUCN Policy statement on research involving species at risk of extension as approved by the 27th meeting of IUCN Council, Gland, Switzerland, and 14th June 1989.

Commercial Declaration

The study was in recognition of Food and Drug Administration (FDA), Federal Trade Commission, (FTC), FDA, and Federal Food Drug and Cosmetic Act (FFDCA) Advocates for food, a dietary supplement to cosmetics with regards to public health and enforcement.

Physical Properties and Spectrometry Information of Pure Compounds

Vitexin (1) yellow color; melting point 204 °C; IR V_{max} cm-1: 3474, 3186, 1672, 1557, 1456, 1377, 1278, 1041, 778: ^{1}H-NMR (500 MHz, $CDCl_3$) δ (ppm): 6.07 (1H.d, H-2), 6.59 (1H, s, H-8), 7.52 (1H, d, H-11), 4.88 (1H, s, H-13), 6.91 (IH, d, H-14), 6.91 (1H, d, H-16), 7.52 (1H, s, H-17), 3.29 (1H, d, H-19), 3.29 (1H, m, H-20), 3.70 (1H, m, H-21), 4.19 (1H, m, H-22), 1.00 (1H, m, H-23), 3.46 (2H, m, H-24), 4.12 (1H, d, H-25), 4.37 (1H, s, H-27), 4.58 (1H, s, H-28), 1.47 (1H, m, H-29), 1.02 (1H, m, H-30), 0.30 (1H, d, H-30); ^{13}C-NMR (500 MHz, $CDCl_3$) δ (ppm): 161.23 (C-1), 99.09 (C-2), 199.90 (C-3), 104.27 (C-4), 157.09 (C-5), 104.22 (C-6), 183.05 (C-7), 103.90 (C-8), 164.63 (C-9), 128.75 (C-11), 122.48 (C-12), 74.18 (C-13), 116.00 (C-14), 162.04 (C-15), 116.00 (C-16), 128.75 (C-17), 81.30 (C-19), 71.08 (C-20), 74.36 (C-21), 71.93 (C-22), 62.19 (C-24).

Result and Discussion

The isolation of chemical constituent from methanol extract subjected to column chromatography and the result form the structural elucidation from FTIR, ^{1}H-NMR, and ^{13}C-NMR of this Mass spectroscopy was as shown in Table 1 and Table 2 as well as Figure 3 and Figure 4.

The GC-MS the analysis was performed, and the result obtained revealed a single peak at the retention time of 7.98 min as shown in Figure 2 this confirmed that the single spot obtained from TLC with an R_f value of 7.3 from hexane: ethyl acetate 2:8 fraction with a weight of 12 mg. The mass spectrum of Compound 1 in Figure 2 shows a similarity index of 89.3% with the mass spectrum of the structure suggested by the NIST library. The mass spectrum shows an ion base peak at *m/z* 432 and a molecular ion peak at *m/z* 432 was observed in the mass spectrum suggested by the NIST library. With one of its molecular ion peaks at *m/z* 432 which corresponding to molecular ion peak and molecular ion weight of the suggested structure which has a chemical formula of $C_{21}H_{20}O_{10}$.

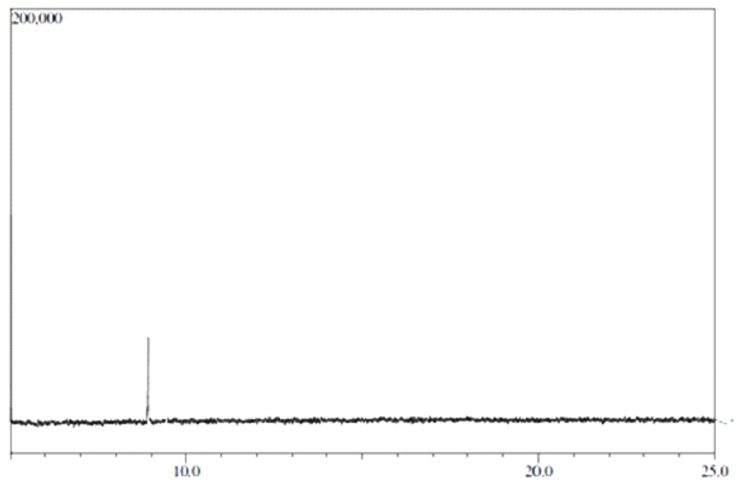


Figure 2: Gas chromatogram of Compound 1

IR spectrum of compound 1 gives a characteristic band at 3474 cm-1 was assigned to a hydroxyl group (OH), and 3186 cm-1 was assigned to C-H. A band appeared at the 1672 cm-1 and 1557cm-1 were assigned to C=C indicating the double bond of compound 1, respectively. A band was observed to appear at 1278 cm-1 and 1041 cm-1 which indicated the presence of C-O. The CH bending was observed at 1456 cm-1 and 1377 cm-1 while at 778 cm-1 indicated the presence of the C-C band. The IR spectrum also showed similarity to IR stretching and bending vibrations of the same proposed compound reported by Themozhi et al. (2016).

The [1]H-NMR spectrum reported in Table 1 and Figure 2 exhibited 19 proton resonates. A doublet proton signal was observed at δ 6.07 (IH, d), δ 7.52 (1H, d), δ 6.91 (1H, d), and δ 6.91 (1H, d) as CH and was assigned to H-2, H-11, H-14, and H-16. A singlet proton signal was observed at δ 6.59, δ 4.88 and δ 7.52 which was identified as a methine group of the structure and was assigned to H-8, H-13 and H-17. Another signal was observed at δ 1.00, δ 3.46, δ 4.12, δ 4.37, δ 4.58, δ 1.47, δ 1.02 and δ 0.30 which was identified as OH of the compound.

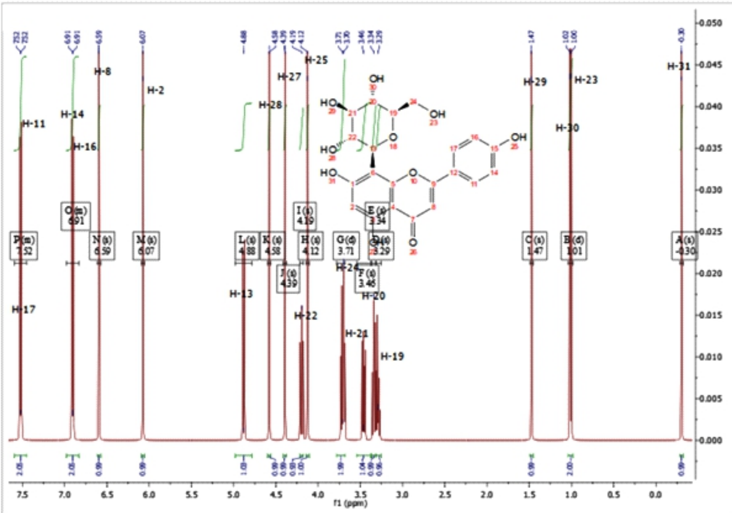


Figure 3: [1]H-NMR spectrum of Compound 1 from 0.0 to 7.5 (500 MHz, $CDCl_3$)

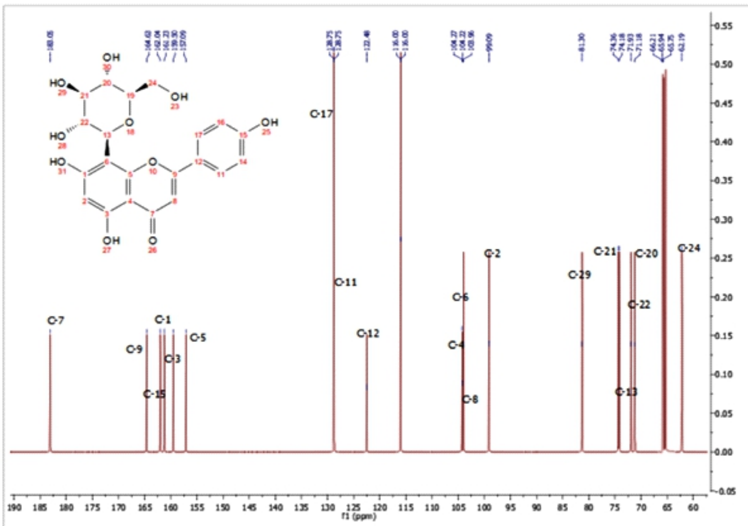


Figure 4: [13]C-NMR spectrum of Compound 2 from 6.0 to 190 (125 MHZ, $CDCl_3$)

The [13]C-NMR of compound 1 shown in Figure 4 and Table 2, every carbon NMR signal was assigned to the proposed chemical structure. The spectrum showed a total of 23 signals. Seventeen signal was observed at the downfield at δ 161.23, δ 99.09, δ 199.90, δ 104.27, δ

157.09, δ 104.22, δ 183.05, δ 103.90, δ 164.63, δ 128.75, δ 122.48, δ 116.00, δ 162.04, δ 116.00, and δ 128.75, respectively and was assigned to C-1, C-2, C-3, C-4, C-5, C-6, C-7, C-8, C-9, C-11, C-12, C-14, C-15, C-16, and C-17. At the upfield, a signal was observed at 74.18, 81.30, 71.08, 74.36, 71.93 and 62.19, they were all assigned to C-13, C-19, C-20, C-21, C-22, C-23, and C-24. The chemical shift of every proton and carbon NMR for Compound 1 is shown in Table 1 and Table 2 and comparison was made with NMR data of similar compounds reported by Themozhi et al. (2016).

Table 1: Proton NMR signal of Compound 2 and that reported by El-Askary *et al.* (2003).

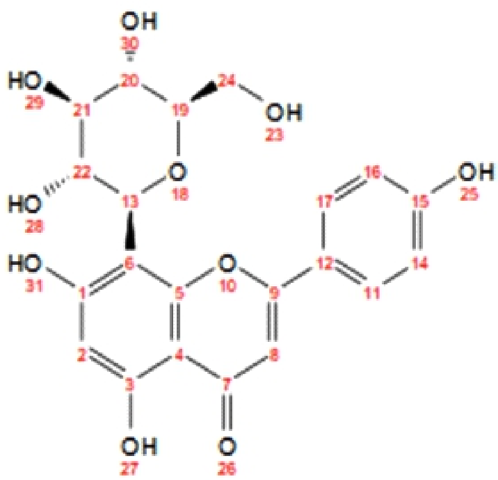
Proton assigned to Compound 2	Proton chemical shift (ppm) of Compound 2	Proton assigned to Vitexin (Themozhi et al., 2016)	Proton chemical shift (ppm) of Vitexin (Themozhi et al., 2016)
H-2	6.07 (IH, d)	H-2	7.81 (1H,d,)
H-8	6.59 (1H, s)	H-8	6.54 (1H, s)
H-11	7.52 (1H, d)	H-11	7.81 92H, d,)
H-13	4.88 (1H, s)	H-13	4.81 (1H, s)
H-14	6.91 (1H, d)	H-14	6.96 (2H, d)
H-16	6.91 (1H, d)	H-16	6.96 (2H, d)
H-17	7.52 (1H, s)	H-17	7.81 (2H, d)
H-19	3.29 (1H, m)	H-19	3.52 (1H, m)
H-20	3.29 (1H, dd)	H-20	3.57 (1H, dd)
H-21	3.70 (1H, m)	H-21	3.54 (1H, m)
H-22	4.19 (1H, t)	H-22	4.14 (1H, t)
H-23	1.00 (1H, m)	H-23	-
H-24	3.46 (2H, m)	H-24	3.77 (1H, dd)
H-25	4.12 (1H, d)	H-25	-
H-27	4.37 (1H, s)	H-27	-
H-28	4.58 (1H, s)	H-28	-
H-29	1.47 (1H, m)	H-29	-
H-30	1.02 (1H, m)	H-30	-
H-31	0.30 (1H, d)	H-30	-

Table 2: Carbon NMR signal of Compound 2 and that reported by El-Askary *et al.* (2003).

Carbon assigned to Compound 2	Carbon chemical shift (ppm) of Compound 2	Proton assigned to Vitexin (Themozhi et al., 2016)	Proton chemical shift (ppm) of Vitexin (Themozhi et al., 2016)
C-1	161.23	C-1	164.5
C-2	99.09	C-2	108.7
C-3	199.90	C-3	160.3
C-4	104.27	C-4	104.3
C-5	157.09	C-5	157.4
C-6	104.22	C-6	95.1
C-7	183.05	C-7	183.6
C-8	103.90	C-8	103.7
C-9	164.63	C-9	165.4
C-11	128.75	C-11	129.0
C-12	122.48	C-12	122.5

C-13	74.18	C-13	74.5
C-14	116.00	C-14	116.3
C-15	162.04	C-15	162.0
C-16	116.00	C-16	116.3
C-17	128.75	C-17	129.0
C-19	81.30	C-19	81.6
C-20	71.08	C-20	61.3
C-21	74.36	C-21	70,6
C-22	71.93	C-22	79.7
C-24	62.19	C-24	72.5

Vitexin is an apigenin flavone glycoside isolated from natural sources. It is considered as important one when compared to the other flavonoids such as quercetin, rutin and kaempferol. It exhibited potent hypotensive, anti-inflammatory, analgesic, anti-metastatic potential and anti-spasmodic properties Prabhakar, et al., 1981; Kim et al., 2005).



Vitexin and the crude extract was evaluated of its cytotoxicity test and the result is as shown in Table 1 and Table 2. The cytotoxicity evaluation of methanol crude extract and the isolated compound (vitexin) was observed against brine shrimp (*Artemia salina*).

From the result of the methanol crude extract of *Euphorbia mili and* the isolated compound was observed to have indicated the presence of potent cytotoxic components in the crude extract with 34.59 µg/mL and the isolated compound vitexin of 16.34 µg/mL when compared to the test control of 1.16 µg/mL. Moshi *et al.* (2010), Elumba *et al.* (2013) and Del Socorro *et al.* (2014) suggested that some of the plants extract with LC_{50} below 100 µg/mL which are categorized as toxic, does not always indicate its danger or outright toxicity toward the human, but may also suggest a potential antitumor or anticancer activity. Exposure or consuming this type of plant unlikely to have any ill effect on humans (Moshi *et al.*, 2010).

Table 3: Average death of brine shrimp (Artemia salina) of *Euphorbia milii* leaf methanol crude extract

Plant Part	Solvent	Average death of *Artemia salina* Concentration (µg/mL)				LC_{50} (µg/mL)
		10	50	100	250	
	-ve control	0	0	0	0	
Leaves	+ve control	5 ± 0.55	7 ± 0.55	10 ± 0.55	10 ± 0.55	1.16
	Methanol	3 + 0.54	4 + 0.54	4 + 0.54	7 + 0.54	34.59

Table 4: Average death of brine shrimp (*Artemia salina*) of isolated vitexin

Isolated compound	Average death of *Artemia salina* Concentration (µg/mL)				LC_{50} (µg/mL)
	10	50	100	250	
Vitexin	0	0	0	0	-
-ve control	5 ± 0.55	7 ± 0.55	10 ± 0.55	10 ± 0.55	1.16
+ve control	4 ± 0.44	7 ±0.52	7 ± 0.54	8 ±0.07	16.34

Moshi *et al*. (2010) reported that if the test sample showed LC_{50} between 30-100 µg/mL, it is categorized as mildly toxic, whereas those with LC_{50} more than 100 µg/mL are considered as being practically low or non-toxic. With this guideline, the result from this study showed that the methanol crude extracts and the isolated compound (vitexin) from *Euphorbia milii* were categorized as toxic for having LC_{50} values of 16.34 µg/mL (vitexin) and 34.59 µg/mL (Crude extract).

Conclusion

Euphorbia milii is distributed sparely in the eastern part of Malaysia. The current study investigated the cytotoxicity and isolated pure compound from the *Euphorbia milii* methanol leaves crude extract. The result shows that the crude extract and the isolated compound suggest a potential antitumor or anticancer activity. Therefore, *Euphorbia milii leaves crude extract*, an abundant and low-cost by-product, possessed great potential to be explored as a source of natural agents. The results would extend our knowledge of potential bioactivities and pharmaceutical applications of vitexin. Nevertheless, we are suggesting that further research is needed to assess.

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ENTREPRENEURS, TECHNICAL AND VOCATIONAL EDUCATION A TOOL FOR A SUSTAINABLE NATIONAL DEVELOPMENT IN NIGERIA

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Abstract

Despite the effort of Nigeria Government toward poverty reduction and unemployment, the economic crisis is on the rise and this has increased the level of unemployment, reduced youth participation in the labour market beyond the already harsh long run trends, public policies and programmes for entrepreneurship, technical and vocational education can play a role in addressing these challenges. A system that incorporates entrepreneurship into technical and vocational education, offers an irresistible cocktail which will transform our schools into centres for skill acquisition, preparing graduates for employment in the workplace, and imbuing them with job-specific and employability skills that connect them with the business community. The major thrusts of entrepreneur, technical and vocational education (ETVE) in Nigeria amongst other things are to address issues of self-reliance, job creation, youth unemployment, poverty and international competitiveness in skills development towards current and projected opportunities and challenges. Such issues are crucial particularly to Nigeria and to Africa's dignity and survival in general in the fast-changing global environment. The paper recommends that Entrepreneurial skills and workshop on how to find business ideas should be integrated in school curriculum to encourage young people to start their own business, Providing adequate financing for vocational/technical training, Linking vocational technical and entrepreneurial training with job centres to ensure that the skills profiles supplied match demand among others. This paper highlights on the concepts, issues and need for entrepreneurial skill acquisition in woodwork trades in addressing the problems of youth unemployment in Nigeria.

Background to the Study

In Nigeria today, youth employment challenges are causing the government a great deal of concern. According to Noko (2016), it is estimated that about 4.5 million youths, mostly educated, are entering the labour market annually. He pointed out that in order to prevent the unusually high level of youth unemployment and underdevelopment rates from getting higher, the government should take urgent ameliorative action. Also, Obomanu, (2015) asserted that mass unemployment which has been evident in the last two decades has reached alarming proportions and involved all categories of labour-skilled and unskilled persons, university graduates and specialist individuals. There is therefore the need to massively equip the youth with useful trade and entrepreneurship skills necessary to elevate them from their present condition of poverty and joblessness to a vibrant and entrepreneurial youth, ready to contribute to the development of the nation. Bulk, (2012) asserted that every educational institution obviously cannot impart entrepreneur skills to learners without teaching-learning process. This makes teaching and learning one of the most important aspects of the educational institutions, of which technical and vocational education programme (TVE) is one of such institutions which offers relevant practical training component that is widely recognized as the key to any nation becoming technologically relevant and internationally competitive in the world market. It is also regarded as the most effective means of empowering the citizenry to stimulate sustainable national development, enhance employment, improve the quality of life, reduce poverty, limit the incidence of social vices due to joblessness and promote a culture of peace, freedom and democracy (FME, 2010).

Entrepreneur, Technical and Vocational Education has been widely acclaimed as the most important component or factor in the development of productive and sustainable national development and humankind in general (Okwelle, and Wordu, 2016). A sustainable human and national development is essentially the ‚protection of the life opportunities of future generations and the natural systems on which all life depends' (UNDP, 2015). Thus, there are five indices of sustainable human and national development: as Empowerment - The expansion of capabilities and choices of citizens, free from hunger, want and deprivation; Cooperation - Building an enduring partnership that enables people work together and interact with one another in an atmosphere of freedom; Equity- Guaranteeing free and equal access to all citizens in the areas of health, education and general welfare; Sustainability - Validating and preserving the claims of future generations free from any inhibitions and **Security** - Protecting citizens from threats to life, limb and property, and from every possible disruption. The UNDP focusses on FOUR critical elements of sustainable human and national development: elimination of poverty, creation of jobs and sustenance of livelihood, protection and regeneration of the environment, and promotion and advancement of interests of disadvantaged segments of the population, for example women and children. Globally, the need has been clearly identified, that entrpreneurial, technical and vocational education holds the informed and measured response to national requirement for growth and development. (Ogbazi & Emmanuel, 2014).

Entrepreneurial Education

Entrepreneurship can be defined as the combination of initiative, innovation and calculated risk-taking associated with identifying market opportunities, mobilizing resources and managing them efficiently in the operation of productive, viable and socially responsible enterprise. It is the result of a disciplined, systematic process of applying creativity and innovation to needs and opportunities in the marketplace. It involves applying focussed strategies to new ideas and new insights to create a product or a service that satisfies customers' needs or solves existing problems. It is the dynamic process of creating incremental wealth by translating dreams, visions and ideas into economically viable entities. Entrepreneurship is not a project or a mission. It is first and foremost, a mind-set, a life-style - a process of creative destruction with an eye on profit, a value-adding and wealth-creating process. The European Commission defines entrepreneurship as: ...an individual's ability to turn ideas into action. It includes creativity, innovation and taking calculated risk, as well as the ability to plan and manage projects in order to achieve objectives. This supports everyone in day-to-day life at home and in society; makes employees more aware of the context of their work and better able to seize opportunities and provides a foundation for entrepreneurs establishing a social or commercial activity. (Afolabi, 2013)). It is not only about creating business plans and starting new ventures. It is also about creativity, innovation, growth and development - a wealth-creating value-enhancing way of thinking and acting relevant to all parts of the economy and society as well as the entire ecosystem.

Entrepreneurial education (EE) covers the array of methods and tools applied in the development of human capital and in ensuring appropriate learning environment that will encourage creativity, innovation and the ability to “think out of the box” in the solution of societal problems (Benjamin, 2015). It seeks to foster an entrepreneurial culture and develop skills, attitudes and behaviours to prepare young people and others to pursue entrepreneurial opportunities. The driving force for entrepreneurial education includes the challenge of globalization, technological innovations, emergence of the knowledge-economy and demographic trends that draw attention to the impact of entrepreneurship on economic development, structural change and employment generation. Objectives of the system include: Developing entrepreneurial drive among students by raising awareness and motivation; Developing the ability to identify and exploit opportunities; Training students in the skills they need to set up a business and manage its growth; Create an environment that fosters entrepreneurial mind-sets, skills and behaviours across the institution; and Provide a hub for scientific invention and technological development (Benjamin, 2015). This is the opportunity to develop knowledge-intensive high-growth enterprises from all academic disciplines.

Akanmu (2011) in an analysis of Strategy and Policy issues, lamented the serious jobless growth problem in Nigeria and even thou there several promises made by the government but yet to be translated into jobs and real-life opportunities for Nigerian youths. Nigeria's jobless growth at least three out of ten graduates cannot find employment on graduation; even being highly educated does not increase the chance of finding employment. Even more forlorn and depressing is the fact that there is a persistent mismatch in the skill and fit-requirement for employment. Employers want their graduate recruits to be technically competent, well equipped with complementary skills such as problem solving, reflective and critical thinking, interpersonal and teaming skills, effective communication, character, integrity and high level of personal ethics, self-esteem, self- discipline, organising skills and abilities to translate ideas into action (Noko 2016).

Akanmu (2017) identifies two core policy issues that confront Nigeria's policy makers:

i. How to increase the employment generation capacity of the economy, create jobs that will absorb thousands of graduates and reverse the current pattern of Nigeria's jobless economic growth. His informed estimate is that Nigeria should be able to create twenty-four million jobs over the next ten years;
ii. How higher education institutions will produce graduates that are employable for the jobs created. This calls for transformed standards with the minimum sufficient technical skills in their chosen field. The national need is for ,a more formal technical and vocational education system that will produce graduates with the skills needed to operate the employment intensive industries and their value chains. What this portends, is a deliberate migration from liberal arts-based system, to a technical system, from curriculum emphasis on academic excellence to emphasis on skill acquisition - a system that will equip the graduate with integrated set of technical work skills that demand creativity, problem-solving ability, higher-thinking order skills, and transferable and adaptable skills to be relevant in the labour market (Okoye & Okwelle, 2014).

Technical And Vocational Education

Technical education is a formal training that makes possible the application of the techniques of applied sciences and mathematical principles for the service of mankind. It has its bias in nurturing skills and practical development of an individual (Afeti, 2018). The vocational counterpart is education that defines and delineates guiding principles for effective professional performance, thus specifically qualifying the individual for particular career or vocation Osuala (2016). Vocational education is dedicated to preparing graduates for work-place employment, teaching them job-specific and employability skills, and ensuring a connection with the business community. A convenient convergence of the two strands would produce Technical and Vocational Education and Training (TVET). TVET which has been defined as an education programme that orients people into skills acquisition and inculcates the attitude and knowledge necessary for performance in specific occupational callings (Okoye & Okwelle, 2014). The TVET delivery system is thus touted to possess the potential to train the skilled workforce the nation needs, create employment for the youths, and enable the nation to emerge out of poverty, under-development and technical retardation. Adeniyi (2012) appraises the goals of technical and vocational education as being to train manpower in applied science, technology and commerce; to provide technical knowledge and vocational skills and give introduction to professional studies; and to train and impart skills to craftsmen, while enabling the youths to have an intelligent grasp of the increasing complexity of technology.

In the words of Adeniyi, (2012), emphasis is on skill-acquisition and sound scientific knowledge, which gives ability to the use of hand and machine for the purpose of production, maintenance and self-reliance. The TVET coalescence is a concert that offers an irresistible cocktail for far-reaching educational reform for growth and development. To incorporate entrepreneurship into the policy mix, will ensure that our institutions become not just centres for skills acquisition, but also incubating centres for production of job creators not job seekers - students will then graduate not just with good CVs but also with good business plans. The educational system needs to be redefined and refocused, to create and enhance the supply of entrepreneurial initiatives needed to reduce unemployment rate in the polity, increase employee productivity, and engender overall growth and development in the economy (Benjamin, 2015). Ilechukwu et al (2014) postulate that Education for Sustainable Development (a conflux of all curricula and taxonomies of education, including environmental factors), can be a tool to equip individuals and societies with the ‚knowledge, values and skills to live and work in an equitable, secure and sustainable manner', balancing ‚economic well-being and human development with cultural tradition and respect for and protection of earth's natural resources and environment' (Ilechukwu et al, 2014).

Today's education system must empower the graduate with needed skills (Council on Competitiveness, 2008). The council identifies:

A. Millennial Themes - Global awareness, Financial, Economic, Entrepreneurial, and Business literacy, Civic literacy, and Health literacy.
B. Learning and Innovation Skills - Creativity and innovation skills, critical thinking and problem solving skills, and communication and collaboration skills;
C. Information Media and Technology Skills - Information literacy, media literacy, and ICT literacy;
D. Life and Career Skills - Flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, and leadership and responsibility (Partnership for 21st Century Skills, 2008).

The educational demands of this age and the global imperatives to remain competitive and relevant are varied. The products of the system must be able to think critically and make judgements, assess the credibility, accuracy and value of information, analyse and evaluate information, make reasoned decisions and take purposeful action. They should be able to solve complex, multi-disciplinary, open-ended problems, think creatively - challenge the status quo, think outside the box, and question the herd. They must develop the ability to recognize and act on opportunities, ever willing to embrace risk and responsibility in the pursuit of profitable outcomes. They need to learn to communicate and collaborate with groups and teams, skilled at interacting competently and respectfully with others, demonstrate new specialized skills, and make innovative and creative use of knowledge, information and opportunities to create new products, services and processes. These are the compelling realities for a new order, the need for a coalescing of entrepreneurship, and technical and vocational development of Nigerian youths.

Quality of a Good Entrepreneur, Technical and Vocational Education

Cooney (2012) identified four sets of interlocking skills that need to be part of good entrepreneurial and vocational education:

i. Technical Skills - they include operations specific to the industry, design, communications, research and design, and environmental observation. These are skills necessary to produce the business's product or service;

ii. Managerial Skills - these include planning, decision making, motivating, marketing, finance and selling. They are essential to the day-to-day management and administration of the company;

iii. Entrepreneurial Skills - these include inner discipline, ability to take risks, innovative, change-orientated, and persistence. They involve recognizing economic opportunities and acting effectively on them;

iv. Personal Maturity Skills - which include self-awareness, accountability, emotional skills, and creative skills Caroline Smith groups the entrepreneurial skill-set into four: a) Personal Skills - like optimism, vision, initiative, desire for control, drive and persistence, risk tolerance and resilience; b) Interpersonal Skills comprising leadership and motivation, communication skills, listening, personal relations, negotiation and ethics; c) Critical and Creative Thinking Skills encompassing creative thinking, problem solving, and ability to recognise opportunities; d) Practical Skills including goal setting, planning and organising, and decision making. A good education system which combines entrepreneurship with technical and vocational education, will build these qualities into the graduates of the system. Cooney (2012), identified two different models for teaching entrepreneurship. The first is the dominant model which is static and heavily focussed on the writing of Business Plan and the various functional activities of an enterprise. The second one portrays the entrepreneur as dynamic with a range of behavioural attributes.

Entrepreneurial Career Opportunities in vocational Education

Ogbuanaya, (2014), also defined career entrepreneurship opportunities as that which consist of an attractive business opportunity with great value propositions, technically feasible products, strong intellectual property, sustainable competitive advantage, large potential market and a proven business model. Entrepreneurship opportunities is a situation in which a person can create a means-end framework for recombining resources that the entrepreneur believes will yield a profit. Allawadi (2017) stated that entrepreneurship opportunity is the art of creating a new product, a new method production, opening of a new market, conquest of new source of supply and creating a new organization. Wherever the term opportunity is mentioned, what come into people's minds are chances they have to do something. According to Hornby (2022) opportunity is a time when a particular situation makes it possible to do or achieve something. More so, there are diverse opportunities in electronics technology programme, these opportunities can also be identified as business entrepreneurship opportunities. Opportunities do not limit itself to business alone; there are other aspects of opportunities which among them is technological entrepreneurship. Ogbuanaya, (2014) stated that entrepreneurship opportunity in electronics continue to expand and become more varied with each passing year. He stressed that it seems as if the entrepreneurial opportunities in electronics are almost limitless. Entrepreneurship opportunities in vocational and technology education programme are practical example of technological entrepreneurship with multiple new venture creations, innovations and high growth rate.

An entrepreneurial and vocational education system should encompass the following as identified by Kiyosaki (2020) are:

a. Practical Case Studies, especially of high growth enterprises.
b. Group and team techniques for creating new business ideas and managing growth.
c. Business games and simulations for business formation, early development and growth of the enterprise.
d. Lectures from entrepreneurs and other practitioners, plus visits to high-growth enterprises.
e. Interviews with entrepreneurs, particularly highly successful ones.
f. Project work.
g. Development and assessment of business plans and
h. Foundation of student enterprises - developing new venture creation and growth projects

The Challenge of Entrepreneurial Education

In Nigeria, the challenge of entrepreneurial education are:

1. Vocational skill acquisition is often mistaken for entrepreneurship education. While the one builds on the other, they are quite distinct features of enterprise growth and education.
2. Isolated courses are often mounted on creativity and innovation. On occasion, courses in entrepreneurship are mounted as General Studies courses to be taken by all undergraduate students, without much depth and serious commitment.
3. Often an Entrepreneurship Centre is established, but without an enduring framework for integrating an entrepreneurial culture into the curriculum, methodology and pedagogy of the institution.
4. Uncoordinated keynote speeches, lectures and talks on entrepreneurship which do not build on a cohesive and consistent framework. Any arrangement that lacks a coordinated framework and structure, which provides for systematic planning and execution, and integrates industry and universities in one continuous learning cycle, will not satisfy the need for entrepreneurship education.

The challenge of entrepreneurial education is how to develop and embed entrepreneurship in the formal and informal education system. A sound system must cover the areas of curriculum development, training and development of teachers, funding of entrepreneurship, cross-disciplinary research collaboration, and the facilitation of spin-outs from higher education institutions (WEF, 2009). The viewpoints are diverse. From a pedagogical perspective, the emphasis is on how to develop the capacity of students to connect thought to action, and theory to practice. Thus, teaching contents and methods must go beyond the classical understanding of tertiary education to encompass the development of entrepreneurial thinking and action in the students.

Entrepreneurs, Technical and Vocational Education for National Development
Kiyosaki (2020) identified four different kinds of people in the business world, they include Employees, Business Owners, Self-Employed and the Investors with each group fitting snugly into its own Quadrant. Each quadrant describes a distinct and different source of cashflow, a different lifestyle and a representation of different core values.

1. The Employee - His source of cashflow comes from a pay-check. He works hardest for his money. He spends all his life trying to eke out a living. With every promotion comes a salary raise. And as the income increases, so does the expenditure profile of the employee. His core value is security - he is averse to the risk of being his own boss. He accumulates ‚assets' which, to all intents and purposes, are liabilities. All his life, the employee works for his money; he needs to make his money work for him.
2. The Self-Employed - He is only slightly better than the employee. He cherishes is independence, as he works for himself. He is usually very technically competent, and since the success of the work depends on him, he works long hours and hardly ever takes a vacation. He wears himself out trying to make a living. At the core of his personal approach to business, is a lack of trust in anyone in the firm; so he runs the entire set-up by himself
3. Business Owner - This one is indeed a wise strategist. He knows that money has a generative capacity - it can multiply itself. So he sets up a system that runs, whether or not he is there. His core value is wealth-building. This man usually starts from nothing and builds a great business with powerful life mission. He values a great team and efficient teamwork and wants to serve and work with as many people as possible. He can afford to take extended vacations, because even as he holidays, his money keeps earning returns.
4. The Investor - He is in the same class as the business owner. He puts his money in stocks and shares, real estate investments, and other income earning ventures. And while he cools off at his holiday resort, the business outfit earns him some good money. His core value is financial freedom.

Promoting Entrepreneurship, Technical and Vocational Education
The promotion of entrepreneurial Technical and Vocational Education studies in Nigeria would create opportunities for employment with subsequent income multiplier effects for the surrounding community. If job creation and entrepreneurial activities are carefully co-ordinated, then it would not be argued that increased entrepreneurship would no doubt help the most disadvantaged in the labour market.

Except entrepreneurship technical and vocational education are carefully and purposefully promoted the reduction of unemployment that would culminate in sustainable national development will elude developing nations including Nigeria. Supporting this assertion, Igbo (2014) pointed out that until government redirects efforts in tackling and solving the problem of chronic unemployment, the dreams of Nigeria to be seated among the comity of industrialized nations of the world by 20, 2020 will be a mirage. Entrepreneurship technical and vocational Education can be promoted in the following ways among others:

A. **Adequate Funding:** Funding of entrepreneurship technical and vocational education by the government will undoubtedly enhance its development. Ile (2011) stated that government funding of entrepreneurship education in Nigeria is very poor. Considering the overall economic realities in the country today the ability of individuals to raise enough found to set up surviving entrepreneurship is very remote. To promote effectual entrepreneurship technical and vocational education, funds are needed to employ competent personnel, pay workers' salaries, supply teaching facilities and provide conducive classrooms.

b. **Revitalization of Electricity Supply:** Another source of promoting entrepreneurship technical and vocational education is revitalization of electricity supply. Doile (2010) noted that no meaningful entrepreneurial activity survives in an environment without relatively constant electricity supply. Incidence of epileptic power supply in both urban and rural dwellings does not encourage development of entrepreneurship activities for self-reliance. Many economic activities that were expected to yield sustainable development had closed because of incessant power failures.

c. **Expansion of Educational Facilities:** Expansion of educational facilities to enable tertiary institutions admits more students is very imperative. Presently, the Nigeria universities commission stipulates the number of students that should be admitted each year. Offor (2011) stated that only few of the targeted population under this NUC condition actually benefit from the entrepreneurship technical and vocational education at this level.

d. **Societal Security:** Societal insecurity hampers entrepreneurship, technical and vocational education that would lead to sustainable development. Societal insecurity gives credence to rampant theft activities, armed robbery, kidnapping and demands for ransom and consequent migration of best brains to establish in some more stable countries. This ugly trend potentially contributes significantly to defeat the progress of entrepreneurship education.

Conclusion

A viable educational system, anchored on entrepreneurship, technical and vocational education, must be the pivot in the drive to restore hope and confidence in our future as a nation. We must learn, teach, and practice what it takes to create, nurture and prosper in wealth. This is the true fight for growth and national development. At the core of the nation's educational reform, must be the challenge of how to redress the problems of poverty, ignorance and disease. A Successful wealth creation begins with an idea - a burning passion, ironclad determination, and sometimes, even desperation. It is all about finding and meeting specific needs - identifying new and creative ways of adding value to society around us. And when we add value, we make money. In spite of complex situation of business life today, opportunities for excelling still abound. Opportunities are all around us; they are never in short supply. What is in short supply are men capable of capitalizing on existing opportunities or of creating new ones. But to take advantage of them, a man must be perceptive enough to recognize them and at the same time follow through. The need to learn to communicate and collaborate with groups and teams, skilled at interacting competently and respectfully with others, demonstrate new specialized skills, and make innovative and creative use of knowledge, information and opportunities to create new products, services and processes. These are the compelling realities for a new order, the need for a coalescing of entrepreneurship, and technical and vocational development of Nigerian youths.

Recommendations

The following recommendations are made on how entrepreneurial, technical and vocational education can be used as a tool for national development in Nigeria.

1. Entrepreneurial skills and workshop on how to find business ideas should be integrated in school curriculum to encourage young people to start their own business
2. Providing adequate financing for vocational/technical training.
3. Linking vocational technical and entrepreneurial training with job centres to ensure that the skills profiles supplied match demand.
4. Encouraging out-of-school young people to be involved in entrepreneur, technical and vocational training to promote social inclusion as well as enhance employability.
5. The education system should provide the skills profiles required by the labour market to enhance employability of young people after graduation.
6. Government should encourage private sector's participation in the delivery of entrepreneur, technical and vocational education.

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COUP D'ETATS AND DEMOCRATIC GOVERNANCE IN AFRICA: A STUDY OF MALI AND GUINEA MILITARY INTERVENTIONS

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Abstract

This paper examined the coup d'etats and democratic rule in Africa with focus on the resurgence coups in West African states of Mali and Guinea. It made use of qualitative approach and adopted greed-based theory as its theoretical framework along with a designed greed model. Democracy is believed to be a germane form of government in a civil and well-organized society due to benefits accrued to both the leaders and followers in a given state. Finding showed that democratic government in the West African region have been maligned with different anti-democratic issues such as constitutional coup, policitisation of the military which affected negatively civil-military relations and the plague of sit-tightism. The military who easily see themselves as an alternative to democratic rule, staged coups and take overpower from the civilians as in the case of Mali and Guinea. Probably for a better governance which they are not trained for. The paper therefore recommended among others, the urgent need for trust building among citizens for their leaders, democratic institutions should be well organized and strengthened beyond the whips and caprices of an individual, and the need for stringent measures from international bodies such as African Union and ECOWAS on any nation where democratic leadership act in an undemocratic way in order to forestall any justification for military coup.

Keywords: constitutional coup, coup d'etats, democracy, Guinea and Mali.

Background to the Study

Coup d'états were common in Africa between 1960s and 1990s after independence of most countries on the continent (Isilow & Tih, 2020). Military involvement in politics either through military rule, sometimes referred to as military government or military regime, is a political phenomenon that has been characteristic of many societies especially the Third

World countries (Edeh & Ugwueze, 2014). While it is regarded as a political aberration across the globe in recent times, such ousters, however, lessened over the years because of mass opposition to unconstitutional change of governments. This brought about democratically elected governments in the continent along with what the colonial masters hitherto, bequeathed to their colonies.

Historically, African societies prior to the advent of the Europeans had their ways of organising themselves both in the area of administration and defence. The aspect of the defence which deals with the military was patterned on the band, segmentary, acephalous, and centralised formations (Akhaime, 2021). It reveals that the military forces in the pre-colonial African societies had different organisational forms corresponding to the social organisation of each society. There were citizens' army, professional army, and evolutionary army, with each having specific roles in the society. During the World War II, some of the citizens' army was used by the colonial masters at the war front, a situation that further opened the eyes of these men into governance. This is so because; the ex-servicemen were part of the struggle for independence after returning from the war.

Since the “third wave” of democracy as espoused by Hungtinton (1991) after the fall of Berlin Wall and the collapse of the Soviet Union which ended the cold war. The return to civilian rule which in most African states gave ray of hope to the people as the worse civilian government is better than any military government, this is so because, democratic government comes with some liberties which the military will not allowed. Such liberties are often entrenched in the constitution of the country, for instance, in Nigeria, Chapter IV, Section 33-46 of the 1999 constitution (as amended) stipulates the rights of the citizens and when infringed on, ways of seeking redress. Other democratic values include human dignity; free, fair and transparent elections; the rule of law; equality before the law and even development in a state.

While many African states can lay claim to having accepted democracy in theory, in reality, majority are autocratic regime. They have accepted democracy, but democratic principles of freedom of speech, human rights, free, fair and transparent elections, are not being adhered to (Abiodun, Nwannennaya, Ochie & Ayo-Adeyekun, 2018). Thus, even though most African people embraced democracy (at the end of the Cold War) as opposed to military rule and had great expectations of it, in some states such as Mali and Guinea, democracy has not brought the expected rewards, especially in terms of the guarantee of human security and welfare provisioning for the people. To the extent that large segments of the population in developing countries remain poor, and faith in the ability of democratic regimes to improve living standards and provide security weakens, memories of the failures of military rule are likely to fade and it will once again become a plausible (and even attractive) alternative (Birikorang, 2013).

After many years of civil rules, coup d'état re-surfaced in African political system in what looks like a “savior” has arrived. The people of Zimbabwe cheered military take over when the nonagerian president Robert Mugabe was forced to resign after 30 years in power in 2017.

Lieutenant Amadou Konaré of the Malian Army had, cited the government's failure to equip troops to defend the nation against northern rebels as a reason for the 2012 coup. The recent coups in Mali and Guinea in the West African sub-region where political leaders (Moctar Ouane and Bah N'daw and President Alpha Condé) were ousted further serve as a pointer to the failure of democratic rule in some African states as the principles of democracy were obviously lacking in these countries.

Owing from the foregoing, we are poised to examine the rationale behind the resurgence of military coups in Guinea and Mali after decades of civilian rule. To unearth this, the paper is divided into six (6) sections apart from the introductory part. Conceptual clarification where core concepts of the work are discussed forms the first section; the second section comprises theoretical framework; a nexus between representative democracy and coup in Africa and factors responsible for military incursions in African democratic process are discussed in the third and fourth section; coup d'etat and challenges of democratic rule in Africa with Mali and Guinea in focus forms the penultimate section while the last section, comprises conclusion and recommendations for a better democratic government in Mali and Guinea in particular and African continent as whole.

Conceptual Clarification

Coups d'état

It is germane to make a clarification on the concepts of coup and democracy in order to understand them differently and how they support and or oppose democratization process in any given state. Diverse definitions have been given for coup d'etat in extant literature, in this paper; we simply put coup d'etat as an illegal and unconstitutional taking over of civil government by military. The military here are uniformed men (women) who are trained in the use of modern sophisticated weapons of mass destruction to protect the territorial integrity of a state without any external control. The military consist of the armed forces, navy and air force, they defend the state on land, water and in the air respectively against insurrection.

Ordinarily, the military are trained to defend the territorial integrity of the state and quell any form of attack within a state that is beyond the control of the police as in the case of Nigeria since the terror attacks from Boko Haram insurgents, but on different occasions, the military have added to this responsibility by venturing in politics. The military is unique in some fundamental ways that set it apart from all other non-military organizations. The military has some odd organizational traits given that it is a tool for good, was established by order or edict, and exists only to fight and win wars. These characteristics include centralized command, hierarchy, order, discipline, internal communication, and esprit de corps, along with matching seclusion and self-sufficiency (Finer, 1962 cited in Ojo, 2015). Coup is not peculiar to African states alone, as nations across the globe such as Argentina, Panama, Italy, Chile, Guatemala, China and Myanmar (Burma) among others (Ibrahim, 2017) have in one way or the other experienced this illegal taking over of power in the past.

Coup d'etat is of different types. Samuel Huntington in his 1968 book "Political Order in

Changing Societies" explained three (3) broad types of coups as follows; first, the breakthrough coup; this is the most-common type of takeover where opposing group of civilian or military organizers overthrows the seated government and installs themselves as the nation's new leaders. The Bolshevik Revolution of 1917, in which Russian Communists led by Vladimir Ilyich Lenin overthrew the tsarist regime, is an example of a breakthrough coup. Second, the guardian coup; this is justified as being for the "broader good of the nation," the guardian coup occurs when one elite group seizes power from another elite group. For example, an army general overthrows a king or president. Some consider the 2013 overthrow of former Egyptian President Mohamed Morsi by General Abdel Fattah el-Sisi as part of the Arab Spring to have been a guardian coup. Third, veto coup; in a veto coup, the military steps in to prevent radical political change. The failed 2016 coup conducted by a faction of the Turkish military in an attempt to prevent what it considered Turkish President Recep Tayyip Erdogan's assault on secularism could be considered a veto coup. From the types of coup, it can be said that not all coups are violent in nature. Some coups are seen as a path to safe the people from a somewhat despotic or lack of directional leader. That notwithstanding, coup d'etat is not a proper way of changing any government.

Democracy and Democratic Governance

Democracy comes from the Greek word, "demos," meaning people and "kratos" meaning power (Kapur, 2008; Dibie, 2018). Thus, democracy is people's power, that is, in democracies; it is the people who hold sovereign power over legislator and government. This power and civic responsibility are exercised by all citizens, directly or through their freely elected representatives. Democracy can be described as a system of government in which power is vested in the people, who rule either directly or through freely elected representatives (The New Dictionary of Cultural Literacy, 2005). For Pennock (1979), democracy is seen as the government which guarantees the greatest possible degree of liberty, equality and fraternity for its citizens, and where common problems and interests are freely and fully discussed. Lukman (2014) avers that in democratic societies, the voice of the people is supreme and that their wishes fashion the laws of the society.

The above definition of democracy seems to have capture all positive aspect of the concept in a society, however, we are focusing on a bi-headed definitions of democracy. First, democracy can be simply put as government where the majority of the citizens decided on crucial issues of the state either directly as seen in Athens or through their representatives as the case of modern democracy today. Conversely and in relation to African societies, democracy is a device put in place to perpetuate what Marx referred to as class dominance, where the people willingly entered into agreement to legalise the ruling of the elite and dominant class on them. The last definition is peculiar to the practice of democracy in developing countries today where what is obtain is better put as a semi-democratic rule. Ordinarily, in the real sense of the framer of democracy, in a democratic society, there should be no room for dictatorship, authoritarianism, totalitarianism, autocracy, oligarchy, and other forms of despotism as the people, determine how the affairs of the state will be regulated.

Democratic rule anywhere in the world is a government organised and people with the people having a say in the government. The principle of democratic rule includes; The principle of majority rule, coupled with individual and minority rights. All democracies, while respecting the will of the majority, zealously protect the fundamental rights of individuals and minority groups; rule of law where all citizens (both the ruled and rulers) are constitutionally guided and protected; guaranteed and protections of human rights such as right to life, freedom of speech and religion; the right to equal protection under law; and the opportunity to organize and participate fully in the political, economic, and cultural life of society; periodic conduction of free, fair and transparent elections opens to all citizens (Lukman, 2014). Elections in a democracy cannot be facades that dictators or a single party hide behind, but authentic competitions for the support of the people and cordial civil-military relations, so as to maintain peaceful co-existence through commitment to the values of tolerance, cooperation, and compromise in the political system. This will elaborated later in the paper. Democracy has been interpreted and applied in different ways throughout the African continent according to the whims and caprices of politicians and ruling elites, causing significant discontent among many African people. To sum it up, Birikorang (2013) posited that, a democracy is a regime in which there is meaningful and extensive competition at regular intervals among individuals and organised groups for all effective positions of government power, and without the use of force; a highly inclusive level of political participation exists in the selection of leaders and policies, such that no major (adult) social group is excluded; and a sufficient level of civil and political liberties exists to ensure the integrity of political competition and participation.

Theoretical Framework

The paper is anchored on greed-based theory. One of the most notable contributions to the development of the greed-based theory has been Collier's (2000) work. Assumptions of the theory emerged mainly from empirical studies, where economic factors rather than ethnic, socioeconomic, or political grievances are more strongly associated with the start of war or revolution (Ballentine & Nitzscke, 20005 p.4). Collier in his work he asserts that 'civil wars are far more likely to be caused by economic opportunities. This assumption was based on findings of his empirical research on civil wars in which he claims positive correlation between exports of primary commodities, the number of young men in society and low education levels with the frequency of civil war outbreak.

According to Collier and Hoeffler (2004) (cited in Murshed & Tajoeddin, 2007; Bensted, 2011) rebellion maybe sustained through looting of natural resources, extortion of local populations, and support from diasporas. Furthermore, insurgency is less likely to occur if participation costs are higher than economic gains for rebel groups (Collier & Hoeffler 2004). This denial of opportunities by those in power often leads to what Ted Gurr called relative deprivation that in-turn leads to conflict and rebel against existing authority when there is disparity between what people think they deserve and what they actually get from their leaders in a given state.

Collier's (2000) and Collier and Hoeffler's (2004) greed-based theory have been critised for their oversimplification of conflict scenario complexity and reductionist outlook. Due to the difficulties of measuring some economic goals and variables, such as arms suppliers and chances for corruption in government, the first limitation results from their omission (Bensted, 2011; Keen, 2012). The criticism notwithstanding, the assumption of this theory goes in-line with what African political leaders in Mali and Guinea have been doing to their people for years. Democratic rule is expected to bring relieve to the people, in the light of taking part in decision-making process, contribute to government policy, ask government questions and seek redress whenever their rights are being infringed upon in the law court. But these were not seen in these states as their leaders greedily held on to power and other resources of the state, living largely while the people are pauperized on a daily bases. The government of Conde in Guinea and that of President N'daw and prime minister Ouan in Mali also sideline the military as needed welfare and ammunition were denied them as a result of greediness which later led to the rebelion on the part of the military and the people against the democratic leaders in these two states (Mali and Guinea).

Representative Democracy and Coup d'etat in Africa: A nexus

In a representative democracy, the populace chooses representatives to enact laws and set policy on their behalf. The U.S. (a democratic republic), the UK (a constitutional monarchy), and France (a unitary state) are just a few of the nations that use a representative democracy as their system of governance (Longely, 2021). Most states in Africa today, also practice this type of democracy after the return from decades of military interregnums. Africa democratic governance, however, has been questioned on several grounds as the manner at which elected leaders attends to political, economic and soicio-cultural issues in their respective states remain worrisome. Though African democracy has shown some improvements, in the 1990s after the end of Cold War, with elections becoming more frequent and more regular in some parts of the continent, few African states are still characterized by corruption and autocracy (Mbaku, 2020). In such states, the incumbent incapacitates the opposition and exploits the power of the state to skew the electoral contest in his favour. A good example is President Yoweri Museveni of Uganda who used the police to carry out multiple arrests of opposition activists, including his closest rival, Kizza Besigye (Abiodun, et al 2018).

Another challenge is the issue of constitutional coups. Constitutional coups appear to be the new tool incumbents employ to sidestep term limits. This, they do, by amending the provisions of a national constitution to achieve tenure elongation (Abdulateef & Modestus, 2017). This is usually done out of greed and the legislature influenced by the executive. For instance, President Robert Mugabe of Zimbabwe, Paul Biya of Cameroun, and the recently ousted president of Guinea, Alpha Conde have in different times manipulated the legislative arm of government to tinker with the constitutional provisions in order to make them continue in office. Same was attempted in Nigeria by President Olusegun Obasanjo towards the end of his second term in office, but such attempt did not scale through the second reading in the national assembly (Majeed, 2021).

Furthermore, the sit-tight syndrome among some Africa leaders has negatively affected the principle of political participation, equality and human rights in these states. Scanning across the continent, we find suppose democratic leaders who ought to spend specific number of years in office elongating such using different unconstitutional means. Over the past decade, more than thirty (30) African countries have witnessed a direct or indirect presidential election that resulted in a change of leaders. Fifty-six (56) heads of state relinquished power, while nine (9) died in office and thirteen (13) stepped down after a coup or uprising. Through elections, leaders of fifteen (15) countries have remained the same over the past ten (10) years. They include Angola, Burundi, Algeria, Cameroon, Chad, DR Congo, Congo, Djibouti, Equatorial Guinea, Liberia, Rwanda, Sudan, Togo, Uganda and Zimbabwe. Aside Liberia's Ellen Johnson-Sirleaf, fourteen (14) of the leaders took office before 2006 (Ibrahim, 2017; Abiodun, et al, 2018). This remains a challenge to representative democracy in the continent as leaders always want to stay beyond their welcome in office. Table 1 below show details of African leaders who have overstayed their time in office or engulfed with tenure elongation.

Table 1: Selected African leaders who overshot their terms in office.

s/n	Name of Leader	Country	Age	Number of Years
1.	Jose Eduardo dos Santos	Angola	79 years	1979-2017
2.	Teodor Obiang Nguema Mbasogo	Equatorial Guinea	79 years	1979 – date
3.	Paul Biya	Cameroun	88 years	1982- date
4.	Yoweri Museveni	Uganda	77 years	1986- date
5.	Robert Mugabe	Zimbabwe	95 years	1987-2017
6.	Omar al-Bashir	Sudan	77 years	1989-1993 (military) 1993-2019 (civilian)
7.	Mswati III	Eswatini (formerly Swaziland)	53 years	1986–date
8.	Isaias Afewerki	Eritrea	75 years	1993- date
9.	Idriss Deby	Chad	69 years	1990-2021
10.	Yahya Jammeh	Gambia	56 years	1994-1996 (military) 1996-2017 (civilian)
11.	Paul Kagame	Rwanda	63 years	2000- date
12.	Faure Gnassingbe	Togo	55 years	2005- date

Sources: Author's compilation,2023.

Some of these African leaders, metamorphosed from military leader to civilian leaders, some were holding ministerial offices before becoming president. Its amazing, the manner at which these leaders manipulate the so called “watchdog” institution- the legislature, and perpetuate themselves in office. For instance, with five presidential terms in office, Museveni claims Uganda is one of the most democratic countries in the world. In 2005, the constitution was changed to allow him to extend his time in office. Museveni was re-elected in 2016 in an election overshadowed by arrest of politicians and allegations of rigging (Abiodun, et al, 2018). He also utilized the machinery of constitutional amendment to ensure the removal of the age barrier in the country which would have disallowed him from vying for president in 2021. Similarly, President Alpha Conde and Idris Deby of Guinea and Chad respectively tinkered with the constitution of their countries to legally remain in office. Both were ousted in 2021, unfortunately, Deby was not lucky enough as he was killed in the process.

African democracies stand out not because they confront a great deal of difficulties but rather because they have made significant strides despite lacking many of the so-called "pre-conditions" for democratic consolidation (Abiodun, et al, 2018; Siegle, 2021) which makes for the incursion of the military through coup d'etat in some African states as seen in Mali and Guinea in the West African region.

Factors responsible for military incursions in African democratic process

As earlier mentioned, the main responsibility of the military in a state is to defend the territorial integrity of such state from external insurrection and sometimes, invited to assist the police to quash internal security issues. However, post-independence events in many African states left the military with no other option than to see themselves as an alternative to civil rule. Nigeria for example from 1966 to 1997 experienced eleven (11) coup d'etats. Military incursions in African democratic process have been caused by some factors, these are explained below.

Political Factors; The military can intervene in the politics of any country, especially when there is growing dictatorship by the ruling party. The army can equally seize political power when the fundamental human rights are being neglected and ignored, which resulted from the abuse of the constitution by politicians and political leaders as seen in some African countries under democratic regime. A good example is the case of a power drunk Zimbabwean leader, Robert Mugabe who maltreated the people without any recurs to the law. In Niger, President Tandja Mamadou was even overthrown directly by the armed forces in 2010, when he tried to unconstitutionally extend his time in office (Abdallah, 2020). Same thing happened in Mali and Guinea in 1991 and 2008 respectively.

Also, corruption is a canker worm eating deep into the fabric of African societies. It is the abuse of public office for private gain. Crabtree (2017) posits that the main indices of corruption are theft or embezzlement of public funds, giving bribes particularly for electoral support or support of the mass media, acceptance of bribes such as backhanders for awarding government contracts to companies and independent contractors, giving positions of power to family and friends, extortion, graft and nepotism. Many civilian leaders are corrupt to an extent of siphoning and embezzling of public funds, for their selfish aggrandizements. Some African leaders like Presidents Bongo of Gabon, Biya of Cameroon, Chiluba of Zambia, Muluzi of Malawi, Moi of Kenya, Mugabe of Zimbabwe and others have used their political position to embezzle economic resources – a process which often involves the mass pauperisation of their "subjects" and the deepening of their dependence on the patrimonial favours of the "ruler" (Khalil, 2005).This actions, therefore attracts the military which seizes power in an attempt to correct the mistakes of the civilian leaders.

Another reason for military seizure political power is due to mismanagement of the economy in terms of carrying out or embarking on useless projects which do not help or promote economic development of the country. Again, conspicuous consumption by the politicians even when the masses are suffering also attracts the military into politics of any state or country. Poor economic development as a result of mismanagement of the economy in Africa has been alleged by the military for taking over government. An instance is the claim of the military in Malian coup plotter in 2020 after the corona virus pandemic. This is a total departure from what was seen in Singapore under a transformative regime of Lee Kuan Yew who brought the economy of Singapore from zero to an enviable level in Asia and the world after a serious period economic backwardness and infrastructural debacles in a country that has no natural resources (Zhou, 2019). This is not the case in most African states where there are avalanche of natural resources, but the people still suffer as a result of poor economic development by the political leaders.

Furthermore, some military officers intervene in politics with the aim or ambition of becoming Heads of State and the Commander in Chief of the Armed Forces as well as to get promotion quickly to either a Brigadier, Major-General. So, leadership in order to take part in sharing the national cake is one of the foremost reasons for military intervention in politics (Siegle, 2021). Contagious effect among military rank and files, this is so because if colonels in one country overthrow the government and seize political powers, colonels in another country will be aspired to do the same (Siegle, 2021). Therefore, military coup d'état in Togo, where the first military coup d'état in West Africa was staged in 1963, has attracted other military coup d'état in Nigeria, Ghana, Liberia, Sierra-Leone, Mali and other countries in the sub-Saharan African region.

In addition, Africa is one of the continents with most cases of conflict and violence, this may be said to have been caused by a multiplicity of factors such as: arbitrary borders created by the colonial powers in Berlin between 1884 and 1885 (Rosenberg, 2019), heterogeneous ethnic composition of African states, inept political leadership, and poverty among others. The incessant conflict and violence attack shows the incapacity of the political leaders to handle their state in what is referred to failed state scenario. Thus, gives the military the impetus to take over governance. This has been seen in Somalia, Ethiopia, Burundi, South-Sudan, Togo, Mali and Nigeria among others in the past. Pen-ultimately, the military are trained to professionally defend the state, however, political leaders in a bid to perpetuate themselves in power and enjoy undue supports, always infiltrate the military by tampering with procedures and rules. Top military brass and even rank and files hobnob with politicians, leading to political military situation as against proper civil-military relations. This makes the military to know what happens at the corridors of power and want to taste of it (Ojo, 2015).

Lastly, foreign influence; most African states today were formerly under the European colonial rule. Many of them started getting independence from the 1960s but the colonial influences still remain in some former colonies, especially, in the French colonies where Mali and Guinea belong (Siegle, 2021). The French government still intervene in political activities in this state and most coup carried out were either from the France trained military officers or from officers carrying out the bidding of the French government. Also, some developed countries, support military takeover in Africa, first, to make for a stabilize society and second for the sake of perpetuating the dominance on the state, especially in economically viable states in the continent. The military have therefore seen themselves as best option to democratic rule. In Africa, over two hundred (200) coups have been stage since the late 1950s (Nile Post, 2021), with more than half successfully carried out. Table 2 below shows some coups in Africa from 2017 to date.

Table 2: Military Coups in Africa (2017 to 2023)

Country	Date	Ousted Leader	Remarks
Zimbabwe	15th November, 2017	Robert Mugabe	Successful
Sudan	11th April, 2019	Omar Al-Bashir	Successful
Gabon	7th January, 2019	Ali Bongo	Not successful
Ethiopia (Amhara Region)	22nd June, 2019	Ambachew Mekonnen (assassinated)	Partially successful
Mali	18th August, 2020	Ibrahim Boubakar Keita	Successful
Mali	24th May, 2021	President Bah N'daw and prime minister Moctar Ouan	Successful
Guinea	5th September, 2021	Alpha Conde	Successful
Burkina Faso	24th January, 2022	President Roch Marc Kabore.	Partially successful
Benin Republic	26th July, 2023	President Mohamed Bazoum	Successful
Gabon	30th July, 2023	President Ali Bongo	Successful

Sources: BBC (2020), Centre for Democracy and Development (2021), Akhaine (2021) and Ojeme (2022), BBC (2023), Vanguard Newspaper (2023).

Coup d'etat and Challenges of Democratic Rule in Africa; the case of Mali and Guinea

As it is commonly said that a worst civilian government is better than the best military rule. Regardless of the reasons why an illegal government such as military regime is formed, some salient elements of democracy will always suffer when a state is under military government. Though, a weak democracy is a breeding ground for insecurity, corruption, and economic challenges and it makes a state susceptible to coup plots by the military. This is the case in Mali a country that has experienced two military interventions within a year (CDD, 2021). Similar occurrence was seen in Guinea in September, 2021.

Mali's transition to democracy began in 1991 when thousands of demonstrators took to the street to demand the resignation of the then president, President Moussa Traoré, after more than two decades of military rule. Subsequently, Lt. Colonel Amadou Toumani Touré launched a military coup d'état and overthrew Traoré's government. He then established a transitional government composed of military and civilian leaders that later handed power to a democratically elected government in 1992. The democratization process was, however, plagued by the re-emergence of the Tuareg's (nomadic people who live in the northern desert region of Mali) rebellion in the early 1990s.

Mali's democracy ran uninterrupted from 1992 to 2012 with Alpha Oumar Konaré (1992 – 1997; 1997 – 2002) and President Amadou Toumani Touré (2002 – 2007; 2007 - 2012) as democratically elected presidents. The consensus politics of President Amadou Toumani Touré, where the opposition was co-opted into a coalition, undermined the political opposition under his regime unlike that of his predecessor, President Alpha Oumar Konaré, which had vibrant opposition, decentralization and dialogue as the hallmarks of democracy. For instance, President Amadou Toumani Touré ran independently for his second term in 2007 but he was backed by a super-alliance of 43 parties called the Alliance for Democracy and Progress (ADP) which included all but two political parties.

During the years of Amadou Toumani Touré, Mali's democracy was uninterrupted, but governance was characterized by lack of commitment and follow-through with respect to decentralization. This was illustrated by the government's lack of concern for improving local governance and accountability. Corruption was rampant and illicit trafficking in northern Mali was also growing (Fornof, & Cole, 2020). A brief military intervention on 21 March 2012 interrupted Mali's two-decade-long democracy, overthrowing the government of President Amadou Toumani Touré. Shortly after the coup, in 2013, the military actors returned the country to the path of democracy through the conduct of democratic elections won by President Ibrahim Boubacar Keïta. Mali continued in that path until the military coup of 2020 and 2021 which overthrew the government of President Ibrahim Boubacar Keïta and President Bah N'daw and Prime Minister Moctar Ouan respectively.

In the case of Guinea, another West Africa country, first major military coup was staged by Captain Moussa Dadis Camara and his military colleagues of The National Council for Democracy and Development (Conseil National pour la Démocratie et le Development; CNDD), six hours after the death of President Lansana Conté was announced on the December 23, 2008 (Sakor, Sacko & Soko, 2021). President Alpha Condé became the first-ever democratically elected president in Guinea's history in 2010.

The popularity of President Alpha Condé, however, started to become problematic among ordinary Guineans and the international community when he, in 2020, announced a constitutional referendum to allow him to run for his third term in office. Although the new constitution contained improvements for human rights, such as rising the age of marriage to 18 years, a total ban on Female Genital Mutilation (FGM) of Guinean girls, slavery and child labour, and equal rights to spouses in marriage and divorce, the concept of a new constitution meant a new republic, was a political manipulation by Mr. Alpha Condé in order to further his political ambitions.

As a result, public discontent towards President Condé rapidly gravitated, and spread across the country in a short period of time due to various socio-political factors. Meanwhile, a week before the coup d'état and detention of President Alpha Condé, a new spending loophole was proposed for the National Assembly and the President's Office. This move would have resulted in a massive cut in the budget of security forces (police and military officials), a shift which not only caused uproar among some key military generals, but eventually led to the coup on the September 5, 2021.

Both coups in Mali and Guinea were welcomed by citizens of these countries, as evidence was seen in the way the people came out to celebrate the removal of democratic leaders. It shows two germane scenarios, first, the people hitherto were looking for way out from democratic oppression as result of undemocratic democratic regimes and the second brought to limelight, the lapses in civil-military relations, which led to the disloyalty of military personnel to political leaders in these two countries.

Conclusion and Recommendations

This paper has examined the democratic government of African states with focus on the recent coup de'tat in Mali and Guinea. The rationales behind these coups in the West African sub region have been the undemocratic tendencies of their leaders and the weak civil-military relations. These played crucial role in the return of the military juntas to governance which is not their primary onus in a state. In order to forestall the menace of military intervention in political system of states in Africa and other developing states of the world, the paper therefore, recommends the following:

1. The political leadership in Mali and Guinea should as matter of urgency build trust of the people in government coupled with a cordial civil-military relations in these countries.
2. The should be a pro-democracy conversations and activities such as conference where the people, and groups can address their grievances in a democratic state. This will forestall the feeling of deprivation as seen in Mali, and Guinea.
3. Obviously, a disloyal security apparatus is a threat to democracy, and a loyal military contributes to a democratic political system, thus, the need to put measures in place for the welfare of military personnel and that of their families becomes imperative for their loyalty to democratic government to be guaranteed.
4. Regional and sub-regional organizations such as African Union (AU) and Economic Community of West African States (ECOWAS) respectively should do more in ensuring democratic governance in the continent. This can be done by placing more stringent sanctions on any country where civilian leaders embarks on ploy to elongate their stay in power.

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GC-MS, CHEMICAL CONSTITUENTS, CHARACTERIZATION OF 3-PYRIDINE CARBOXYLIC ACID AND TOXICITY OF *SOLANDRA LONGIFLORA* TUSSAC ON *ARTEMIA SALINA*

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Abstract

Chalice Vine (Solandra Longiflora Tussac) belongs to the family of Solanaceae Juss. It is a plant with a fragrant night-blooming flower that will invite insect to its nectar. The leaves are up to 15cm long and 7cm wide and can sometimes be variegated in colour. This is the first-time phytochemicals were isolated from the plant parts and cytotoxicity using Artemia salina was studied. Material and Methods: he leaves of Solandra Longiflora was extracted by the conventional solvent extraction method, chromatographic method namely column chromatogram, Gas Chromatography - Mass Spectrometry (GC-MS), Nuclear Magnetic Resonance (NMR) and Fourier Transform Infra-Red spectrometry (FTIR) graphy (CC), with thin layer chromatography (TLC) plate as a medium for visual identification and Brine Shrimp (Artemia salina) Lethality Test. Result: A compounds was isolated from the stem bark crude extract of methanol of Solandra Longiflora as 3-pyridine carboxylic acid and the crude extract result shows methanol fraction of the stem-bark extract exhibited the highest lethality with LC_{50} value of 574.87 μg/mL, while hexane fraction exhibited the lowest toxicity with LC_{50} value of 4577.43 μg/mL

Conclusion: *The high cytotoxicity of the crude extract and the presence of the chemical constitutes as well as the isolated compound indicate a*

potential agent for anticancer agents.

***Keywords**: Chemical Constituents, Characterization, Toxicity, Solandra Longiflora, Artemia salin*a

Background to the Study

The study of ethnomedical systems and of plants as therapeutic agents is of paramount importance to address the health challenges the local communities and third world countries as well as of industrialized societies. Though large number of studies have been conducted in the traditional pharmacopoeia of indigenous plants used by local and traditional and rural communities throughout the world, are still yet to explored and understand the chemical constituents to utilize the potentials of these plants (Cano, & Volpato, 2004). Chalice Vine (Solandra Longiflora Tussac) belongs to the family of Solanaceae Juss. It is a plant with a fragrant night-blooming flower that will invite insect to its nectar. The leaves are up to 15cm long and 7cm wide, and can sometimes be variegated in colour. The flowers, which open mostly at night, are large, cup-shaped, white to yellow in colour, sometimes with purple veins, and measure up to 25cm in length. The flowers are strongly perfumed at night. It is somewhat deciduous and messy, its flowering is most of the time without specific seasons and used as ornamental in most of Sawakian houses. Its common habitat is a dry dappled shade woodland. It is also called the trumpet plant possibly because of the trumpet shape of the flower. The concoction from the plant is used for rheumatism and osteoarthritis (Queen Elizabeth II Botanic Park)

The fruit is fleshy, nearly round and up to 6cm in diameter, white to pale-yellow, with many small seeds inside. The sap from the plant part has been recorded as being an irritant, either in the eye or on the skin. All parts of the plant are thought to be toxic. If ingested, symptoms may include nausea, vomiting, diarrhoea, headache, dilated pupils, temperatures and delirium (Children's Health 2017). The present investigation was undertaken to isolate and evaluate the cytotoxicity effect of methanol crude extracts of Chalice Vine (Solandra Long flora Tussac) Stem bark. This is the first time phytochemicals were isolated from the plant parts and cytotoxicity using *Artemia salina* was studied.

Figure 1: The flower and leaves of *Solandra Longflora*

Materials and Methods

Extraction Method

The leaves of *Solandra Longiflora* was extracted by the conventional solvent extraction method described by Fasihuddin et al. (2010). This was achieved by soaking the ground plant material in non-polar, medium polar and polar solvents in the order of increasing polarity. A total of 2 kg of the dried and ground stem bark sample of *Solandra Longiflora* was extracted using cold soaking method with hexane (C6H14). The samples were soaked in the hexane with the ratio of 1:3 in 5 litres Erlenmeyer flasks at room temperature for 72 hours. The resulting hexane solution was then filtered using filter paper and the residue was re-extracted with fresh hexane for another 72 hours and filtered. Both extracts were combined and concentrated with a rotary evaporator (Heidolph Laborota 4000 efficient) under reduced pressure to obtain the hexane crude extract. The residues were re-extracted using similar procedure with dichloromethane (CH_2CL_2), followed by chloroform ($CHCL_3$), and methanol (MeOH) to obtain dichloromethane, chloroform and methanol crude extracts, respectively (Umaru et al., 2020a).

To remove tannin from the methanol extract, the crude extract was dissolved in a small volume of methanol mixed with petroleum ether to remove tannin. The mixture in the separating funnel were shaken slowly and left for 5 minutes and wait for two layers solution clearly formed. The petroleum ether was removed and extract further extracted until a clear and colourless solution of petroleum ether was obtained, then the extract is ready for analysis. (Umaru *et al*., 2019).

Isolation and Purification

The Secondary metabolites in the crude extracts of *Solandra Longiflora* was isolated and purified by using chromatographic method namely column chromatography (CC), with thin layer chromatography (TLC) plate as a medium for visual identification. The analytical thin layer chromatography (TLC) was carried out by using aluminium plate of 20 x 20 cm coated with silica gel 60 F254 as reported by Umaru et al., (2018a). The plate was allowed to air-dry before observed under ultraviolet (UV) light. The separated components of the sample, which appeared as spots, was visualized under both short (256 nm) and long (360 nm) wavelength of the UV light.

The basic principle of column chromatography is to separate a mixture of metabolites based on their molecular weight and polarity. A glass column of size 40/34 (large) was used for chromatography, and the sorbent used was silica gel 60 (Merck 70-230 Mesh @ 0.063 0.200 mm). Silica gel slurry was prepared by dissolving silica gel (150 g) with suitable solvent, usually hexane. The column was prepared by pouring a slurry mixture of silica gel and solvent, into a glass column and allow it to settle down (Firdous et al., 2013). The packed column was left overnight before 4-10 g of sample was introduced onto the top of the packed column via wet-packing method or dry-packing method. The column was eluted with suitable solvent systems with increasing polarity (Fasihuddin et al., 2010). The column's valve was then opened and about 10-30 mL fraction of the solvent coming out from the column was collected in test tubes (Patra et al., 2012).

The procedure was repeated by using different solvent systems, based on increasing polarity. Samples from the column fractions were examined by using TLC plates in few suitable solvent systems to obtain the retention factor (R_f) of any components that appeared as spots. Fractions with similar Rf values were combined (Patra et al., 2012). Fractions which contain more than one component were further isolated and purified by using smaller glass column of sizes 24/29 (medium) or 14/23 (small) with suitable solvent systems. Fraction with single component (one spot) that appeared in TLC plate was treated as possible pure secondary metabolite. The combined fractions which contain the same single component was then allowed to air-dried or evaporated to dryness to obtain a pure secondary metabolite (Umaru et al., 2020b).

Chemical Structure Elucidation

Identification of the isolated secondary metabolite was made by various spectroscopy method namely Gas Chromatography - Mass Spectrometry (GC-MS), Nuclear Magnetic Resonance (NMR) and Fourier Transform Infra-Red spectrometry (FTIR) as described by Fasihuddin *et al*. (2010). The elucidation of chemical structural for the extracted secondary metabolite was made based on the data obtained from various spectroscopy methods and also comparison with published information if available.

Gas Chromatography - Mass Spectrometry (GC-MS)

The combined fractions eluted from column chromatography that showed single spot in TLC were further analysed by GC-MS performed on a Shimadzu model QP 2010-Plus to obtain molecular mass of pure compounds according to mass per charge (m/z) ratio. As well as by matching its average peak area to the total areas, the relative percentage quantity of each component was acquired. By matching the retention times with those of authentic compounds, compound identification was obtained and the mass spectral obtained from library data of the corresponding compounds (Umaru *et al*., 2018b)

Nuclear Magnetic Resonance (NMR)

Nuclear Magnetic Resonance (NMR) spectrometry was performed by using JEOL JNM-ECA 500 Spectrometer, based on the method as described by Efdi et al. (2010) and Danelutte et al. (2003). ^{1}H and ^{13}C spectra were measured at 500 and 125 MHz, respectively. Sample was dissolved in 0.8 mL chloroform D1 ($CDCl_3$) and placed into NMR tube to make sample depth around 3.5 to 4 cm and ready to be analysed by NMR spectrometer. Chemical shifts were reported as δ units (ppm) with tetramethysilane (TMS) as internal standard and coupling constants (J) in Hz. Integration of the ^{1}H-NMR and ^{13}C-NMR data was performed by using DELTA version 5.0.4 software by JEOL. Identification of the type of each ^{1}H-NMR and ^{13}C-NMR detected was based on the Table of characteristic NMR absorptions that published in Organic Chemistry (Janice, 2008) and with the guide of the possible proposed structure given by NIST library.

The chemical bonds (functional groups) of the compounds were detected by using Fourier Transform Infra-Red spectrometry (FTIR). The semi-solid, crystalline and powdered samples were introduced directly into FTIR. Scan range employed was from 400 to 4000 cm^{-1}

with a resolution of 4 cm^{-1}, based on the method described by Shalini & Sampathkumar (2012). Characteristic of the chemical bond was read by spectrum produced through transmittance of wavelength of the light. The chemical bond in a molecule was detected by interpreting the infra-red transmittance spectrum. Melting point of the isolated compound was tested by introducing a tiny amount of sample into a small capillary tube and inserted to the melting point machine's heating bath. Heating process was deployed, and the sample was observed to determine the temperature at which melting begins (Umaru *et al.*, 2018b).

Brine Shrimp (Artemia salina) Lethality Test

Toxicity test of *Solandra Longiflora* hexane, dichloromethane, chloroform and methanol extract against brine shrimp (*Artemia salina*) was evaluated. The Leached brine shrimp eggs were hatched in seawater and incubated for 48 hours at 25 ºC. Exactly 5 mg of sample was dissolved in 5 mL methanol, and the mixture was sonicated to ensure homogeneity of the extract. Four different volumes of 500, 250, 50 and 5 µL each from the stock solution were transferred into NUNC multidish in triplicate. Solvent was allowed to evaporate under a running fume hood for overnight and followed by the addition of 0.2 mL DMSO and 4.8 mL seawater to give final concentration of 100, 50, 10 and 1 µg/mL, respectively. Ten brine shrimp nauplii were transferred into each concentration in NUNC multidish and was observed every 6 hours for 24 hours. The amount of dead nauplii were calculated. Thymol was used as positive control, whereas 0.2 mL DMSO and 4.8 mL seawater was used as negative control. The data was analysed to determine the concentration of the samples that kill 50% of brine shrimp at 24 hours or known as LC_{50}. LC_{50} was calculated and determined by performing Probit analysis in IBM SPSS Statistic software of version 21 (Umaru et al., 2018c).

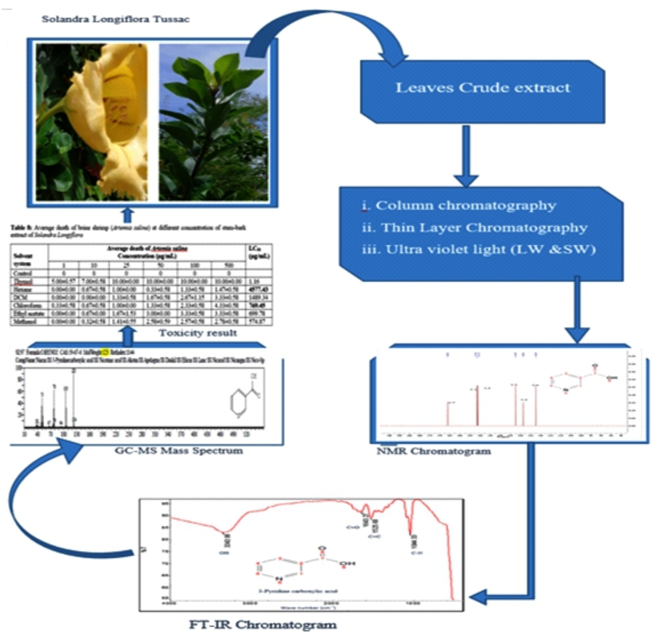

Figure 2: Structural work abstract

Result and Discussion

Percentage Yield of the Crude Extract

Table 1 shows the percentage yield of *Solandra Longiflora Tussac* extracted in various solvent. The highest yield was obtained from methanol extract of 11.28% and the lowest was obtained from hexane extract of 4.60%. In term of chemistry, polar substances would dissolve in polar solvents while non-polar substances polar solvents (Zuo et al., 2002). Thus, the variation in the yield might be due to the polarity of the solvents used in the process of extraction. Crude extract of hexane which are usually extract of fatty acids reported by Suppavorasatit, (2010) was obtained in a form of oily dark green colour. Higher yield from chloroform, ethyl acetate and methanol crude extract indicated the abundance of medium-polar and polar metabolites. Thus, significant when compared to the hexane and dichloromethane. The high yield of methanol crude extract of Solandra Logiflora agrees with the report of Abubakar et al. (2014) and Sandhya and Thirupathi (2017). The yield obtained from methanol stem-bark extract of *Solandra Longiflora* at 11.28%, when compared to the other extract obtained from serial extraction from hexane, dichloromethane, ethyl acetate, and chloroform, was significant. Table 1 show the physical appearance of the stem bark crude extract of *Solandra Longiflora* from different solvent of Hexane, dichloromethane, chloroform ethyl acetate and methanol.

Solvent extract	**Physical appearance of crude extract**	**Yield (%)**
Hexane	Dark amorphous solid	4.60
Dichloromethane	Dark amorphous solid	4.89
Chloroform	Light amorphous solid	5.64
Ethyl acetate	Dark amorphous liquid	**8.94**
Methanol	Dark amorphous oil	**11.284**

Purification and Structural Elucidation of Secondary Metabolites

Purification of Compounds 1 from Methanol Crude Stem bark Extract of *Solandra Longiflora*

A compounds was isolated from the stem bark crude extract of methanol of *Solandra Longiflora.* About 20 g of the crude extract was introduced into the column using slurry pack method with 100% hexane. The sample was then eluted with suitable solvent ratio as shown in Table 1. Table 1 shows the solvent system used for column chromatography by employing 13 solvent systems for column chromatography and 10 fractions were obtained and labelled.

Table 2: Solvent system used for column chromatography (300 mL each solvent)

Solvent	Volume to volume (v/v)
Hexane	1
Hexane: Dichloromethane	1:1
Hexane: Dichloromethane	1:2
Dichloromethane	1
Dichloromethane: Chloroform	1:1
Dichloromethane: Chloroform	1:2
Chloroform	1
Chloroform: Ethyl acetate	1:1
Chloroform: Ethyl acetate	1:2
Ethyl acetate	1
Ethyl acetate: Methanol	1:1
Ethyl acetate: Methanol	1:2
Methanol	1

All the fractions collected where labelled as SLM (1-10), as indicated in Table 3.
Table 3 shows the fraction of methanol stem bark crude extract of *Solandra Longiflora* indicating the fraction weight and colour.

Table 3: Fractions collected from methanol stem bark crude extract of *Solandra Longiflora*

Fractions code	Fraction weight (mg)	Fraction color
LSM1	1.3	Colorless
LSM2	12.4	Dark yellow
LSM3	187.9	Light yellow
LSM4	49.6	Light brown
LSM5	92.6	Light brown
LSM6	180.0	Dark brown
LSM7	210.12	Dark brown
LSM8	275.22	Dark green
LSM9	298.16	Dark green
LSM10	499.12	Orange

Purification and Structural Elucidation of Compound 1
Purification
The isolated compound was obtained from the combined fractions of LSM8 of 275.22 mg extract of *Solandra Longiflora* in ethyl acetate with a dark green colour. The TLC analysis of the fraction was performed in a different solvent system of after which the result was observed under UV light and recorded as shown in Table 4.

Table 4: TLC and R_f values of combined fraction of LSM8 in different solvent system under UV light.

Solvent system (v/v)	Number of spots on TLC	R_f value	Stained TLC Color
Dichloromethane: Ethyl acetate (7:3)	2	0.42, 0.21	Light brown
Dichloromethane: Ethyl acetate (4:1)	2	0.55, 0.13	Light brown
Dichloromethane: Ethyl acetate (9:1)	2	0.50, 0.20	Light brown

The 275.22 mg was subjected to column chromatography separation using a mixture of dichloromethane and ethyl acetate. A light brown colour fraction from dichloromethane and ethyl acetate ratio as shown in Table 4 of fraction of LSM8-1 to LSM8-8 was collected, targeted and combined, and was labelled as LSM8-A. LSM8-A was then subjected for separation using small column and similar TLC fractions was collected and combined fractions was labelled as LSM8-A1. LSM8-A1 gave a good separation and the targeted spots were further purified in a smaller column using solvent ratio of Dichloromethane: Ethyl acetate (9:1). The fractions where subjected to UV light and those with same R_f value and colour were combined. The result is shown in Table 5.

Table 5: TLC and R_f values of combined fraction of LSM8-A1 in different solvent system under UV light.

Solvent system (v/v)	Number of spots on TLC	R_f value	Stained TLC Color
Dichloromethane: Ethyl acetate (9:1)	2	0.61, 0.57	colorless

Fraction LSM8-A1 which showed similar R_f value and colour were subjected to small column using Dichloromethane: Ethyl acetate (9:1). TLC of the fractions was collected and examined under UV and vanillin stain which showed a single spot was labelled as LSM8-A2 as shown in Table 6.

Table 6: TLC and R_f values of combined fraction of LSM8-A2 in different solvent system under UV light.

Combined fraction	Solvent system (v/v)	Number of spot on TLC	R_f value	Stained TLC Color
LSM8-A2	Dichloromethane: Ethyl acetate (9:1)	1	0.61	colorless

Figure 3 shows the TLC profile of the combined fractions, LSM8-A2 in Dichloromethane: Ethyl acetate (9:1) with a single spot which suggested a pure compound with a weight of 8.0 mg.

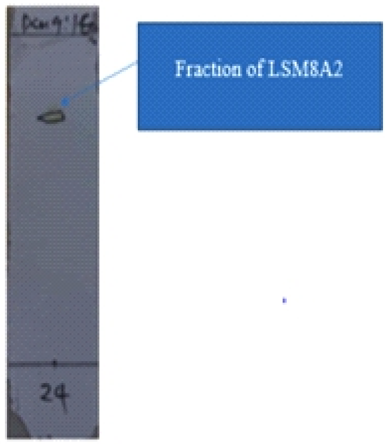

Figure 3: TLC plate with one spot of combined fraction of LSM8-A2 in Dichloromethane: Ethyl acetate (9:1).

Fraction LSM8-A2 was then analysed on gas chromatography (GC) and the gas chromatogram indicated one peak at a retention time of 12.93 min in Figure 4 which shows that LSM8-A2 is a pure compound and was renamed as Compound 1 or the isolated compound.

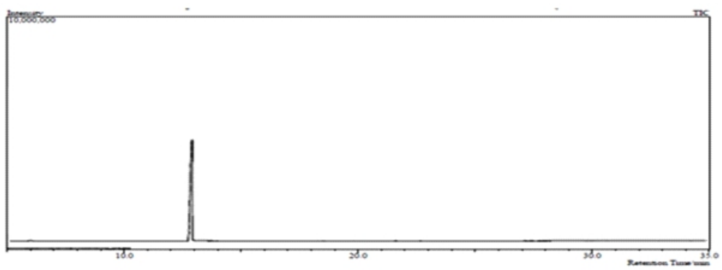

Figure 4: Gas chromatogram of Compound 2

Structural Elucidation of Compound 1

Compound 1 (8.0 mg) was obtained as a colourless solid fraction from methanol stem bark extract of *Solandra Longiflora* with a melting point of 103 °C (105 °C). Figure 5 shows the mass spectrum of the isolated compound with one of its molecular ion peak observed at *m/z* 123 which corresponded to the same molecular ion peak and molecular ion weight as suggested for structure of Compound 1 by NIST library with the chemical formula of $C_6H_5NO_2$. Figure 5 also indicated a base peaks of Compound 1, at *m/z* 105 which was also obtained in the mass spectrum of the suggested spectrum of 3-pyridine carboxylic acid.

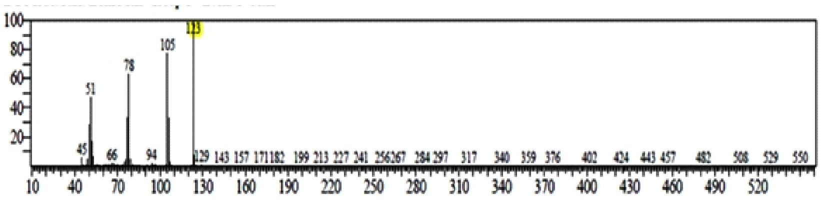

Figure 5: Mass spectrum of Compound 1

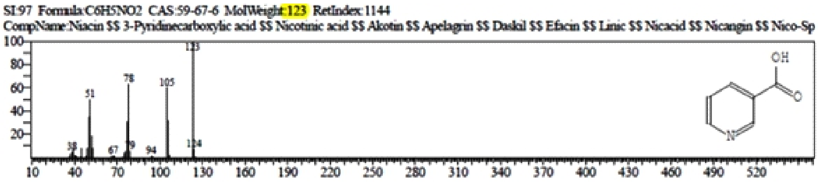

Figure 6: Mass spectrum of suggested structure of Compound 2 by NIST Library.

IR spectrum of the isolated compound (Compound 1) (Figure 6) shows an absorption band of hydroxyl group (OH) at 3343.98 cm^{-1}, an absorption band of C=C which was observed at 1525.68 cm^{-1} and a signal was observed at 1643.27 cm^{-1} which represented the C=O bond in the ring of the suggested structure of 3-pyridine carboxylic acid was observed on the IR spectrum of Compound 1 (Figure 7). IR spectrum of Compound 1 is similar with the IR spectrum reported by Venkateswarlu et al. (2015), for 3-pyridine carboxylic acid.

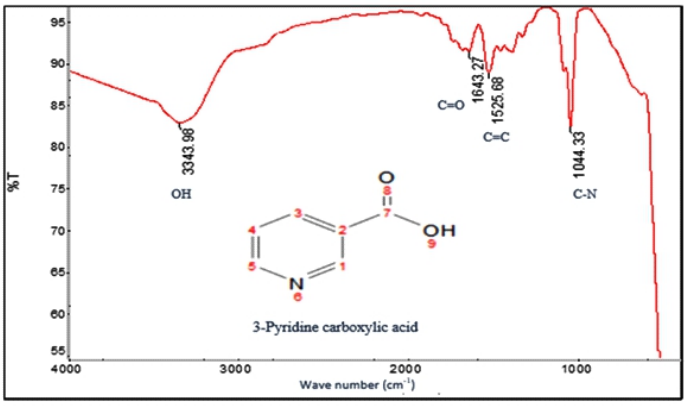

Figure 7: IR spectrum of Compound 1

NMR analysis of Compound 1 was performed for the elucidation of the chemical structure and the spectra are as shown in Figure 8, Figure 9 (^{1}H-NMR) and Figure 10 (^{13}C-NMR). The proton of Compound 1 was based on the table of ^{1}H-NMR characteristic absorption as well as the ^{1}H-NMR splitting pattern as reported in spectrometric identification of Organic Compounds by Silverstein et al. (2005). The proton signals were integrated and are assigned to every proton of Compound 1 as the suggested chemical structure.

From the result it was observed that ^{1}H-NMR spectrum of the isolated compound is composed of 5 proton resonates, four proton signals were observed at δ 9.04 (1H, s), δ 8.24

(1H, s), 7.50 (1H, s) and 8.76 (H, s) indicating the presence of methine group of the structure and was assigned to H-1, H-3, H-4 and H-5 respectively. A singlet signal was observed at 13.38 (1H, s) and was assigned to OH which indicated the existence of carboxylic group of the isolated compound.

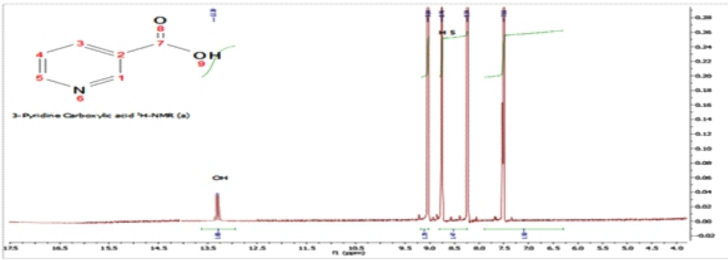

Figure 8: ^{1}H-NMR spectrum of Compound 2 from δ 4.0 to δ 17.5 (500 MHz, DMSO-d6)

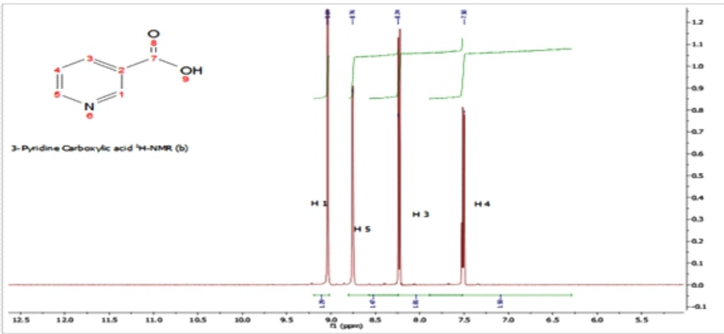

Figure 9: ^{1}H-NMR spectrum of Compound 2 from δ 5.5 to δ 12.5 (500 MHz, DMSO-d6)

The ^{13}C-NMR of the compound shown in Figure 9 presented the result of carbon NMR signal result and was assigned to the proposed chemical structure. A total of 6 carbon resonates was observed in the spectrum presented. The down field region showed four signals at δ 151.50, δ 128.54, δ 137.39, δ 122.34 and δ 151.10, were identified as methine carbon and assigned to C-1, C-2, C-3, C-4 and C-5. Another signal was observed at δ 166.03 was assigned C-7 which was identified as C=O group.

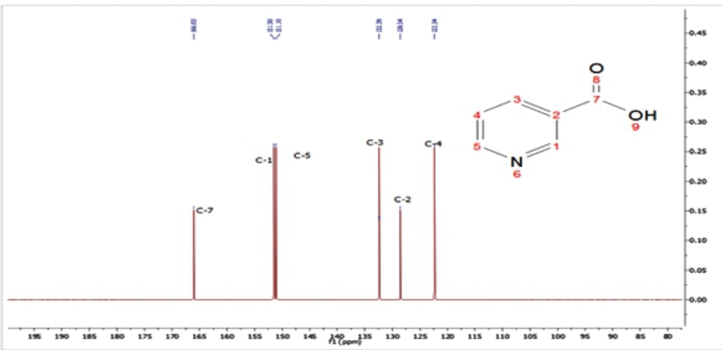

Figure 10: ^{13}C-NMR spectrum of Compound 2 from δ 80 to δ 195 (125 MHz, DMSO-d6)

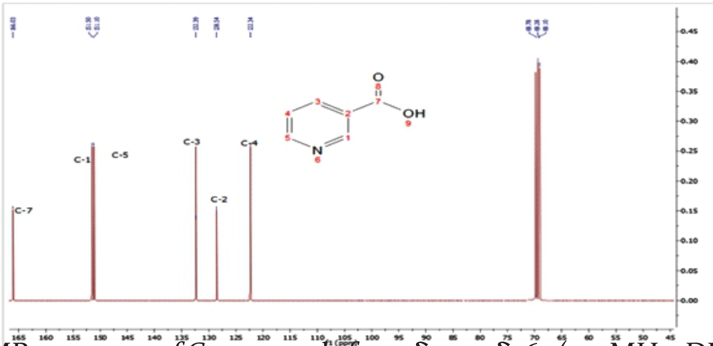

Figure 11: ^{13}C-NMR spectrum of Compound 1 from δ 45 to δ 165 (125 MHz, DMSO-d6)

The isolated compound chemical shift of every ^{1}H-NMR and ^{13}C-NMR are shown in Table 6 and Table 7 with reference data as reported by Venkateswarlu et al. (2015).

Table 6: Proton NMR signal of Compound 1 and that reported by Venkateswarlu et al. (2015)

Proton assigned to Compound 2	Proton chemical shift (ppm) of Compound 2	Proton assigned to 3-pyridine carboxylic acid (Venkateswarlu et al., 2015)	Proton chemical shift (ppm) of 3 - pyridine carboxylic acid (Venkateswarlu et al., 2015)
H-1	9.04 (1H, s).	H-1	9.02 (1H, s)
H-3	8.24 (1H, s)	H-3	8.32 (1H, s),
H-4	7.50 (1H, s)	H-4	7.48 (1H, s)
H-5	8.76 (1H, s)	H-5	8.64 (1H, s)
OH	13.38 (1H, s)	OH	12.68 (1H, s)

Table 7: Carbon NMR signal of Compound 2 and that reported by Venkateswarlu et al. (2015).

Carbon assigned to Compound 2	Carbon chemical shift (ppm) of compound 2	Carbon assigned to 3-pyridine carboxylic acid (Venkateswarlu et al., 2015)	Carbon chemical shift (ppm) of 3 -pyridine carboxylic acid (Venkateswarlu et al., 2015)
C-1	151.50	C-1	151.20
C-2	128.54	C-2	128.70
C-3	137.39	C-3	139.30
C-4	122.34	C-4	125.30
C-5	151.10	C-5	153.60
C-7	166.03	C-7	167.70

Based on the spectrum of IR, ^{1}H-NMR and ^{13}C-NMR data and comparison with the published information the isolated compound was identified as 3-pyridine carboxylic acid when compared to the reported by Venkateswarlu et al. (2015).

Cytotoxicity of *Solandra Longiflora* stem bark

Table 8: Average death of brine shrimp (*Artemia salina*) at different concentration of stem-bark extract of *Solandra Longiflora*

Solvent System	Average death of *Artemia salina* Concentration (μg/mL)						LC_{50} (μg/mL)
	1	10	25	50	100	500	
Control	0	0	0	0	0	0	
Thymol	5.00±0.57	7.00±0.58	10.00±0.00	10.00±0.00	10.00±0.00	10.00±0.00	1.16
Hexane	0.00±0.00	0.67±0.58	1.00±0.00	0.33±0.58	1.33±0.58	1.47±0.58	**4577.43**
DCM	0.00±0.00	0.00±0.00	1.33±0.58	1.67±0.58	2.67±1.15	3.33±0.58	1489.34
Chloroform	0.33±0.58	0.67±0.58	1.00±0.00	1.33±0.58	2.33±0.58	4.33±0.58	**769.45**
Ethyl acetate	0.00±0.00	0.67±0.00	1.67±1.53	3.00±0.00	3.33±0.58	3.33±0.58	699.78
Methanol	0.00±0.00	0.32±0.58	1.41±0.55	2.58±0.59	2.57±0.58	2.78±0.58	574.87

The result is Mean±SD. N = 10

There was an observed concentration dependant increment in mortality rate of the brine shrimp

The lethality concentration of LC_{50} was assessed for *Solandra Longiflora* stem bark, the result shows methanol fraction of the stem-bark extract exhibited the highest lethality with LC_{50} value of 574.87 μg/mL, while hexane fraction exhibited the lowest toxicity with LC_{50} value of 4577.43 μg/mL (Table 8). The attracting attention of the result in this study is that there was a concentration dependent increase in the mortality rate of the *Artemia salina* in the stem bark extracts. This was an indication of a proof of the bioactive potential of the plants extracts as a bioactive (Abhilasha, *et al*., 2013, Prashith *et al*., 2010, & Adelowotan *et al*., 2008). This was suggested that some of the plant extracts with LC_{50} below 1000 μg/mL which are categorized as toxic, does not always indicate its danger or out-right toxicity toward human, but may also suggest a potential antitumor or anticancer activity. Exposure or administering this type of plant may unlikely to have negative effects on human (Del Socorro *et al*., 2014, Elumba *et al*., 2013; Moshi *et al*., 2010). Asaduzzaman *et al*. (2015) reported brine shrimp lethality test, gives a significant correlation between brine shrimp assay and *in-vitro* growth inhibition of human solid tumor cell lines which could be used in the synthesis of more effective drugs to avert human pathogens.

Conclusion

In conclusion crude extract from *Solandra Longiflora* stem bark and the methanol fraction exhibited great potential as the cytotoxicity report unlikely to have negative effects on human. The methanol fraction yielded a high value of crude extract compared to the other fractions. A compound was isolated from the methanol crude extract, thus from the present investigation provided evidence of the potential of medicinal plants for herbal drug as an antibacterial, anticancer etc. However further study for the use of this fractions in vivo should be evaluated of its efficacy and antioxidant.

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ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN FIGHTING CRIME AND INSECURITY IN MAIDUGURI METROPOLITAN COUNCIL (MMC), BORNO STATE.

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Abstract

This research is design to determine the Role of information and communication technology in fighting crime and insecurity in Maiduguri Metropolitan Council (MMC) Borno State. The design objectives will be achieved through determining the Impact of Information and Communication Technologies in Fighting Crimes and Insecurity, measure the levels in which ICTs have been used by security agents in Fighting Crimes and Insecurity in the area, factors that hamper effective use of ICTs in Fighting Crimes and Insecurity and the practical measures which will be taken to enhance the use of ICTs in Fighting Crime and Insecurity. Four research questions and four hypotheses will be tested descriptive survey method will be adopted for the study covering and accessible population of 9500 security personnel and public servant. The sample size of the study will be 600 security men and 350 public servants using 10% of the mother population. Questionnaire will be used for data collection and T-test statistic will use to test the null hypothesis. Base on the finding, the research question will be answered; conclusion and recommendation will be drawn.

Keywords*: Fighting, Crime, Insecurity, Role, Communication, Information and Maiduguri*

Background to the Study

The advent of Information and Communication Technologies (ICTs) has brought tremendous innovation in all spheres of human endeavors. Moreover, the security agents in Nigeria have taken a good advantage of ICTs to Fight Crime and Insecurity through the use of the ICTs gadgets such as: GSM, internet, telephones, digital television, cable or satellite, telex, facsimile and others. The use of ICTs has made the job of intelligent security defense very effective, interesting, easy, faster and more reliable. Information and Communication Technologies (ICTs) invention or discovery has its link and purpose with the discovery of Advance Research Project Agency Network (ARPANET) which gave birth to internet, GSM, social network and others. The ARPANET came into existence as a result of insecurity, crime and poor communication. In 1970s, when the cold war was still raging, the U.S Department of Defense was concerned about the vulnerability of its computer network to nuclear attack. The pentagon did not want to lose all its computing and communication ability to one well-placed atomic bomb. Consequently, defense computer experts decentralized the whole system by creating an inter-connected web of computer networks.

The network was designed so that every computer could be connected to another. The information was bundled in a packet, called an Internet Protocol Packet, (IPP), which contained the destination address of the target computer. The system that the pentagon eventually developed was called (ARPANET) Advance Research Project Agency Network Extracted, from the Dynamics of mass communication by Joseph R. Dominick. In the olden days before the invention of ICTs, information most especially security information was disseminated interpersonally, sometimes in a group and such communication technology had instant feedback, neigbours alerted neighbours, town criers, signs and symbols were used for security purpose.

Historically, there are recorded channels of communication from the early stage which include: the family, market place, town criers, churches, village square, signs and symbols (Oreh, 1984). The early communication instrument despite their importance and unique roles could not reach a wide range of audience hence the need to create other means of information dissemination. So, with the invention of Information and Communication Technologies, information dissemination became an easy task as one can sit comfortably at home and touch with the outside world. With the invention of these technologies otherwise known as "New media" the world became a global village where information are relayed and feedback are given within minutes.

Mbam (2012), defined ICT as the application of computer hardware and software components, telecommunication equipment and electronics in finding solutions to the multiple problems of mankind. It is one of the most valuable resources or factors of communication profession. . It is also one of the nervous systems of modern communication and indeed of the economy which serves as an eye opener to security agents because they will learn to monitor activities of people and in the same vein imbibe on security consciousness and cultural value.

The emergence and spread of Information and Communication Technologies as well as its use in Fighting Crimes and Insecurity has a lot to do with computer development which is dominated by GSM phones, digital television, cable or satellite, telex and facsimile e.t.c. Okunna (2020) opined that whenever we think of Information and Communication Technology our mind flies to the world of computers, satellites, fax machines, fiber optics, digital networks, and ultimately the internet. They are variously called New Information

Technologies (NITs) which makes possible Computer Mediate Communication (CMC) and have given rise to information highway or information super highway. All these have to do with the online world which William Gibson named "Cyber Space". All of them are simply classified into computer information mediated communication according to Agber (2020).

Adamu (2007:223) writes that ICTs deal primarily with the use of electronic computer and computer software to convert, store, project, process, transmit and retrieve information from anywhere at any time. Similarly, Nwodu (2003:5) describes ICTs as a generic name used to refer to a number of communication hardware adopted in ensuring instantaneous dissemination of information and social values across the globe.

Statement of the Problem

The rate of insecurity in Nigeria today is alarming. On daily basis, lives and properties are wasted due to high level of bribery and corruption, killings, kidnapping and bombing. The security challenge in Nigeria today makes government to spend huge amount of money in fighting the scourge. Of course, these are money that otherwise could have been channeled to other areas of human development.

Meanwhile, there seem to exist a gap in knowledge on the use of ICTs in Fighting Crimes and Insecurity challenges in Nigeria. Thus, it became necessary to scientifically investigate the use of ICTs in fighting crime and insecurity in Nigeria with Maiduguri, Borno State in focus. The study is important because if ignored the increasing spread of crime and insecurity in the country and in the state, would continue to exist or even escalate, resulting in anarchy, heightened lawlessness, increased poverty, loss of lives and human resources.

Objectives of the Study

The general objective of this study is to study the Impact of Information and Communication Technologies (ICTs) in Fighting Crimes and Insecurity in Maiduguri Metropolis of Borno State. However, the specific objectives include:

i. To determine the Impact of Information and Communication Technologies in Fighting Crimes and Insecurity in Maiduguri, Borno State.
ii. To measure the levels in which ICTs have been used by security agents in Fighting Crimes and Insecurity in the area.
iii. To determine the factors that hamper effective use of ICTs in Fighting Crimes and Insecurity in Maiduguri, Borno State.
iv. To determine the practical measures which could be taken to enhance the use of ICTs in Fighting Crime and Insecurity in Maiduguri, Borno State.

Significance of the Study

The following are the contributions of the study in terms of knowledge and benefit to the readers:

The study reveals the actual level ICTs could be used in Fighting Crimes and Insecurity in Maiduguri, Borno State.

i. It highlights the problems and prospects of ICTs use in Maiduguri, Borno State by security agents.
ii. It is instrumental to prospective researchers who may wish to go into this or similar area of study.
iii. It has far-reaching significance to media organizations, media practitioners, media educators, media students, general public, security agencies and governments.

Research Questions

For the sake of validity, questions are designed to obtain public opinions and generate ideas which will serve as a statistical significance for this work. The following research questions were asked:

i. Do ICTs play any role in Fighting Crimes and Insecurity in Maiduguri, Borno State?
ii. What is the level of application of ICTs by the Borno State security Agents in Fighting Crime and Insecurity?
iii. What challenges hamper effective use of ICTs in Fighting Crime and Insecurity in Maiduguri, Borno State?
iv. What practical measures could Maiduguri, Borno State security agents use to Fight Crime and Insecurity?

Methodology

Methodology is the systematic process or procedure designed for generating, collecting and analyzing the data required for solving a specific problem. The method adopted in this study is Survey Research Method. Survey research is defined as a process of gathering data from targeted population through the questionnaire or interviews and subjecting such data to statistical analysis for the purpose of reaching conclusion on subject matter of the study and providing solutions to identified research problems.

The reason for using the survey method is because it is the most suitable method for this study in which people's opinion and perception over a given issue such as Role of ICTs in Fighting Crime and Insecurity will be ascertained. The study was conducted among the security agents in Maiduguri metropolis and some randomly selected public servants to reflect public opinion in this research work.

Research Hypotheses

Hypothesis One

H:0 ICTs are not relevant in Fighting Crimes and Insecurity.

H:1 ICTs are relevant in Fighting Crimes and Insecurity.

Respondent	Yes	No	Total
Police	80 (18.45)	20 (18.54)	100
The military	100 (81.45)	0 (18.54)	100
State Security Service	30 (48.05)	29 (10.94)	59
Federal Road Safety Corps	90 (81.45)	10 (18.54)	100
Publics	25 (32.58)	15 (7.14)	40
Total	325	74	399

Hypothesis Two

The table below shows that there is practical measures taken to enhance the use of ICTs in combating crimes and insecurity in MMC, Borno State.

Variables	Yes	No	Total
Police	70(87.45)	30(12.53)	100
The military	80(87.46)	20(12.53)	100
State Security Service	59(51.60)	0(7.39)	59
Federal Road Safety Corps	100(87.46)	2(12.53)	100
Publics	40(34.98)	0(5.0)	40
Total	349		399

Discussion and Interpretation.

The discussion and interpretation of the findings from the primary research carried out on the role of ICTs in Fighting Crime and Insecurity in Maiduguri Metropolis was based on the collected and analyzed data. It was also discovered that the security agents and some selected publics in Maiduguri Metropolis were the primary respondents whose opinions and views were gathered through the questionnaire, by the researcher. After due analysis with use of contingency table analysis and chi-square (x2) test, the outcome of the analysis and chi-square revealed that people strongly believed that ICTs is the best option that can help in Fighting Crimes and Insecurity Maiduguri Borno State.

The actual respondents were selected security agents and selected publics in Maiduguri metropolis: they are police, military, State Security Servants, Federal Road Safely and Civil Servants. The questionnaire table of this analysis showed that 100 respondents were from the police headquarter, 100 respondents were from the Army command Barrack (Giwa Barrack), 59 respondents were from the SSS office at Maiduguri, 100 respondents were from federal road safety of Nig (FRSN) office at Maiduguri, while 40 respondents were from the selected civil servant at CAS (EBSU) which made up of 399 respondents used in this study.

The contingency analysis table treated the leading question and response of the security agents. The first table seeks to know the view of security agents over the ICTs. The findings shows that they are strongly believed that with the help of ICTs. The crime and insecurity in Borno State was calculated totally. Though some security agents disbelieved when it was calculated and tested with chi-square their views shows that they did not believe that ICTs can be used to Fight Crime and Insecurity in Borno State. Other analysed and tested data were on the relevance of ICTs and the challenges hampering the effective use of ICTs in Fighting Crime and Insecurity in Borno State their responses were yes and few said No.

To this effect, majority of them (security agents) were not satisfied that they did not have some of the sophisticated ICTs gadgets in their offices due to lack of finance and some did not have the knowledge the of ICTs. Therefore, this analysis provided facts and solutions that will be used to overcome the challenges and to enhance the use of ICTs in every security

Agencies to fight crimes and insecurity in Nigeria as a whole and also it will create a well positive impact.

Conclusion

Conclusion of this study is quite encouraging because most of the security agencies are aware of ICTs and they also strongly believed that with the use of Information Communication Technologies crime and insecurity will be minimized in Maiduguri metropolis. However, this work took a conceptual, contextual and philosophical look at the subject "Information and Communication Technology in Fighting Crime and Insecurity. If ICTs revolution can be utilized effectively, it will serve as an effective communication tool needed in Fighting Crime and Insecurity in a growing Nation like Nigeria which has been overtaken by incessant bomb blasts at our Churches, police military cantonment, private and public institutions. The presence of circuit cable television, digital Computer, Telegraph, internet and GSM phones if utilized effectively by security agencies in Maiduguri metropolis can help to reduce crime and insecurity to the barest minimum. This is because ICTs can breach the communication gap between the security agents and the publics, since it can store, process, retrieve and disseminate information.

Recommendations

The outcome of this research has prompted the researcher to make some recommendations that would aid further study and research on the area or related area to this work. Among these recommendations were those stated as follows: Further research on the role of ICTs in Fighting Crime and Insecurity in Maiduguri metropolis should be carried out in a comparative form between all the federation security agencies in Nigeria. This will bring a critical and concrete comparism and analysis if they are aware of ICTs relevance in Fighting Crime and Insecurity. By so doing it will also reveal concrete reasons, why ICTs should be used in security offices.

Secondly, since it was discovered that the role of ICTs are very relevant in Fighting Crime and Insecurity in Maiduguri metropolis, further research should focus on how to draw the attention of both state government and federal government to make provision for sophisticated ICTs gadgets such as circuit cable which can be mounted at every strategy corner of the state, it will go a long way to monitor and spot the activities of hoodlums, criminals and other hiding activities that may pose threats to human insecurity in the state. And also the GSM phone Sims card registration has become one of the vital tools of ICTs. The security agents should open assessable public phone number for immediate contact where there is problem of security threat.

Finally, it was also suggested that government should enroll all the security officials whether military, Police, State Security Servants, Federal Road Safety Corps members into ICTs training, orientation and regulation. The recruitment and appointment of any security agent should be based on ICTs literacy. It was believed that these recommendations if enforced will bring a lasting solution to the role of ICTs in Fighting Crime and Insecurity in Nigeria not only in Maiduguri metropolis.

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THE STEVE ORONSAYE'S REPORT AND THE VIABILITY OF EFFECTIVE PUBLIC SERVICE REFORM IN NIGERIA

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Abstract

Public service plays crucial roles in the operation of government across the globe from policies formulation to implementation. This makes it a pivotal part of governance. However, public service in Nigeria over the years have been bedeviled with rocky development which have affected the efficient and effective service delivery to the public. These necessitated efforts of governments to reform the service since 1960. The paper examined the effects of Steve Oronsaye reform committee's report on public service in Nigeria. Qualitative method was used and Klador-Hicks efficiency theory adopted as it theoretical framework. Mr. Steve Oransanye's report happened to be a landmark in the Nigerian public service but it was discovered that the report and the government White Paper recommendations are yet to be implemented due to lack of political will on the part of government, and the economic cum security implications on the country if implemented without putting necessary measures in place. As a way forward, the paper recommended a strong political will from the three arms of government to actualise the implementation of the report and needed palliative be made available for workers who will be affected by restructuring and rationalisation of the public service as recommended by the Oransaye reform committee.

Keywords: *ministries, Nigeria, parastatal, public service, reform*

Background to the Study

More than ever, the public service is seen as an essential tool of contemporary administration world over. It is the apparatus the government uses to carry out its plans, policies, and programmes (Ijere & Ukwanda, 2020). Organisation (public or private) comes into existence to realise certain objectives and essentially undertakes some core activities toward the discharge of its mandate. To achieve better results, organisations embark on reforms from time to time. In developing countries such as Nigeria with an urgent and pressing need to bring about accelerated socio-economic development, public service reforms have become imperative as public administration is only effective to the extent that it can respond swiftly and efficiently to the ever-changing demands from its environment (Partnership to Engage Reform and Learn, PERL, 2020). Public service reforms have primarily been driven by the quest to strengthen or enhance the capacity of public administration to achieve better service delivery.

To live a decent and productive life, one must have access to basic necessities including food, shelter, education, power and energy, health, and water supplies, but most importantly, peace and security (Obiorah & Nwekeaku, 2019). These are majorly provided for by government in the developing countries such as Nigeria through public service delivery from Ministries, Departments and Agencies/Parastatal (MDAs) established by government at cheaper rates. The Nigerian public service has had a rocky history of development, which is one thing that has not changed since independence in 1960. Successive government, therefore, have embarked on different public service reforms to ensure efficient and effective service delivery to the citizens. Some of which are Morgan Commission (1963), Elwood Grading Team (1966), Adebo Salaries and Wages Review Commision (1970), Udoji Commission (1972), Dotun Philips Commission (1988), Ayida Review Panel (1994), Servicom (2006), Pension Refrom (2008), Steve Oronsaye Reform Committee (2012) and Mallam Adamu Fika's Commission (2014) (Olaopa, 2009; Abiodun, 2014; Ake, 2015; Ene, 2022). The focus of this paper however, will be on the report of the Steve Oronsanye Reform Committee and its practicability for effective public service in Nigeria.

Conceptual Framework

Public Service

Public service has not been given to a definite definition as scholars in their different understanding have tried to give meaning to the concept. An underlining agreement is that public service are carried by government agencies who are required to provide necessary needs to the citizens in a given state. Onuoha (1993), puts Public Service as the employees of government who are responsible for the functioning of government through the implementation of government policies. To Adebayo (1981), Public service constitute the permanent officials of the various government departments that are responsible for the execution of government policies and programmes. It belongs to the executive arm of government. In the words of Oladejo and Oni (2016), Public service refers to government agencies which are the operational arm of government that includes ministries, departments, and agencies.

Olugbemi (1987) sees the public service as "the mill through which those acquired and vastly expanded responsibilities of the country's government(s) are processed" (Olugbemi, 1987 as cited in Omitola, 2012, p.23). From these definitions, it can be deduced that public service comprises both the civil service (ministries) and other agencies/parastatal (Public Corporations and departments) which include the Nigerian Railways Corporation (NPC), Central Bank of Nigeria (CBN), National Drug Law Enforcement Agency (NDLEA), Nigerian National Petroleum Corporation (NNPC), Universities, Polytechnics, Colleges of Education, the Armed Forces, Police and other para-military establishments such as the Correctional Services and Customs Services, the Federal Road Safety Commission (FRSC) and the Nigerian Immigration Service(NIS) among others.

The public service of any country, including Nigeria performs certain crucial functions. It provides a number of social services to the citizens of a country. Such services include transportation, communications, supply of water, roads, education, health, housing, power, public enterprises and other public utilities in the interests, of socio-economic justice (Obiorah & Nwekeaku, 2019). It also formulates and implements laws and policies of government. It equally undertake research for the purpose of collating data required for effective planning, advising political heads of government ministries, departments and agencies (MDAs) on policy ideas and alternatives, actively participate in the budgetary process, quasi-judicial functions such as administrative inquiries, public complaint commission (ombudsman), quasi-legislative function such as draft legislative bills, and set rules of conduct and stabilising the society by ensuring continuity in governance even when political regimes changes from time to time (Oladejo & Oni, 2016). MDAs in the public service are expected to meet the needs of the citizens promptly and adequately through efficient procedures (Oronsaye, 2010). This implies that the interaction between government and citizens are such that the needs of the citizens are met in a timely manner, thereby making the citizens key in public service delivery. The implication here is that as the private sector considers its customer as 'king', thereby ensuring quality service delivery, the public should be regarded as the 'master' and beneficiary of enhanced performance of the public service (Aladegbola & Jaiyeola, 2016).

Public Service Reform

The word reform originated from a Latin word "*reformo*" which means the improvement or amendment of what is wrong, corrupt,or unsatisfactory. Reform according to the Oxford Advanced Learner's Dictionary (seventh edition) simply means to make changes in (something, especially an institution or practice) in order to improve it. Thus, Public service reform is refers to the administrative transformation of the public sector. It is concerned with taking action on administrative problems in the public service through institutional or administrative reforms. Public service reforms are aimed at improving the efficiency and productivity of the public service (Shafritz, Russell & Borick 2009).

Ovwasa (2004) defined public service reform as the artificial inducement of administrative; transformation against resistance. He further elaborated "that it is artificial because it is man-made and deliberately planned" (Ovwasa, 2004, p. 60). This means that 'it is not natural, accidental, or automatic'. This is so because 'it is induced and it involves persuasion, argument'. Although it is not always universally accepted as the obvious or true course, it is an irreversible process and is undertaken in the belief that the end result will be better than the status quo and therefore will be worth the effort to overcome resistance (Caiden, 1970; Ovwasa, 2004). It therefore implies that public service reforms involve not only administrative change, but also invariably organisational resistance. Quah (1981) postulated that public service reform is a deliberate attempt to change both the structure and procedure of public bureaucracy (that is the re-organisation of the institutional aspects). It also encompasses 'the attitude and behaviour of the public administrators involved (i.e. the attitudinal aspects) in order to promote organisational effectiveness for national development' (Shafritz, Russell & Borick, 2009, p.32).

Mosher (1965) opined that public service reform has four major objectives, these are; change in operation policies and programmes, improve administrative effectiveness. Others include improve personnel, particularly their performance, qualification, job satisfaction, and welfare; and respond to or anticipate criticism or threats from the environment' (Mosher 1965, p.15). Three main features of public service reforms, namely re-calibration of the role of the state, modernisation of public management to improve performance, and improving service delivery were explained by Adamolekun and Kiragu (2005). In all, public service reforms were meant to bring about positive changes in the structure and operation of government owned institutions- ministries, departments and agencies. However, the case of Nigeria remain peculiar as different reforms in the past are yet to bring about needed expectation of the citizens. The submission of the former head of the Nigerian civil service, Mr Stephen Oronsaye attested to this when he describe the public service in Nigeria as bridge between the government and the governed, stressing that an inefficient public service, therefore, constitutes a barrier between the government and the people (Obiorah & Nwekeaku, 2019)

Theoretical Framework

Different theories have been applied to discourse on public service, however, this paper is anchored on Kaldor-Hick efficiency theory (1967), also known as the improvement theory. This is an economic based theory that deals with the re-allocation of the resources in order to ensure improvement and efficient service delivery to the people. The theory came as a result of the gap left by Paereto optimality theory on the improvement.

The basic assumption of Kaldor-Hick efficiency theory is that changes usually makes some people better off and others worse off, but, those who are better off are more than those who are worse off with compensation for the latter. This is in-line with the argument of Nicollo Machiavelli where he opined that the end will justify the means. If the Prince meant well for the society, the means of attaining the position will be appreciated at the end. A major criticism of Kaldor-Hicks efficiency theory is that it is unclear the yardstick to be used to measure the capacity to compensate the losers in the re-allocation of resources, or have moral or political significance as some decision criteria, if the compensation is not actually paid. Again, motivation makes for efficiency than only reforming, this criticism came from the motivation theory of Maslow (1954). Public service will tend to perform better if workers are motivated by the government (Ake. 2015).

The criticisms notwithstanding, Klador-Hicks efficiency theory captured the essence of actualizing an efficient and effective service delivery in government owned MDAs through different restructuring which forms the rationale for reforms in the service. No doubt, a lot are still needed to be done on the part of government to balance the differences in the gap that will exist between the retrenched workers and those that will retained if Oronsanye Committee's report will be successfully implemented in the Nigerian public service.

Historical overview of Nigerian Public Service

Historically, Nigerian public service origin can be traced to the colonial era and the development of capitalism in the country in the 19th century. Though, prior to the advent of colonialism, various ethnic groups that make up today's Nigeria, lived in clans and empires (Ogunrotifa, 2012). With their peculiar ways of administering themselves from the north to the southern part of the country. The development of capitalism that came as a result of industrial revolution in Europe imposed national limitations to its economic expansion later resorted to the search quest for new colonies for trade and investment, cheap source of raw material and mineral resources to feed its ever-increasing industries, as a way of strengthening it political and economic domination at home and oversea (Ozigi & Ocho 1981; Ogunrotifa, 2012).

Through the use of force, the British colonial power brought different ethnic communities and empires together under Lagos colony in 1861 before establishing direct rule, followed by the creation of public service in 1862 with the specific objectives- the survival of capitalism in colonial Nigeria, and the stability of colonial capitalist state structure (Ogundiya, 2007; Ogunrotifa. 2012; Ijere & Ukwandu, 2020). Hence, different hierarchical positions of Governor, Chief Magistrate, Colonial Secretary and Senior Military Officers, Offices of Private Secretary to the Governor, Auditor for Public Accounts, Chief Clerk, and Collector of Customs were established (El-rufai, 2011). These public bureaucracies were established as the essential ingredient, live-wire, and sine-quo-non for the consolidation of pre-colonial state structure in Nigeria. Between 1900 and 1914, different mergers were made by the British colonial power which culminated in the amalgamation of the Northern and Southern protectorates into the Nigeria protectorate with the respective services merged in 1914 and placed a centralised administration, with regional structure of public service in the country (Ogunrotifa, 2012). Lord Lugard specifically carried out this action with the hope that amalgamation of the two protectorates into a single entity would help to ameliorate the problem of surplus spending and make effective colonial administration easier (Barkan & Gboyega, 2001).

The commencement of different bureaucracies by the colonial power, for instance, the construction of railway from the Kano to Lagos, and the shortage of British personnel in Nigeria, made the colonial masters to think of using local/indigenous manpower. Thus, the training of the locals for the work at hand, introduction of western education in the southern region and full feudalization allowed in the north. Western education was restricted to the south because the colonial masters did not want to offend the northern emirs because of the germane roles of the later in the colonial rule. The real structure of the service as we now know it was put in place by Sir Hugh Clifford who succeeded Lord Lugard and was appointed Governor of Nigeria. He established a Central Secretariat in Lagos in

1921. In 1939 similar Secretariats were established in three provinces and were administered from Ibadan, Enugu and Kaduna (Ballad, 1971; Okeke, 2017).

From 1940 several colonial policies were made to continue the activities of public service in Nigeria with the inclusions of Nigerians in the administration of their country. This culminated in the Nigerianization of the public service at the inception of full-fledged federalism by sir Oliver Lyletton's constitution of in1954. No doubt, the Nigerian public service originated from the colonial era which was tailored after the British bureaucracies, however, the General Order, administrative structures and other rules for public service functioning introduced and bequeathed to Nigeria were alien to the peculiarity of the country and the people owing to our historical background. This, the British colonial masters saw before 1960 and brought about some major reforms before independence- Tudor-Davies commission in 1945, Hugh Foot commission in 1948, Gorsuch commission in 1954, Lidbury commission in 1954 and Mbanefo commision in 1959 (Onyekwena, 2022).

Post-Independence Public Service Reforms in Nigeria

Since political independence in 1960, different governments from the civilian to the military have made frantic efforts to ensure better performance of the public service. Several reforms committees or commissions have been instituted as it will be shown in table 1 below. Though, some of the recommendations of these committees or commissions are yet to be fully implemented by government. This is the case of the Stephen Oronsanye's commission set-up by the administration of President Goodluck Jonathan on 18th April, 2011.

Table 1:Public service/Civil service Reform Commissions/Committees before 1999 in Nigeria

S/n	Commission/Committe	Date	Regime	Objective(s)	Recommendations
1.	Morgan Commission	1963	Tafawa Balewa/Nnamdi Azikiwe	to review the wages and salaries conditions of junior employyes in public and private sector.	A minimum wage in the country on a geographical basis.
2.	Elwood Grading Team	1966	Aguiyi Ironsi	determining appropriate grading and how to achieve universality in the salaries of employees who perform similar functions.	Job evaluation and other scientific methods be used to grade all positions in the public service. This should be performed before remunerations are apportioned to positions and functions
3.	Adebo Salaries and Wages Review Commission	1970	Yakubu Gowon	to review existing wages and salaries at all levels in the public service.	abolition of the daily paid worker system. It also recommended the use of scientific methods to analyse jobs and fix salaries

4.	Udoji Commission	1972	Yakubu Gowon	examining the organisation, structure and management of the public services	Salary increases to all categories of workers backdated and paid in arrears. The adoption and use of modern management techniques such as Management by Objectives; Programme, Performance, Budgeting System; and Project Management. Introduction of a Unified Grading Salary Structure from levels 01 to 17. The abolition of dual hierarchies in ministries and replacing them with a unified and integrated structure. Emphasise merit as a yardstick for the promotion of officers in the public service. Open reporting system for the performance appraisal of employees. Incorporation of a code of ethics in the oath for the public offices for discipline and guidance.
5.	Dotun Philips Committee	1988	Ibrahim Babangida	to make the service result orientated and efficient	Merging of administrative and political leadership by making the minister both the chief executive and accounting officer of the ministry Abrogation of the post of permanent secretary and replacing it with the political post of director-general, Professionalisation of the service, Promotion to be based on merit as defined by performance. The federal character and seniority were therefore de-emphasised as criteria for promotion'. The criteria for promotion were changed as follows: Annual performance: 50%; interview: 30%; additional qualification/examination: 15%; and seniority: 5%
6.	Longe Commission	1991	Ibrahim Babangida	To see to the civil service problems such as funding, salaries and condition of service.	General salaries increase by 30%

7.	Ayida Review Panel	1994	Sani Abacha	To look into the recommendations of 1988 committee.	Ministries and extra-ministerial departments should be structured according to their objectives, functions, and sizes and not according to a uniform pattern as prescribed by the 1988 reforms. The pool system was restored for personnel in professional and sub-professional cadres that commonly exist in the ministries/extra-ministerial departments.

Source: Onyekwena (2022); Ijere & Ukwandu (2020); Udoji Commission (1974, p. 170)

At the inception of fourth republic in 1999, President Olusegun Obasanjo's administration haven inherited a problematic public service, made crucial administrative reforms to savage the situation. Part of these reforms was seen in the implementation of National Economic Empowerment and Development Strategy (NEEDs) (Public Service Review Commission, 2004; Ijere & Ukwandu, 2020). To change the way government carried out its works was the major objective of the public service reforms in this regime, this is to ensure efficient and effective service delivery to the public. Monetisation of fringe benefits, pension reform, pay reform and SERVICOM were the major areas of reforms done by the administration (Ake, 2015; Ogunrotifa, 2012).

In 2007, a change in government brought President Umaru Yar'Adua into power. A national strategy for public service reforms was adopted to improve the performance of the public service. These reforms were in-line with the regime's seven-point agenda along with the attainment of Vision 20:20:20 goal set (Ijere & Ukwandu, 2020). At the demise of President Yar'Adua in 2010, his vice, Dr. Goodluck Jonathan assumed office as the substantial president of the country. In 2011, Jonathan's administration set-up another reform committee headed by the former head of service, Mr. Stephen Oronsaye. The reports of this committee is the focus of this paper, how viable is it to the public service reform and efficiency in Nigeria.

The Steve Oronsaye's Public Service Reform Committee: Report, Issues and Prospects

In a bid to reposition the Nigerian public service for better performances, the administration of President Jonathan instituted a Presidential Committee on Restructuring and Rationalisation of Federal Government Parastatal, Commissions and Agencies, under the Chairmanship of Mr. Steve Oronsaye in 2011 (Ujah, 2020). The six (6) man committee had aside from the chairman, Japh CT Nwosu; Rabiu D. Abubakar; Salman Mann; Hamza A. Tahir; Adetunji Adesunkanmi as members; and Umar Mohammed as secretary. The major objective of the committee was to examine ways of reducing the cost of running the government by minimizing duplication among several MDAs (Olaopa, 2020; Ujah, 2020).

A year later, the committee submitted a far-reaching report on the way forward for the Nigerian public service. An 800-page report was submitted to the president with a major shake on the MDAs mentioned. The summary of the reports as related to the restructuring of federal government MDAs are shown in table 2 below:

Table 2: Salient restructuring and rationalisation recommended by Oronsaye's Committee

S/N	Recommendations for restructuring
1.	541 Federal government parastals, commissions and agencies (Statutory and non-statutory) exist.
2.	263 of the statutory agencies should be reduced to 161.
3.	38 agencies should be scrapped.
4.	52 agencies should be merged.
5.	14 agencies should be returned to departments in federal ministries.

Source: Olaopa (2020).

Cost-cutting on the part of the government was one of the germane take-home from the report. It is important to note that the recommendations of the Oronsaye Committee are unique to Africa in terms of their desire to restructure the public sector (PERL, 2020), however, the report from the White Paper Drafting Committee set-up by federal government and led by Mr. Mohammed Bello Adoke, SAN in 2014, accepted only very few of the recommendations from Oronsaye's committee, with a larger number rejected. Different issues surround the acceptance and rejection of some of these recommendations. Salient among which are further discussed.

First, the White Paper report was released a year before the 2015 general election; A report that would become a burden for the government of the day's aim for electoral victory would be pure political suicide for it to implement with 2014 being just a year away from an election year. No administration, regardless of its noble intentions, can carry out such excellent intentions without the support of a strong power base (Olaopa, 2020). If ever the Jonathan administration was to return to the Oronsaye Report's implementation, it would also need to have won the 2015 general election, but, he lost the election.

Second, the issue of legislation that established most of the federal government agencies and parastals that were recommended for scrapping. This serves as a key impediment to the implementation of report, as the enabling laws had to be repealed before they cease to exist. Such procedures might be time-consuming in a democracy, especially in light of the reluctance of the agencies' Chief Executive Officers and executive teams to step down. Thus, high-level lobbying of the law-makers was employed by the agencies' managers to truncate the implementation of the report such that when the government White paper of the Oronsaye report was released, most of the recommendations for scrapping and mergers were rejected. The Fiscal Responsibility Commission (FRC) as well as the salaries and wages income commission were part of the agencies to be abolished as the Revenue Mobilization Allocation and Fiscal Commission (RMAFC) performs similar duties (PERL, 2020; Ujah, 2020).

Besides, the lobbying from agencies' managers, the parliamentarians has long exhibited a predisposition towards expanding the public bureaucracy. 213 of the 311 legislation that were introduced in the 8th Senate (from 2015 to 2019) dealt with establishment of federal agencies (PERL, 2020). The duplication of existing institutional mandates was the second most frequent reason that the President vetoed 53 bills from the National Assembly between 2017 and 2019. This was also the trend in the 9th National Assembly where out of 195 bills introduced by the 9th Senate as at December 2021, 96 are establishment bills (PERL, 2020; Ujah, 2020).

Furthermore, in the face of economy hardship that is prevalent in the country, a responsible government will be reluctant to downsizing or rationalizing her work force as this will aggravate security and safety issues in country as a result of increase unemployment. An instance was the tragic civil service purge of 1975, where government laid-off workers without proper post-retirement package for them (Umaru, 2020). The foregoing issues notwithstanding, all hope is not lost, as the Oronsaye's report and the government White Paper recommendations were recently revisited by the administration of President Buhari, as he alluded to the fact that implementation of the report will lead to fundamental changes in the civil service (Ujah, 2020). A newspaper report has it that:

> *Prospects that the reform of the Nigerian public service towards the long-expected reduction in size and cost of governance may commence with the 2023 budget, came to the fore last week when the Chairman of the Senate Committee on Finance, Solomon Olamilekan Adeola, mooted the eventuality at a meeting with MDAs in the course of the review of the 2023 - 2025 Medium Term Economic Framework (METF) (DailyTrust, 22/09/2022).*

Implementation of the reports by the Bola Tinubu administration will in no small measures put the Nigerian public service in a better position to deliver efficiently and effectively as seen in developed bureaucracies around the world.

Conclusion and Recommendation

Going by the germane role played by the public service in Nigeria's national life, attempts to improve governance have appropriately focused on reform of this bureaucracy. The Nigerian public service has undergone series of reforms since its creation by the British colonial power in 1862. The Steve Oronsaye's reform committee has given a crucial way forward for efficient and effective performance of the public service and at the same time cut-cost and wastage on the part of government. However, government White Paper recommendations that emanated from Oronsaye committee's report has not been implemented due to salient issues surrounding the implementations. In light of a brighter future for Nigerian public service, this paper recommends as follows:

First, political will on the part of the government to implement the recommendations will go along way in placing the country's public service in better position for optimal service delivery to the public. This will be achievable if the three arms government deliberately wish to make it happen. Second, post-retirement packages couple with enabling terrain for workers whose services will not be needed as a result of the implentation of Steve Oronsaye reform committee's recommendations should be given piority by government as this will forestall a repeat of the 1975 purge and also, send positive signals to those who will be left behind for efficient and effective performance in the country's public service.

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INDUCED SPATIAL VARIABILITY AND TEMPORAL DYNAMICS OF FLOOD VULNERABILITY IN THE BENUE TROUGH, NIGERIA

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Abstract

Flood vulnerability is a critical concern in regions susceptible to inundation, and the Benue Trough in Nigeria is no exception. This study investigates the spatial variability and temporal dynamics of flood vulnerability in the Benue Trough, shedding light on the multifaceted factors that contribute to the region's susceptibility to flooding. The research employs a comprehensive integrated geospatial analysis to assess the complex interplay of physical and human factors influencing flood vulnerability. Remote sensing data and geographic information systems (GIS) techniques are utilized to map the spatial distribution of vulnerable areas, identifying hotspots prone to recurrent flooding. Temporal dynamics of flood vulnerability are explored through the analysis of historical flood events, considering changes in land use, climate patterns, and river discharge over time. This temporal perspective enhances our understanding of the evolving nature of flood vulnerability and aids in the development of effective mitigation and adaptation strategies. The result of the analysis shows that an alarming 45.64% and 13.18% of the trough have high and very high vulnerability to flood respectively accounting for 58.82 % vulnerability. This reveal spatially varying patterns of vulnerability, with certain regions exhibiting higher susceptibility due to a combination of land use practices, topography, and proximity to water bodies. The temporal analysis uncovers trends in increasing vulnerability associated with urbanization, climate change, and alterations in hydrological regimes. The findings of this study have practical implications for policymakers, urban planners, and disaster management authorities in developing targeted interventions to reduce flood vulnerability in the Benue Trough. The integration of spatial and temporal dynamics provides a robust foundation for the implementation of sustainable and context-specific strategies to enhance the resilience of communities in the face of recurrent flooding events.

Keywords: *Flood vulnerability, Spatial Variability, Temporal dynamics, Benue Trough*.

Background to the Study

In the global panorama of climate change consequences, the nuanced interplay between extreme weather events and vulnerable regions has become increasingly apparent. Among these vulnerable locales, the Benue trough in Nigeria stands out, grappling with the intricate dynamics of spatial variability and temporal shifts, rendering its communities prone to recurrent flooding. As the frequency of extreme weather events rises globally, a deeper understanding of the specific factors influencing flood vulnerability in the Benue trough becomes imperative. The spatial vulnerability of the Benue trough to flooding is significantly shaped by land use changes. Urbanization and deforestation, as demonstrated by Smith, Jones and Davies (2019), alter the region's landscape, heightening susceptibility to inundation during intense rainfall events. As settlements expand and natural vegetation diminishes, hydrological dynamics undergo transformations, intensifying risks faced by its inhabitants. This global-to-local perspective underscores the broader impact of land use changes on the flood vulnerability of the Benue trough. Inhabitants of the Benue Trough face substantial vulnerability to climate-induced floods, driven by the region's high population density and predominantly agrarian economy. Crop losses and infrastructure damage are frequent consequences, further compounded by inadequate infrastructure, poor urban planning, and limited access to flood-resistant housing and early warning systems (Amah, Ajayi, and Okwu-Delunzu, 2017).

Delving deeper into temporal dynamics reveals another critical facet of flood vulnerability, particularly concerning seasonal variations. Johnson and Brown (2021) underscore the intricate relationship between precipitation patterns and river discharge fluctuations, unveiling the cyclical nature of flood risk in riverine areas. Recognizing the temporally evolving nature of these patterns is vital for developing targeted predictive models and implementing timely disaster preparedness measures. Thus, the transition from global climate change impacts to the specific temporal dimensions influencing flood vulnerability in the Benue trough becomes evident. Amidst these challenges, the looming spectre of climate change further heightens concerns. The projections of the Intergovernmental Panel on Climate Change (IPCC, 2014) underscore an impending increase in the frequency and intensity of extreme weather events, including floods. This global context amplifies the urgency of understanding the spatial and temporal nuances of flood vulnerability in regions like the Benue trough, where local vulnerabilities intersect with broader climate trends. This multi-dimensional perspective sets the stage for a detailed examination of how global climate change projections interact with the specific vulnerabilities of the Benue trough.

In response to these challenges, technological advancements in remote sensing and geospatial analysis offer a means to unravel the complexities of flood vulnerability. Studies utilizing these tools, as exemplified by Adeloye, Johnson and Smith (2020), contribute invaluable insights into mapping and monitoring changes in land use and hydrological patterns. From the broader context of global climate change down to the specific utilization of advanced technologies, the narrative transitions seamlessly to the tools that empower a more detailed understanding of the spatial dynamics of flood vulnerability in the Benue trough. Moreover, acknowledging the importance of community resilience and adaptive capacity further refines our exploration. Drawing on the work of Adger (2006), we recognize that beyond environmental factors, the socio-economic fabric of local communities plays a pivotal role in shaping vulnerability. Engaging with the perspectives of these communities becomes paramount, offering a specific lens through which to understand and address the unique challenges faced by inhabitants of the Benue trough.

The broad aim of this article is to provide an extensive examination of the intricate relationship between induced spatial variability and flood dynamics in the Benue Trough. It places a specific focus on the interplay of environmental factors, socio-economic vulnerabilities, and their implications for sustainable development. This analysis is essential for the development of effective adaptation and mitigation strategies to reduce the adverse impacts of floods in the region.

Objectives

I. To identify and analyse the specific environmental factors contributing to the intensification of flood dynamics in the Benue Trough.
ii. Develop a flood vulnerability ma of the study area.
iii. Determine the percentage contribution of climate and physiological factors in the area.
iv. To contribute to the broader body of knowledge on climate change adaptation, with a focus on flood-prone regions in developing countries.

Literature Review

Climate change, with its far-reaching environmental and societal consequences, has emerged as a dominant global challenge in recent years. In regions prone to climate-induced hazards, such as flooding, understanding the complexities of vulnerability and flood dynamics is paramount. This literature review provides an overview of key research findings and insights related to climate change, vulnerability, and floods, with a focus on the Benue Trough in Nigeria.

Climate Change and Flooding in Nigeria

Nigeria, as a nation, has experienced discernible changes in climate patterns over the past few decades. The Intergovernmental Panel on Climate Change (IPCC) has consistently reported these shifts, noting variations in temperature, rainfall, and extreme weather events (IPCC, 2014). The consequences of these changes, especially in relation to flooding, are observable across the country. In the Benue Trough region, these changes are reflected in increased rainfall and alterations in precipitation patterns, leading to intensified flood dynamics (Adedeji, Ojeh and Akintoye, 2018).

Environmental Factors in Flood Dynamics

The unique topography of the Benue Trough, characterized by a complex network of rivers and water bodies, plays a pivotal role in the dynamics of flooding. Heavy rainfall and climate-induced alterations in precipitation patterns have escalated water flow, causing riverbank breaches and floodplain inundations (Adedeji et al., 2018). Additionally, deforestation in the region due to agricultural expansion and urbanization further diminishes the natural capacity of the environment to absorb excess water, thereby exacerbating the flood risk (Adejuwon, Ogunjobi and Akinbobola, 2016).

Socio-Economic Vulnerabilities

Vulnerabilities stemming from climate-induced floods in the Benue Trough are intrinsically linked to socio-economic factors. High population density, predominantly agrarian livelihoods, and inadequate infrastructure make the local population particularly susceptible to the impacts of flooding. Crop losses, damage to infrastructure, and the absence of flood-resistant housing and early warning systems further amplify these vulnerabilities (Amah et al., 2017).

Implications for Sustainable Development

The implications of flood dynamics and vulnerabilities in the Benue Trough extend beyond immediate disaster response. Sustainable development in the region faces significant challenges, including disruptions in agriculture, damage to critical infrastructure, and the need for long-term resilience-building efforts. These impacts have the potential to impede progress in achieving sustainable development goals.

Knowledge Gaps

While existing literature highlights the broad issues related to climate change, vulnerability, and floods in the Benue Trough, there remains a need for an examination of the interplay between these factors. This research seeks to address the existing knowledge gaps by delving into the specifics of environmental changes, vulnerabilities, and their implications for sustainable development. By achieving this, the study aims to provide a robust foundation for the development of effective adaptation and mitigation strategies to combat the adverse impacts of climate change-induced floods in the region.

Study Area

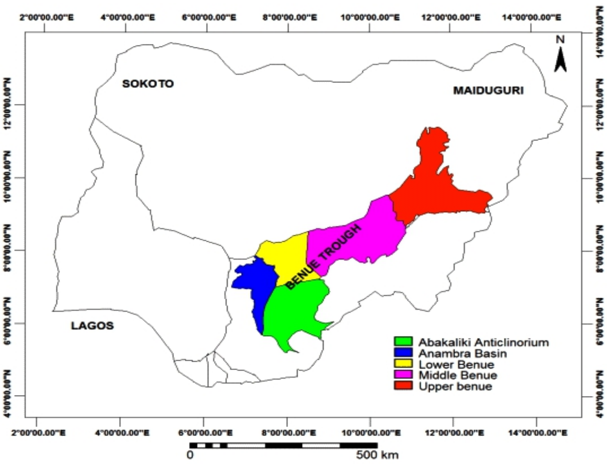
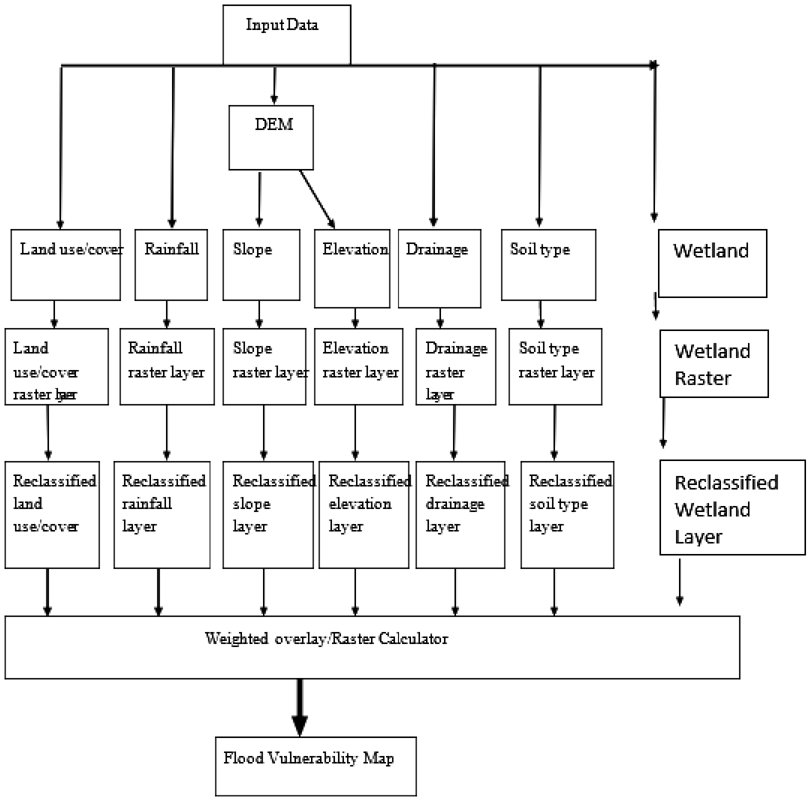


Figure 1: Map of Nigeria showing Benue Trough.

Data Collection and Methodology

Secondary data collected from books, journals, manuals, conference proceedings and streamflow and precipitation were used. The Digital Elevation Model (DEM) and other Parameters for flood vulnerability plotting were investigated with ArcGIS. Flood producing aspects such as drainage density, digital elevation model, land use/land cover, soil type, rainfall, and slope were also designed for flood vulnerability valuation with ArcGIS. The development of a map of flood plains was done by gridding rainfall/precipitation data between 1901 to 2022 from Climatic Research Unit (CRU) record and 30m by 30m high resolution of DEM of a watershed in raster format been collected from the USGS (United State Geological Agency) was used for this study.



Results of Flood Inducing Factors

Slope Factor

The slope of the study area resulted from a 10-meter contour interval characteristic rank which was derived from 30m-by-30m Digital Elevation Model. The characteristics were changed to a 3-D shapefile using create Tin Tools in ArcGIS. The slope characteristic rank was changed more to raster using the conversion tool into raster. The slope raster layers were further reclassified into five subgroups with regular grouping systems (Natural break) as shown in Figure 3(a). As presented in Figure 3(b), the re-categorized slopes have been given significance one to five through the upper value, five showing high effect in resulting very high inundation rate, while the lower value, one, indicating very low influence showing very low flood rate. Thus, an area with a very low slope was ranked as five, and an area with a very high slope was ranked as one. This categorization method segregates a variety of feature worth to the same sized sub-ranges which allow specifying the number of intervals.

Hazard Level	Rank Class	Area (sqkm)	%
Very High	5	127667.77	77.72
High	4	21871.24	13.31
Moderate	3	8567.63	5.22
Low	2	1814.95	1.10
Very Low	1	4352.65	2.65

The smaller slope value was flatter topography and, likewise, the upper slope values were the steeper topography. Depending on their vulnerability to inundating, slopes were characterized into five ranks. According to these classifications, areas with the smallest slope are ranked to class five (2.65%) and are not likely to be affected by the flood. Similarly, a high vulnerability ranked to class five (77.72%), and are extremely likely to be affected by flood. The break values were checked depending on the local information, expert knowledge, as well as the achievable comprehensions for slope hazard map.

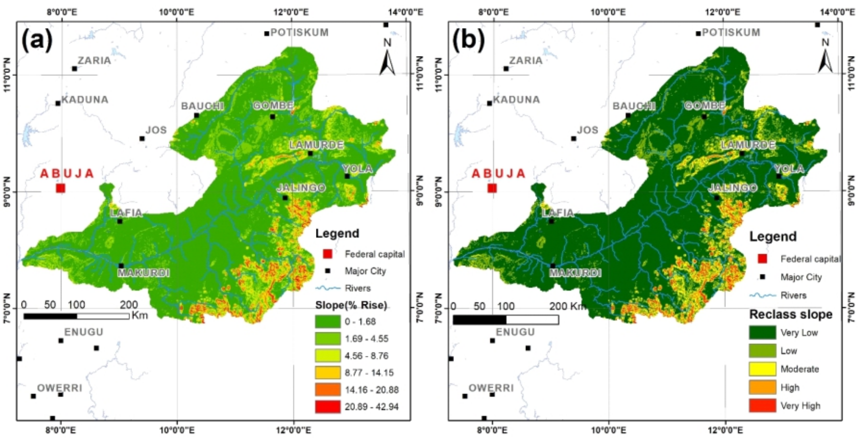


Figure 3: (a) Slope distribution and (b) Reclassified level of hazard slope of the study area

Elevation Factor

DEMs were changed to elevation raster layers with the ArcGIS conversion tool. The elevation raster layers were then re-categorized into five subgroups using a normal classification system (Natural break). Thus, the categorization method split a variety of feature values into the sub-ranges, allowing them to identify numeral intervals. The latest value was re-categorized to flood vulnerability rating/rank. Hence, the categorization procedure to the smallest elevation was extremely affected by the flood. Thus, class five upper elevations have been affected by the flood more than class one as shown in Figure 4(b).

Hazard Level	Rank Class	Elevation Ranges	Area (sqkm)	%
Very High	5	33 - 236m	81584.13	49.01
High	4	236 - 408m	44439.28	26.70
Moderate	3	408 - 629m	30675.93	18.43
Low	2	629 - 1,023m	8118.35	4.88
Very Low	1	1,023 - 1,837m	1645.42	0.99

The lesser elevation worth mentioning was the flatter topography and the upper elevation was the steeper topography. Depending on their vulnerability to flooding, it has been categorized into five classes (Figure 4(b)). An area at the lowest elevation was extremely affected with flood ranked to class five (<236m). Subsequent high vulnerability is ranked to class four (237–408 m), moderate ranked to class three (408–629 m), low ranked to class two (629–1,023 m) and very low ranked to class one (>1,023m).

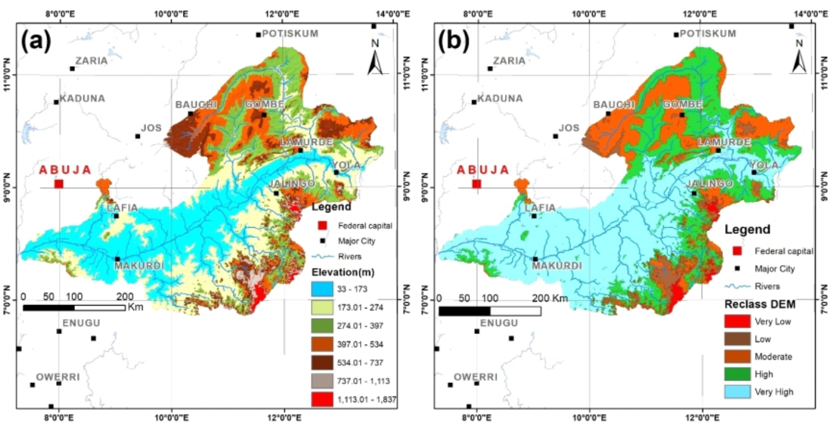


Figure 4: (a) DEM Layer and (b) Reclassified Elevation/DEM Hazard

Rainfall Factor

This was a point from the data collected 50m grided spatial layer. From this data, annual average rainfall was calculated for each station using Inverse Distance Weight (IDW) method and was converted to the raster layer which is ultimately re-categorized into five ranks using Natural break. The re-categorized precipitations were provided with one to five through the upper value, five indicating high influence in ensuing extremely high flood rate, whereas the smallest value, one, viewing incredibly low impact extremely low flood rate. As a result, an area with very high rainfall is ranked to class five and an area with very low rainfall is ranked to class one as shown in Figure 5.

Hazard Level	Rainfall Ranges/year	Rank Class	Area (sqkm)	%
Very Low	54.81 - 77.42 mm	1	27522.01	16.64
Low	77.43 - 100mm	2	61513.49	37.19
Moderate	100.01 - 122.63mm	3	45070.51	27.25
High	122.64 - 145.43mm	4	21714.55	13.13
Very High	145.44 - 167.84mm	5	9603.25	5.81

During the categorization system (as presented in Figure 5), the higher rainfall value, is extremely affected with extreme exposure to overflow and was categorized as class five (>145.44 mm/year), high ranked to class four (122.64–145.43 mm/year), moderate ranked to class three (100.01–122.63 mm/year), low ranked to class two (77.43–100 mm/ year) and very low ranked to class one (<77.42 mm/year).

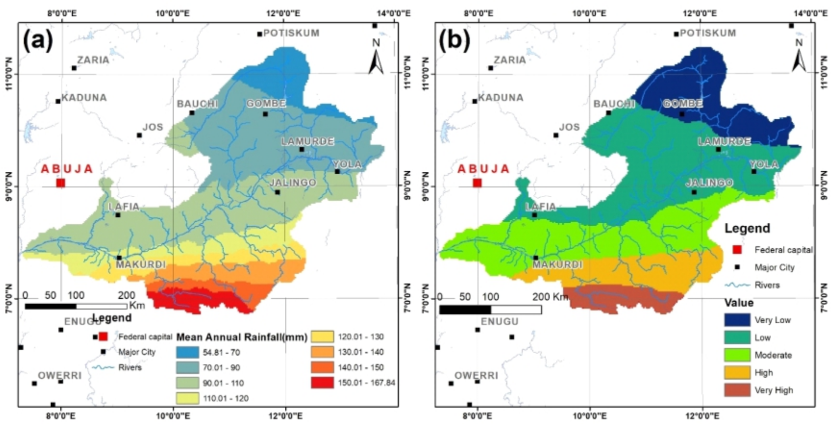


Figure 5: (a) Mean annual rainfall Map and (b) Rainfall Hazard Map

Landuse/Landcover Factor

Land use/Land cover of the watershed area was reassigned with classified land use/land cover form in five common grades and was improved into the raster layer. Further, the land use/land cover type was re-categorized into five classes, depending on their capacity to raise or reduce the rate of inundating. Hence, water landuse type can increase flood degree in the area and it is ranked to class five, bare land is ranked to class four, rangeland is ranked to the class three, cropland is ranked to class two and trees is very low capability to create flood and is ranked to class one, as presented in Figures 6 below:

LULC Hazard	Rank Class	Area (sqkm)	%
Very Low	1	1971.37	1.18
Low	2	18036.10	10.84
Moderate	3	118629.60	71.27
High	4	26574.47	15.97
Very High	5	1240.73	0.75

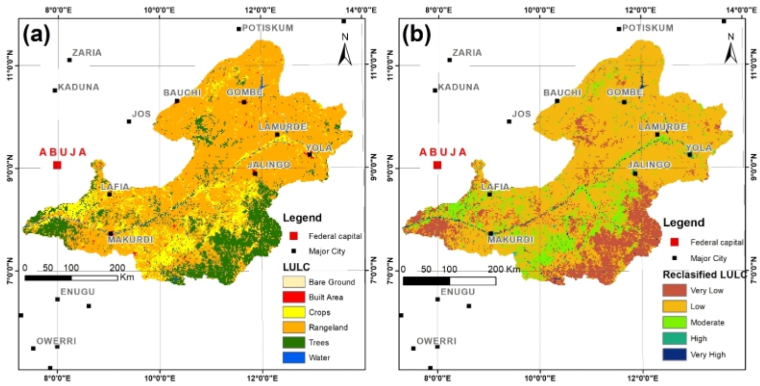


Figure 6: (a) Landuse/Landcover and (b) Reclassified Landuse/Landcover

Soil Factor

There are a variety of soil types, among these fifteen (15) major soils classification is recognized depending on the hydrologic soil grouping scheme of FAO (Food and Agricultural Organisation). These are Acrisols, Arenosols, Cambisols, Ferralsols, Fluvisols, Gleysols, Leptosols, Lixisols, Luvisols, Nitisols, Phaeozems, Plinthosols, Regosols, Technosols and Vertisols. Consequently, factors of the watershed were derived as of the FAO measure categorization of Ethiopian soil. The characteristic of every soil class is examined depending on the hydrologic soil grouping scheme. Hence, it is classified into five mutual clusters and was renewed into a raster format. Further, raster layer classes were re-categorized into five classes, and a new value change was made based on their flood danger rating. The class that has extremely high capability to produce incredibly high flood rate were rank with class five and incredibly low capacity to produce flood rate were ranked to class one.

Hazard Level	Rank Class	Area (sqkm)	%
Very Low	1	12214.93	7.34
Low	2	9033.39	5.43
Moderate	3	88459.21	**53.13**
High	4	40500.43	24.32
Very High	5	16292.44	9.79

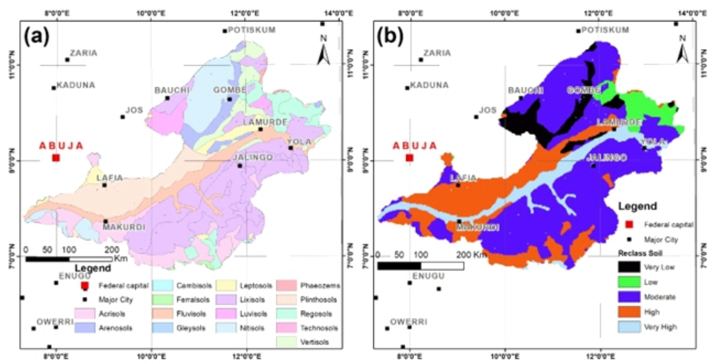


Figure 7: (a) Soil map and (b) Reclassified Soil Map

Wetland Factor

Wetland Hazard Level	Rank Class	Area (sqkm)	%
Very Low	1	162107.20	97.33
Low	2	2.83	0.00
Moderate	3	375.68	0.23
High	4	3523.83	2.12
Very High	5	547.41	0.33

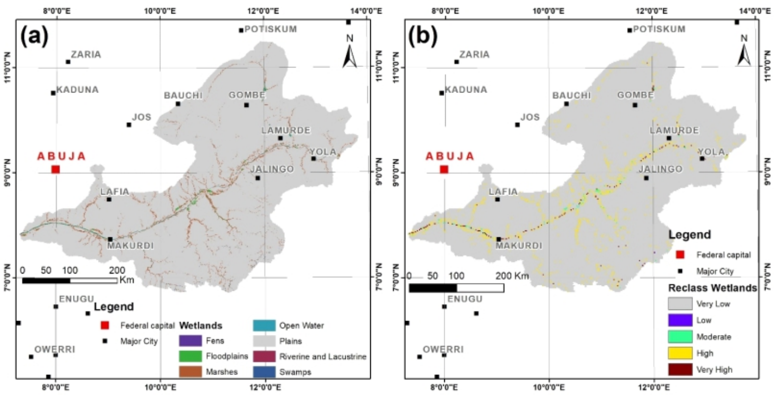


Figure 8: (a) Wetland of Map and (b) Reclass Wetland

Drainage Factor

The drainage density was the whole length of all the streams and rivers in drainage divided by the whole area of the drainage. Drainage of the study areas was derived from digitized river systems of the Fetam watershed and more rectified within the GIS setting, presented in Figure 9. Moreover, the spatial analyst extension line density modules were accustomed to calculate the drainage density of the study area. Line density computes the amount per unit area from polyline characteristic to descend inside a radius around each cell.

Drainage Hazard	Rank class	Density km/km^2	area_sqkm	%
Very Low	1	>14.51	80791.84	48.51
Low	2	10.88–14.5	57588.11	34.58
Moderate	3	7.26–10.87	24889.35	14.94
High	4	3.63–7.25	2989.37	1.79
Very High	5	<3.62	288.58	0.17

The Fetam watershed was used to estimate the drainage density with the spatial analyst extension. According to the classification method shown in Figure 9(b) and table above, an area with the higher value is very highly affected by flood and ranked to class five (>14.51 km/km^2), high ranked to class four (10.88–14.5 km/km^2), moderate ranked to class three (7.26–10.87 km/km^2), low ranked to class two (3.63–7.25 km/ km^2) and very low ranked to class one (<3.62 km/km^2).

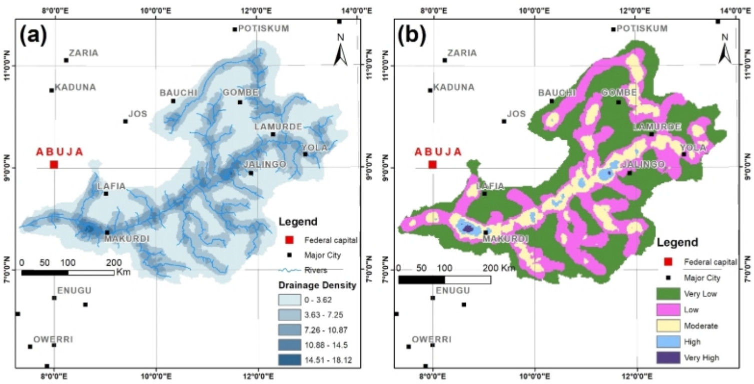


Figure 9: (a) Drainage Density and (b) Reclass Drainage Density

Pairwise Comparison

Pairwise method of MCDA (Multi Criteria Decision Analysis) uses Numerical algorithms to explain the suitability of meticulous effect on the origin of contribution criteria and this influence mutually through various mathematical or logical means of deciding disagreement. Using this procedure, the influence value range 1 to 9 was allocated to every factor with professionals to replicate their relation consequence. By the weighted linear combination technique, every map layer was overlaid in ultimate GIS spatial examination for flood vulnerable zone imitation. The relationship between a mathematical value and intensity of less importance was as follows: 1 equal importance, 1/3 moderate, 1/5 strong, 1/7 very strong, 1/9 extremely at the contrary, high significant variables were rated between 1 and 9.

	Slope	Elevation	Wetland	Rainfall	LULC	Drainage Density	Soil
Slope	1.00	1.00	3.00	7.00	9.00	1.00	5.00
Elevation	1.00	1.00	1.00	3.00	5.00	1.00	2.00
Wetland	0.33	1.00	1.00	1.00	0.50	1.00	1.00
Rainfall	0.14	0.33	1.00	1.00	2.00	0.33	1.00
LULC	0.11	0.20	2.00	0.50	1.00	0.33	2.00
Drainage Density	1.00	1.00	1.00	3.00	3.00	1.00	3.00

Cat	Priority/Influence	Rank	(+)	(-)
Slope	31.80%	1	15.40%	15.40%
Elevation	19.40%	2	8.80%	8.80%
Wetland	9.70%	4	5.40%	5.40%
Rainfall	7.10%	6	3.10%	3.10%
LULC	7.30%	5	5.40%	5.40%
Drainage Density	18.30%	3	5.90%	5.90%
Soil	6.30%	7	1.90%	1.90%

Flood Vulnerability

The slope, elevation, rainfall, land use/land cover, drainage density, wetlands and soil types have been used to develop a flood vulnerability map by using GIS and AHP or multi-criteria decision-making techniques. The result of the analysis shows that about 45.64% and 13.18%

of the study area/benue basin have high and very high vulnerability to flood respectively as seen in the table below.

Vulnerability Level	No. Set. Overlay	% No. Set.	Land Area Sqkm	Land Area%
Very Low	178	2.35	6943.09	4.24
Low	821	10.83	16535.50	10.10
Moderate	2383	31.43	43930.38	26.84
High	3351	44.19	74719.69	45.64
Very High	850	11.21	21571.73	13.18

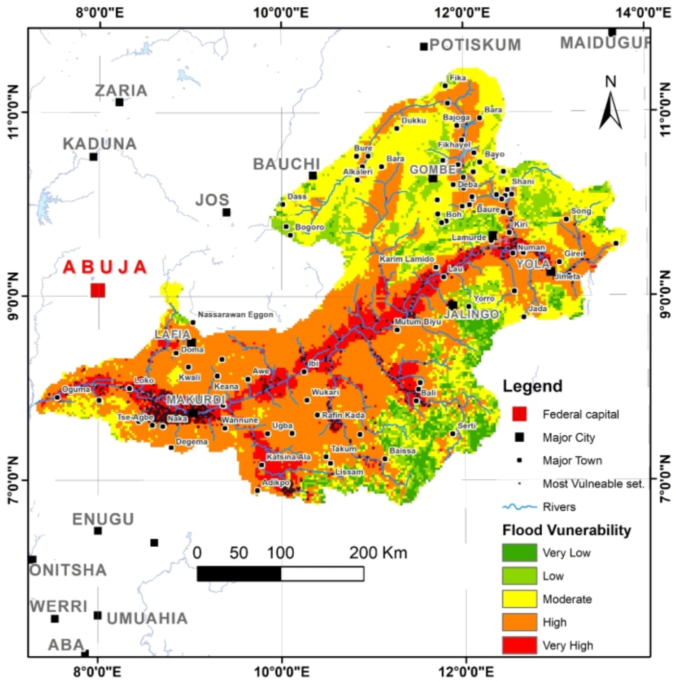


Figure 10: Flood Vulnerability Map of the Study Area.

Discussion

The research conducted in this study underscores a significant correlation between flood hazards and regions characterized by low elevation in the study area. This connection is rooted in the natural process of runoff, where water descends from higher elevations to lower ones. The study highlights the pivotal role of topography in influencing flood vulnerability, emphasizing that low-lying areas Loko in Nasarawa, Naka and Makurdi in Benue, Ibi in Taraba, Numan in Adamawa among others are particularly prone to flooding due to their position along the runoff path. While topography is a key factor, the study acknowledges that other elements, such as insufficient land use planning and community inertia, also contribute significantly to the overall vulnerability of the area to flooding.

An essential revelation from the study is the prevalence of river and drainage channel flooding as the most common form of inundation in the research area. Triggered by heavy rainfall events, these incidents lead to extensive flooding that can persist for prolonged

Conclusion

In conclusion, this study has delved into the intricate spatial variability and temporal dynamics of flood vulnerability within the Benue trough, Nigeria. The investigation has illuminated the multifaceted factors contributing to flood susceptibility, emphasizing the crucial role of topography, particularly in areas of low elevation. The findings align with the broader understanding that regions characterized by low-lying topography face heightened vulnerability to flooding, with runoff from higher elevations exacerbating the risks in these areas. Additionally, the temporal dynamics explored in this study shed light on the seasonality of flood events, emphasizing the significance of understanding and predicting the cyclical patterns of precipitation and river discharge. The identification of river and drainage channel flooding as the predominant form of inundation aligns with the broader consensus in flood research, underlining the need for targeted strategies to address this specific type of flooding in the Benue trough.

Furthermore, the synthesis of insights from various disciplines, including hydrology, climatology, remote sensing, and sociology, has enriched our understanding of the complexities involved in flood vulnerability. The recognition of factors such as ineffective land use planning and community inertia as contributors to vulnerability underscores the interdisciplinary nature of addressing flood risks. This study advocates for a holistic approach that considers both natural processes and human-induced modifications to develop effective mitigation and adaptation strategies.

As climate change projections indicate an increase in the frequency and intensity of extreme weather events, including floods, the implications for the Benue trough become even more pronounced. This study's findings underscore the urgency of incorporating spatial and temporal considerations into land use planning and climate resilience efforts. Proactive measures, especially for areas of low elevation, should be a focal point in policy and planning initiatives to mitigate the impact of floods and enhance the overall resilience of communities in the Benue trough to future climate-related challenges.

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EXTENT OF UTILIZATION OF MULTIMEDIA AND HYPERMEDIA TECHNOLOGIES BY TECHNICAL EDUCATION LECTURERS IN INSTRUCTION DELIVERY IN COLLEGE OF EDUCATION IN MINNA, NIGER STATE

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Abstract

This study was designed to assess the extent to which Technical Education lecturers in Niger State College of Education Minna utilize Multimedia and Hypermedia Technologies in Instruction delivery. Descriptive survey research design was used for the study. Two research questions and one hypothesis were formulated to guide the study. The population consisted of 34 technical education lecturers and 76 NCE III students. Due to the manageable size of the population of NCE technical education lecturers and the students, the entire population was used for the study. The instrument used in the collection of data was 25 items questionnaire validated by three experts, one from Industrial and Technology Education Department and two from Niger State College of Education, Minna. The questionnaire elicited information from the lecturers and students on the extent to which multimedia hardware and hypermedia software are utilized in TE programmed. 34 copies of the questionnaire were administered to the respondents but 32 copies of the questionnaire were completed and returned. The internal consistency of the instruments was found to be 0.88. The data collected were analyzed using mean and standard deviations to answer the research questions posed for the study; the results indicated that TE lecturers utilize multimedia hardware and software/elements at a low extent in instruction delivery. The study therefore recommended regular professional development of lecturers in ICT. Furthermore, the provision of technical support to institutions and their staff by TETfund through the procurement of state-of-the-art multimedia hardware as a strategic intervention for effective utilization of multimedia resources by the TE lecturers in instruction delivery in Nigerian Colleges of Education.

Keywords: *Multimedia Hardware, Multimedia Software, Instruction Delivery, Technical education.*

Background to the Study

Information and communications technology tools have become highly important in everyday affair among policy makers, economists, academics, general public and private organizations. In the education sector, digital technologies play vital roles especially in transforming the methods of teaching and learning as well as the overall educational research activities. Information and communication technology (ICT) is an umbrella term that includes any communication devices or application, encompassing radio, television, cellular phones, computer and other network hardware and software, satellite system and among others, as well as the various services and application associated with them, such as video conferencing and distance learning. ICTs has opined by Momoh (2015) is the processing and maintenance of information and the use of all forms of computer communication network and mobile technologies to enhance learning.

Nwangwu, (2018) is of the view that ICT has become the strategic alternatives for Colleges of Education (CoEs) in Nigeria to facilitate the delivery of quality education effectively and efficiently. Ilechukwu (2013) observed that the utilization of instructional resources such as e-learning has made it possible to deliver educational services devoid of traditional challenges. Egbiri (2012) stated that lecturers, instructors and students cannot do much without adequate knowledge of ICT tool such as multimedia. Multimedia as defined by Oshinaike and Adekunmisi (2012), is the combination of various digital media types such as text, images, sound and video into an integral multi-sensory interactive application or presentation to convey a message or information to an audience. The duo further stated that multimedia technologies are of two main categories; the multimedia hardware and hypermedia software.

Multimedia hardware system is part of digital technology that can be used in the field of education for effective instruction delivery. As stated by Momoh (2015), multimedia hardware could be described as a wide range of computer-based teaching and learning resources/applications and facilities that supplement or complement the educational process. Momoh further stated that, the multimedia hardware components include computer system, projector, interactive whiteboard, instructional CDs/DVDs, iPad/smart phones, internet facilities, digital camera, microphone, speaker, among others. The presence of these hardwares' would require the installation of hypermedia software linked to them, in order to meet the intended operation. Hypermedia software refers to 'linked media' that have their roots in a concept of multimedia. Hypermedia tools focus on the interactive power of computers, which makes it easy for users to explore a variety of paths through many information sources (Beckman & Rathswohl, 1999).

Hypermedia as defined by Kommers, Jonnassen and Mayes (1992) is an enhancement of hypertext, then non sequential access of text documents. using a multimedia environment and providing users the flexibility to select which document they like to view based on their interests. Hypermedia is fundamental to the structure of World Wide Web, which is based on relational database organization. The authors further stated that hypermedia software include video, audio, graphics, animation, e-learning platforms as well as software used for editing multimedia elements. As stated by Nwangwu, (2018) the features include but not limited to Podcast, Power-point, WhatsApp, Youtube, Histogram among others. Gbasibo (2007) asserts that, with the use of hypermedia software, students are made to be more involved in the learning process. It makes the students to be in control of the class as against teacher-controlled media presentations, which are considered passive. As stated by Brashears, Akers and Smith (2005), with the rise of the internet, educational institutions now have the ability not only to transfer text-based materials, similar to the original correspondence courses, but to provide students with hypertext, audio, video, interactive chat and many other methods of instruction delivery that are in-tune with our sensory organs. But unfortunately, NCE Technical students do not have the full knowledge and experiences to utilize modern educational media resources except the operation of an Andriods phones (Berger & Frey, 2016)

The multimedia technologies, when utilized properly and effectively, play vital roles in promoting the quality of teaching and learning in higher institutions of which CoEs is not an exception. Educational media resources, if well selected and skillfully utilized in CoEs can ease learning as well as multiply and widen the communication channels between teacher and learners. This view was supported by Nkweke and Eke (2010) when they noted that the computer, interactive clever board and multimedia offer multiple channel communication, which they see as superior to single channel communication. The effectiveness of these media in this regard, depends on using the appropriate ones. The way students are trained is determined by the extent to which they are equipped with the requisite relevant and diverse skills required to face the challenges in their future careers. Therefore, it is against this backdrop, a need arouses for the study to assess what extent do lecturers in CoE technical utilize these media resources in their effort to train students for Nigerian Certificate in Education (NCE) technical in CoE Minna, Nigeria.

Statement of the Problem

Colleges of Education are constitutional mandated to produce qualified technical teachers capable of teaching basic technology in the upper primary and junior secondary schools, and also to produce NCE technical teachers who will be able to inculcate scientific and technological attitudes and values into the society among others (National Commission for Colleges of Education, NCCE, 2020). Exposition to such relevant skill in the technical trade courses are transmitted by the lecturers, and as such, lecturers must be endured with the technological knowhow before been able to transmit such skills to the students (Umar, 2020). Unfortunately, several studies, happenings, and opinion of experts show that NCE Technical students do not have the full knowledge and experiences of what they claim to have studied, as most of them find it difficult to utilize modern educational media resources except the operation of an Andriods phones (Berger & Frey, 2016). Sequel to the fact that, some unclassified reports have it that some upper and junior secondary schools with equipment do not have qualified teachers to utilize the modern educational media resources, such as computer, multimedia package, interactive or clever board etc. to facilitate teaching and learning of basic technology. Against this backdrop, a need arouses for the study to assess what extent do lecturers in CoE technical utilize multimedia and hypermedia technologies in their effort to train students in NCE, technical in College of Education Minna, Nigeria.

Purpose of the Study

The purpose of the study was to investigate the extent to which Technical Education (TE) lecturers utilize multimedia and hypermedia technologies in instruction delivery in Niger State College of Education, Minna. Specifically, the objectives of the study are to determine:

i. The extent to which TE lecturers utilize multimedia hardware in instructional delivery.
ii. The extent to which TE lecturers utilize hypermedia software in instruction delivery.

Research Questions

The following research questions were formulated to which answers were sought;

i. To what extent do TE lecturers utilize multimedia hardware in their instruction delivery?
ii. To what extent do TE lecturers utilize hypermedia software in their instruction delivery?

Hypothesis

The following hypothesis were stated and tested at 0.05 level of significance:

HO_1: There is no significant difference in the mean responses of TE lecturers and students on the utilization of multimedia hardware in instruction delivery.

Research Methodology

The research design adopted for the study was descriptive survey research design. The target populations are 110 respondents consisting of 34 lecturers and 76 NCE III students. The lecturers comprise of Seven from Automobile Technology, Eight from Building Technology, Eight from Electrical/Electronics Technology, Five from Metalwork Technology, Four from Woodwork Technology as well as Six from Technical Drawing Departments all, in the School of Technical Education (SOTE), Niger State CoE, Minna. Due to the fewer numbers of all the departmental lecturers in the school, all the lecturers were used for the study. Purposive sampling technique was carried out to choose NCE III students as subject of the study. The data was collected using questionnaire to elicit information from the respondents. The questionnaire was organized in two parts; part I and part II. Part I addressed issues meant to collect the demographic data on the subjects for the study. Part II was composed to elicit information on extent to which TE lecturers utilize multimedia technologies in instruction delivery.

Furthermore, part II was sub-divided into two {2} sections comprising A, and B. In sections A the subjects were required to respond to the item statements indicating their extent of extent to which TE lecturers utilize multimedia hardware in instruction delivery. Whereas, in section B, the subjects were expected to respond to the item statement regarding the extent do TE lecturers utilize hypermedia software in their instruction delivery. The questionnaire consists of a 4-point Likert scale as indicated in Table 1, representing 4, 3, 2, & 1 representing very high extent, high extent, low extent and very low extent respectively. Data generated from the questionnaire was analyzed using mean and standard deviation. The mean of 2.50 was used as decision point for every questionnaire item in research questions. Consequently, any item with mean responses of 2.50 and above indicated High Extent, while 2.49 and below was considered Low Extent. Whereas, to effect decision on research questions true limits of real numbers was used as shown in Table 1. The hypothesis was analysed using z-test statistics at 0.05 level of significance.

Decision Rule

Table 1.0: True Limits of Real Numbers

Limits	Designation	Interpretation
3.50 – 4.49	VHE	Very High Extent
2.50 – 3.49	HE	High Extent
1.50 – 2.49	LE	Low Extent
0.50 - 1.49	VLE	Very Low Extent

(**Source**: Spiegel, 1972)

Results and Discussion

The data collected for the study were analyzed using appropriate statistical tools. The research questions were answered using mean and standard deviation.

Research Question I:

To what extent do lecturers in TE utilize multimedia hardware in their instruction delivery?

Table 2: Mean and Standard Deviation Scores of Respondents on the Extent to which TE Lecturers Utilize Multimedia Hardware in their Instruction Delivery in CoE Minna

S/n	ITEMS (Multimedia Hardware)	Respondent Categories: TE Lecturers N = 38		NCE III Students N =76			
		$\bar{x}1$	σ_1	$\bar{x}2$	σ_2	$\bar{x}T$	RMK
1	Interactive/electronics white board	1.83	0.38	1.17	0.49	1.50	LE
2	Multimedia instructional CDs/DVDs players	1.91	0.28	1.30	0.63	1.61	LE
3	Internet access/Facilities (Modem)	2.42	0.87	2.11	1.05	2.26	LE
4	Digital cameras	2.38	0.80	2.22	0.66	2.30	LE
5	Digital Microscopes	2.57	0.59	2.00	0.70	2.28	LE
6	Flash drive	3.23	0.83	2.00	0.86	2.61	HE
7	Multimedia projector	2.33	0.88	2.17	1.07	2.25	LE
8	Laptop/Desktop computers	3.90	0.30	3.66	0.70	3.78	VHE
9	Zpad/Ipad/ Andriod phone	3.50	1.62	3.78	0.59	3.64	VHE
10	Flat Screen Monitor	2.57	0.59	2.00	0.70	2.28	LE
	Average Mean: $\bar{x}_T$	**2.66**	**0.71**	**2.24**	**0.74**	**2.45**	
	Overall Mean					**2.45**	**LE**

KEY: x = Mean of Respondents; Standard Deviation of Respondents; VHE = Very High Extent; HE = High Extent; LE= Low Extent; RMK. = Remark.

In Table 2, the mean scores and standard deviations of respondents on the extent to which TE lecturers utilize multimedia hardware in instruction delivery in CoE Minna have been presented. Table 2.0 shows the similarities and differences of respondents' views on the extent to which TE lecturers utilize multimedia hardware in instruction delivery. The respondents utilize items 8 and 9 to very high extent with mean value of 3.78 and 3.64. The respondent extent of utilize is high with item 06 with mean scores of 2.61. The extent of utilization is low with items 1, 2, 3, 4, 5, 7 and 10, with mean scores ranging from 2.30 to 1.50. The grand mean of 2.45 indicated that multimedia hardware was utilized to a low extent. The standard deviations ranged from a highest of 1.07 to a lowest of 0.28 which shows that the respondents mean responses do not differ significantly.

Research Question II:

To what extent do TE lecturers utilize hypermedia software in their instruction delivery?

Table 3: Mean and Standard Deviation Scores of Respondents on the Extent do TE Lecturers Utilize Hypermedia Software in their Instruction Delivery in CoE Minna

	Hypermedia Software						
S/n	**ITEMS**	**Respondent Categories**					
		TE Lecturers N = 34		**NCE III Students N = 76**			
		$\bar{x}1$	σ_1	$\bar{x}2$	σ_2	$\bar{x}T$	*RMK.*
11	Audio (or Podcast)	1.25	0.86	1.69	1.22	1.47	VLE.
12	Presentation Software (Power-Point)	2.91	0.90	2.95	0.82	2.93	HE
13	E-Learning Platform (Blackboard, Moodle, WebCT, etc.)	1.08	0.28	1.47	1.16	1.28	VLE
14	Video (or YouTube)	1.83	0.38	1.17	0.49	1.50	LE
15	Multimedia tool book	1.91	0.28	1.30	0.63	1.61	LE
16	Pictures/Graphics	1.16	0.57	1.82	1.30	1.49	VLE
17	Animation/Simulation	1.08	0.28	1.47	1.16	1.28	VLE
18	Blogging tools	1.08	0.28	1.47	1.16	1.28	VLE
19	Yahoo messenger	2.00	0.60	2.21	1.24	2.11	LE
20	Multimedia slide show	2.33	0.88	2.17	1.07	2.25	LE
21	Face book	3.41	0.99	3.60	0.94	3.50	VHE
22	WhatsApp	3.50	1.62	3.78	0.59	3.64	VHE
23	Zoom	2.91	0.90	2.95	0.82	2.93	HE
24	Istagram	3.16	0.83	3.13	0.62	3.14	HE
25	Micro-worlds project builder	1.25	0.86	1.69	1.22	1.47	VLE
	Average Mean: $\bar{x}_T$	**2.05**	**0.70**	**2.19**	**0.96**	**2.12**	
	Overall Mean					**2.12**	**LE**

KEY: $\bar{x}$ = Mean of Respondents; σ = Standard Deviation of Respondents; VHE = Very High Extent; HE = High Extent; LE= Low Extent; VLE= Very Low Extent; RMK. = Remark.

In Table 3, the mean scores and standard deviations of respondents on the extent to which TE lecturers utilize hypermedia software in instruction delivery in CoE Minna have been presented. Table 3.0 shows the similarities and differences of respondent's views on the extent to which TE lecturers utilize hypermedia software in instruction delivery. The respondents utilize items 21 and 22 to very high extent with mean value of 3.50 and 3.64. The respondent extent of utilization is high with item 12, 23 and 24, with mean scores ranging from 3.14 – 2.93. The extent of utilization is low with items 14, 15, 19, and 20 with mean scores ranging from 2.25-1.50. The respondents utilize items 11, 13, 16, 17, 18, and 25 to a very low extent with mean value of 2.11 and 1.28. The grand mean of 2.12 indicated that multimedia software/elements was utilized to low extent. The standard deviations ranged from a highest of 0.90 to a lowest of 0.51 which shows that the respondents mean responses do not differ significantly.

Table 4.0: z-Test Analysis of Respondents on the Extent to which TE Lecturers Utilize Multimedia Hardware in their Instruction Delivery in CoE Minna

Respondents	N	df	$\bar{x}$	σ	t-calculated	t. critical	P.
TE Lecturers	34	108	2.66	0.71	2.837	1.658	0.05
Students	76		2.24	0.74			

The data presented in Table 4 reveals that NCE III Students have mean score of 2.24 and standard deviation 0.74, a mean of 2.66 for TE lecturers and a standard deviation of 0.71. The z-test value is 1.658 and is significant at probability level of 2.837 at ($P<0.05$). The null hypothesis is rejected. There is a significant difference between the opinion of TE Lecturers and students in the extent of utilization of multimedia hardware in instructional delivery in TE programme. The implication of this result is that both the TE lecturers and students differ in their opinion regarding the utilization of multimedia hardware in instructional delivery. Post-Hoc (Scheffe's test) conducted indicated that there was significant difference in the responses between TE lecturers, and Students ($P = 0.000$ and $P = 0.001$), since their significant level is less than ($P<0.05$).

Findings of the Study

The following findings emerged from the study based on the data collected and analyzed:

1. The following multimedia hardware revealed that the respondents utilized the following items as follows: Laptop/Desktop computers and Zpad/Ipad/ Andriod phone were utilized at very high extent. While Flash drive was instructional delivery utilized at a high extent.
   Whereas, Interactive/electronics white board, Multimedia instructional CDs/DVDs players, Internet access/Facilities (Modem), Digital cameras, Digital microscope, Multimedia projector and Flat screen monitor were utilized at a low extent.
2. The following hypermedia software revealed that the respondents utilized the following items as follows: Facebook and WhatsApp, were utilized at very high extent. While Histagram, Power-point and Zoom were instructional delivery utilized at a high extent. You Tube, Multimedia toolbook, Yahoo messenger, and Multimedia slide show were utilized at a low extent. E-Learning Platform, Pictures/Graphics, Animation/Simulation, Blooging tools and Micro-worlds project builder were utilized at a very low extent.

3. There was a significant difference between the mean responses of the respondents based on multimedia hardware on the extent of utilization in instructional delivery.

Discussion of Findings

The findings of the study revealed that TE lecturers utilize multimedia hardware and hypermedia software to a low extent in instruction delivery. Although few of the multimedia resources such as laptop/desktop computer, Andriods phones were very highly utilized, the cluster mean scores (3.78 and 3.64) obtained in Tables 2. The overall mean indicates generally that, the utilization of multimedia hardware by TE lecturers in instruction delivery was low. This is in agreement with the findings of Nweke (2013) whose study revealed low extent to the utilization of ICT facilities by OTM Polytechnic lecturers in teaching and learning. as reported by Nweke (2013), Revealed that teachers do not use projectors, electronic media such as slides, video conferencing during their lecture.

Furthermore, Table 3 revealed that the low utilization of hypermedia software by TE lecturers in instruction delivery was attributed to some perceived factors such as low availability of multimedia facilities in each departmental options; epileptic power supply; poor internet services; lack of technical know-how by the lecturers among others. These findings are in line with Nwangwu (2015) who found that inadequate/non-functional classroom facilities, shortage of instructional resources, poor time management issues, are factors that are responsible for poor performance of students in programming courses in Nigerian higher institutions. According to Boardbar (2010), teachers' computer competence is a major predictor of integrating ICT/multimedia technologies in teaching.

The findings on hypothesis one presented in Table 4 revealed that there was a statistical significant difference ($P<.05$) in the mean responses of the respondents based on the extent of utilization of multimedia technologies in instructional delivery. The Post-Hoc (Scheffe's test) revealed that there were significant differences between TE lecturers and students ($P=0.00$, $P=0.000$) and students causes no significant difference in the utilization of multimedia resources in instructional delivery. This indicated that respondents in-charge of passing instruction (TE lecturers) utilizes more multimedia resources than the students. This may likely be associated to education they have received, as well as their participation in conference, workshop and seminar attended over-time. The finding is further supported by the works of Bhargava and Anbazhagan (2014) both stated that, educated persons utilizes digital tools easily and efficiently compared to an uneducated or those persons whose education are less. This result agreed with the assumption of Oshinaike and Adekunmisi, (2012) who stated that because of their position as teachers, they perform more functions outside the school environment as to when compared to their students.

Conclusion

The study was carried out to determine the extent to which TE lecturers utilize multimedia and hypermedia technologies in instruction delivery in the CoE in Niger State, Nigeria. Based on the findings of the study and the discussions, the following conclusions were drawn. The extent of utilization of multimedia and hypermedia technologies by TE lecturers in instruction delivery was low. In other to ascertain the factors responsible for this poor utilization of the multimedia and hypermedia technologies, this study was carried out. Consequently, this enabled the researcher to conclude as follows; inadequate or lack of multimedia facilities in each departments, lack of internet accessibility to the staff and students in each departments, epileptic power supply to the departments, and finally irregular training and retraining of TE lecturers on multimedia and hypermedia design and presentation, among other factors, had contributed to the low utilization of multimedia technologies in CoE in Minna.

Recommendations

Based on the findings of the study, the following recommendations were made:

- i- The college management should assist each department, for in-house training of their staffs to help in meeting the 21st century challenges in multimedia technologies.
- ii- Public and Private Partnership should be encouraged to assist the government in terms of funding of CoEs in procurement of state-of-the-art multimedia hardware to the colleges.
- iii- TETfund should intensify effort for the provision of technical support to institutions and their staff by procurement of state-of-the-art multimedia hardware as a strategic intervention for effective utilization of multimedia technologies by the TE lecturers in instruction delivery in Nigerian Colleges of Education.

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AFRICAN PEACE INITIATIVES TO AVERT THE NIGERIAN CIVIL WAR: ABURI ACCORD AND THE PROSPECTS FOR PEACE

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Abstract

There were a series of peace moves to avert the Nigerian civil war. There were efforts by eminent Nigerians, like leading Obas from the Western region and the National Conciliation Committee, to resolve the conflict. The Organization of African Unity (OAU) intervened to resolve the dispute. Of all the efforts to resolve the conflict, the Aburi Accord, which took place in Ghana at the behest of Ghana's military head of state, General Joseph Arthur Ankrah, between 4 and 5 January 1967, stands out. It stands out because an agreement was reached at the Aburi that was agreeable to both parties. At the peace meeting, extensive negotiation occurred between the Nigerian Government led by Major General Yakubu Gowon and the Biafran delegation led by Col. Odumegwu Ojukwu. At the end of the diplomatic peace talk to resolve the Nigerian conflict, the parties finally signed the Aburi Accord, which declared that a looser Nigerian federation or Confederal Government would be implemented. On this note, this paper examines the Aburi Accord and the prospects for peace. The report found out that the Nigerian Government reneged on the Accord, and this was a significant factor in the outbreak of the Nigerian civil war. The paper used a qualitative method of research. The paper concludes that if both parties had adhered to the Aburi Accord, the war would have been averted at the time.

Keywords: *African Peace Initiatives, Avert, Nigerian Civil War, Aburi Accord, Prospects for Peace*

Introduction

The attainment of Nigeria's independence on October 1, 1960, was followed by General excitement and Great expectations that the country would stand as a model of unity in the African continent. However, the imbalance in the political structure due to the inequality in the regional units, which put one of the regions in a dominant position in the country, gave rise to a crisis. The fact that the Nigerian constitution at independence failed to address the problem of the minorities in their desire for self-determination became a significant factor that affected the country's stability.[1] The country experienced instability three years after Nigerian independence. There was intense agitation by the minority for their separate region. While the agitation bore fruit with the creation of the Midwestern region in 1963, several people who agitated for their region in the North were imprisoned.

In the Western region, a political crisis led to the federal government's suspension of the government and its parliament. In the 1963 census dispute, each region tries to inflate its figure to its advantage. The census crisis created bitterness between the Southern and North regions, accusing each region of massive rigging of the census results.[2]

The controversial election of 1964 created tension in the country. Two political alliances emerged on the eve of the election. The National Council of Nigeria Citizens (NCNC) and Action Group (AG) formed the United Progressive Grand Alliance (UPGA), and the Nigerian national democratic party (NNDP) and Northern People's Congress formed the Nigerian National Alliance (UNA). As the parties prepared for the election, the political atmosphere was tense as the politicians championed ethnic interest rather than national interest. The result was that the politicians regarded the election as a do-or-die affair.[3] The 1964 General election was followed by another tenser Western regional election of 1965, marred by more spectacular election violence.

Five years after Nigerian independence, the above factors led to an explosive situation that ended in the breakdown of law and order. It became clear that there would be a violent change of government sooner or later, and the change was experienced on January 15, 1966, with a coup led by Major Kaduna Nzeogu. According to Terhemba Wuam, the Coup was initially welcomed with celebration in various parts of the country. However, when the pattern of killing was revealed, the North felt short-changed in the Coup as the main casualties were politicians of the northern extraction.

The July 29, 1966, Coup was to counter the January coup. The event following the July coup showed that the officers from the North executed the Coup to revenge the January coup, in which those executed were mainly Northerners—the killings of officers and civilians of the Igbo extraction spread across the country. The consequences of the mass killing of the Igbo threatened the existence of Nigeria. In the July coup, Major General J.T.U Aguiyi Ironsi and his host, the Military Governor of the West, Lt. Col. Adekunle Faguyi, were killed, and Major-General Yakubu Gowon succeeded Aguiyi Ironsi as head of the federal military Government on August 1, 1966. Although Gowon promised to restore peace and order in the country, his inability to stop the pogrom against the Igbo in most parts of the country led to a mass exodus of the Igbo to the East and the Eastern region's demand for secession under the leadership of Col. Odumegwu Ojukwu, the demand for secession was a milestone in the events that led to the Nigerian Civil War of 1967. [4]

There were a series of African peace moves to resolve the conflict. There were efforts by prominent Nigerians, such as leading Oba in the Western region. There was an effort by the National Reconciliation Commission led by Obafemi Awolowo to resolve the crisis.[5] There was also the Organization of African Unity, OAU intervention to resolve the conflict. The Aburi Accord in Ghana, at the behest of Ghana's Military Head of State, stands out for all the efforts to broker peace. It stands out because the Aburi peace talk was an agreement that was agreeable to both the Biafran and the Nigerian government. This paper assesses the Aburi Accord and the prospects for peace in the Nigeria civil war.

Causes of the War

The 15th January 1966 Coup led to a series of events, ending in the Nigeria-Biafra war of 1967-1970. Five majors led the Coup, and Chukwuma Kaduna Nzeogu led the five majors. Others were Major Adewale Ademoyega, Major Donatus Okafor, Major Chris Anuforo, and Major Emmanuel Ifeajuna. The Coup, which was meant to eradicate corruption, tribalism, and nepotism, led to the death of prominent Northern and Western politicians and officers.[6] Those killed were Alhaji Ahmadi Bello, Premier of Northern Region, Brigadier S.A. Ademulegun, Col. R.A. Shodeinde and Kur Mohammed, The Prime Minister, Abubakar Tafawa Balewa, Finance Minister, Chief Festus Okotie-Eboh, Brigadier Z. Maimalari, Lt. Cols J.Y. Pam, Col. A.C. Unegbe and A. Largema. Others were Chief S.L. Akintola, Premier of Western Region.[7] Major General Oluleye notes that the Yorubas in the group had acted faithfully by killing Akintola. Still, the Ibo among the groups betrayed the cause by sparing the life of Dr Michael Okpara. He affirms that Nzeogu planned to clean the entire Nation, but some Ibo officers in the groups thought otherwise.[8]

The news of the Coup was initially received with nationwide celebration. People were happy with the hope that the Coup would end the high rate of corruption and ethnic tension in the country.[9] But when the pattern of killing was revealed, the Coup created another severe political problem in the country. Nzeogu was disappointed with the Coup's general development. Madiebo notes:

> *Nzeogu was utterly disappointed with this development and began to plan a deliberate act on the South to crush Ironsi's men. He blamed his failure on certain officers who had failed to implement their parts of the Coup even though they had given their full support during the planning stage.*[10]

The Northerners began to see the Coup as an attempt by the Ibos to dominate Nigeria's politics and Army. The reasons were that apart from the fact that the Coup brought Aguiyi Ironsi, an Ibo, to power as head of state, the sparing of the life of the Premier of the Eastern Region was also the reason the Northerners suspected the Coup was an Ibo affair.

The Northerners had maintained that since the Coup had planned to eliminate senior officers, why was Ironsi not killed? Undiyaundeye argued, "The gloomy mood in the Northern region would have been cleared if Aguiyi Ironsi, who became the head of the state, had acted swiftly to punish the mutineers held in different prisons across the country."[11] Elechi Amadi notes, "From this point, I had a strong feeling that there would be serious inter-tribal conflict."[12]

The council of Minister handed over the Government to Major General Aguiyi Ironsi on the 16th of January, 1966, and on the 17th January 1966, Ironsi approved Governors for the regions: Lt. Col. Adekunle Fajuyi for the West, Col. David Ejoor for the Midwest, Lt. Col. Odumegwu Ojukwu for the East and Lt. Col. Hassan Katsina for the North. It must be emphasized that Nzeogu had surrendered to Aguiyi Ironsi on the condition that they would be granted amnesty.[13]

Ironsi should have handled the reaction of the Northern element with caution or was insensitive to how they saw the Coup and went ahead to promulgate Decree No. 34 on May 24th, 1966.[14] "He placed Igbo officers in strategic commands. Of twenty-one officers promoted to the rank of Colonel, eighteen were Igbo. Equally, baffling was the way he surrounded himself with Ibo bureaucrats and advisers".[15] Scholars are unanimous that Ironsi's greatest mistake was Decree 34, which abolished regionalism and federal structure, replacing them with a unitary government. The scrapping of regional civil servants means that an Ibo man can become a civil servant anywhere in the country, likewise Hausa and Yoruba. The rationale behind the thinking was to remove the last vestige of intense regionalism.[16] The matters handled by the Decree were issues that Ironsi set up a committee to look into but did not wait for the committee's report before promulgating the Decree. How it was done made the Northerners suspect the intention of the Decree. Raph Uwechue argues that Ironsi escaped to put the coup plotter on trial because doing so would provoke anti-government reaction from the people, especially the South and other people that welcome the Coup.[17]

The promulgation of Decree 34 led to severe political upheaval in the North on 29th May 1966, in which Easterners were killed and their property destroyed. [18] The Northerners saw the "Decree as part of a master plan by the Igbo to seize military, political, and administrative control of the country."[19]

The widespread killings of Igbo in the North following the promulgation of Decree 34 resurfaced as a result of the counter-coup of July 29th, 1966. The Coup brought Lt Col. Yakubu Gowon, a northerner, to power as the Head of State.[20] In the Coup, Major Aguiyi Ironsi and his host, Lt. Col. Adekunle Fajuyi, and many officers were killed.21 According to Obasanjo, the motive of the Coup is to "revenge upon the East by the North."[22] This time, it was apparent that the Coup was meant to enthrone Northern leadership. After the death of Aguiyi Ironsi, Brigadier Ogundipe became the most senior officer in the Nigerian Army. Since he was not a Northerner, the coup plotters refused to hand over to him. Lt. Col. Gowon, being the most senior officer from the North was handed over to by the plotters.[23] Those who led the July coup had demanded that the North should secede, but Gowon and other elements in the North opposed the dissolution of the country. [24]

In Gowon's address to the Nation, his emphasis was on Nigeria's unity, but the widespread killing of the Igbo and other Southerners contrasted Gowon's sentiments of the Nation's unity. On the 30th of July, "Eight officers ranging from Major to Second Lieutenant and fifty-two other ranks from warrant officers downwards were killed."[25] The killing of Igbo continued even when Gowon promised that he would restore law and order in all parts of the country. By 1966, about 50,000 Igbo, including men, women, and children, were massacred in Nigeria.[26] As the killing became unbearable, the Igbo started reprisal attacks on Northerners living in the Eastern Region.[27]

As the killing was going on over the country, the question of acceptance of the supreme Commander to all was hanging. Lieutenant Colonel Ojukwu had refused to accept Gowon as the supreme commander because he was not the most senior in the Army, but Brigadier Ogundipe was.[28] In October, Ojukwu ordered that all the Non-Easterners in the East should leave the region.[29] Gowon had to release Awolowo, Enahoro, and other prisoners to appease the West,[30] so that the North will be saved from fighting multiple enemies.

Aburi Accord

An Ad Hoc Conference summoned by Gowon was attended by representatives of all the regions of the federation to consider the way forward. However, the Eastern delegate was withdrawn from the conference due to a fresh riot in September.[31] With the continued killing of the Igbo people, Ojukwu was no longer willing to see reason in any peace meeting called by Gowon's Government. "He boycotted meetings of the Supreme Military Council and refused to send a delegate to any further constitutional conference."[32] The refusal of Ojukwu to participate in further peace meetings indicated the readiness of the Eastern region for war. "The national peace committee made up of eminent Nigerian was established in April 1967",[33] to avert the problem, and yet there was no headway. Some eminent Obas from the West also visited the East as part of the effort to stop the crisis.[34]

After all the efforts to resolve the conflict failed, at the initiative of Ghana's Head of State, General Ankrah, the parties to the conflict gathered at Aburi in Ghana in January 1967 for a peace meeting. Gowon led the Federal Government delegation, while Ojukwu led the Eastern region delegation. The areas of agreement at the Aburi peace meeting were:

i. A committee comprising the representatives of the various regions should be set up to take stock of the arms and ammunition in the country. The unallocated arms and ammunition should be distributed between the command in the country. The Army should be reorganized to restore discipline, order, and confidence.
ii. The Supreme Military Council should govern the Army headed by the Armed Forces Commander-in-Chief and the Head of the Federal Military Government. Area Commands under Area Commanders should be created corresponding to the regions, and for internal security, the Military Governors should control the Area Commands.

iii. The establishment of military headquarters with equal representation of the various regions and a Lagos Garrison should be established.
iv. In obedience to the resolution of August 9, 1966, military personnel of Northern origin should return to the North from the West. The West's security challenge occasioned by Northern personnel's exit called for a recruitment program in the West.
v. All issues relating to policy, including promotion to executive positions in the Army and the Police, should be handled by the Supreme Military Council. The Military Governors will have to make impute into the legislative and executive authority of the Federal Military Government.
vi. The Supreme Military Council should approve appointments to diplomatic and executive positions in Federal public service and corporations.
vii. All degrees passed since January 15, 1966, should be repealed.
viii. The permanent secretaries of all the governments in the federation should convene a meeting within two weeks to address the challenge of displaced persons.
ix. All displaced government staff should continue to be paid their full salaries, and the regional governments of West, East, and Midwest should send representatives to meetings on the problems of recovery of abandoned property. There should be a Military Government for at least the next six months.
x. All military officials who died should be given complete military honour, and government media should stop making inflammatory statements.
xi. The direction that non-Easterners should leave the Eastern region should be suspended until further notice.
xii. The Supreme Military Council's meeting should be convened in Nigeria at a place unanimously agreed upon.[35]

Offodile notes, "It was the failure to respect the terms of the Aburi Accord that led to the war."[36] Obasanjo affirms that all other delegation members except Ojukwu were prepared for the meeting. Some federal delegations refused to go because of the short notice.[37] Some have argued that Ojukwu had his way in Aburi because of his intellectual and mental wizardry. At first, the Aburi meeting solved the conflict, but the interpretation issue separated the parties. In the Aburi conference, Ojukwu was the only one with clear objectives. Consequently, he proposed an agenda for the meeting, which was accepted.[38] The war would have been averted if Gowon had respected the Aburi Accord. Ademoyega affirms thus;

> Ojukwu had scored all his points at the meeting if Gowon were to be faithful to the resolutions, the Nigerian civil war might have been averted. But as was usual with him, as soon as Gowon stepped down in Lagos, he gave his ears to the federal civil servants and his masters, who had advised him that he had conceded too much to Ojukwu. There and then he was prepared to dishonour his word and break the terms of Aburi agreement.[39]

Ojukwu had made it known to the Council at Aburi that "centralization is a word that stinks in Nigeria today."[40] The Aburi Accord was implemented as Decree No. 8 on 17th March 1967, but before the Decree was issued, Ojukwu refused to attend the Supreme Military Council meeting in Benin to rectify it. He did not participate in the Council meeting "because he had earlier rejected the draft of the Decree which made a mockery of the Aburi resolution."[41] Sections 70 and 71 were the most offending clause of Decree 8. This section gave the Supreme Military Council power to declare a state of emergency in any part of Nigeria with the approval of the Head of State and three governors. Section 71 further gave the Head of State and three governors power to legislate for the region during the state of emergency without the approval of the region's governors.[42] The die was cast this time, and Ojukwu was bent on war if the Aburi Accord was not implemented.

Gowon had hoped to divide Nigeria into twelve states to address the crisis. He planned to separate the oil-producing part of the Niger Delta from the Eastern Region. Under this plan, the Eastern Region will be composed solely of Igbo ethnic groups. These plans sought to destroy the region's economic base with the hope that it would humble Ojukwu.[43] The plan to create states out of the Eastern region was a weapon to fight the war. Ojukwu had made it clear at Aburi that the people had lost confidence in the Nigerian Government. Because of this, the government made no promise that the Easterners would take it seriously. In the Words of Ojukwu at Aburi;

> So we find ourselves in a position where there has been a mass population movement. The basis oneness was destroyed, and I submit to this meeting that people from the East today, no matter what promises we make here indeed, no matter what results we make here, the people of the East will not go back to any part of Northern Nigeria.[44]

Despite the killings and the provocation felt by the people of the East, they heeded the appeal of Aguiyi Ironsi, Ojukwu, and Northern Emirs to go back to the North. Ojukwu, in a banquet in honour of the Emir of Kano, who, a few days after the killings, was installed as Chancellor of the University of Nigerian, Nsuka, said: "The innocent blood thus shed will be accepted as the supreme purchase of price for the solid and everlasting unity of this country."[45] Many Easterners heeded and returned to the North, hoping all was well. But the massacre of Igbo in the North after the July 29th Coup is unprecedented in the human race. This is why Ojukwu told them at Aburi that no matter their promises, the people of the East would refuse to go back to the North, and he was right in that direction. This time around, the Igbo has been provoked.

Aburi Accord and the prospects for peace

The Aburi Accord, if implemented as agreed in Ghana, would have put out the drum of war, which became widespread at the time. The nature of the agreement showed that it was set to restore the pre-military true federalism, which was ejected from Nigeria's body politics by the ascension of the military in 1966. The agreement was to restore economic justice in the distribution of the national cake, which would have enhanced patriotism and restored a sense of ownership among the citizens of the Nigerian project.[46] Osadola Samuel notes that "in Aburi, all the participants made a strong argument for a return to true federalism that was in operation in the country before the first military coup of January 1966."[47]

Nigeria failed to achieve what the Aburi Accord planned to restore, and the result was a catastrophic war between Nigeria and Biafra, which led to the death of more than four million Nigerians and the destruction of property worth millions of naira. Ojukwu was realistic in suggesting a form of Government that would move the people apart until the temper cooled down. Ojukwu thus;

> In all sincerity, in order to avoid further friction and further killings, do submit that the only realistic form of government today until tempers can cool is such that will move people slightly apart, and a government that controls the various entities through the people of their areas. It is better that we move slightly apart and survive. It is much worse that we move closer and perish in the collision.[48]

The above reflected a highly decentralized government, which was suggested by Ojukwu and accepted by all parties at Aburi. In present Nigeria, the agitation for true federalism is a significant challenge to the peace and unity of Nigeria. Decree 8, which gave the Head of State power to declare a state of emergency in any region with the approval of three governors, negates what Ojukwu suggested and was accepted at Aburi. The state of emergency clause was planned in such a way as to cage Ojukwu because the three governors are already on the federal side. Ojukwu was the man alone for whom the conspiracy was meant.

Conclusion

This paper examines the African peace initiatives to avert the Nigerian civil war, focusing on the Aburi Accord. The paper believes that of all the peace efforts to prevent the 1966 crises from degenerating into war, the Aburi Accord was exceptional because it produced an agreement that was agreeable to both the Nigerian Government and the Biafran group. The paper contends that if not for the Nigerian Government reneging on its promise to stand on the Aburi Accord, the war would have been averted at the time.

The Aburi Accord peace talk produced a Nigerian federation before the military entered Nigerian politics. The Accord would have promoted peace as true federalism would have removed the challenge of focusing on the center since the various regional governments would have concentrated on their regions, making the center unattractive. Therefore, the Aburi Accord, apart from the fact that it would have averted the war, would have also guarded against the present challenge of marginalization, lack of productive capacity on the part of the States, and socioeconomic and political injustices. The agitation for true federalism has led to the destruction of lives and properties. The Aburi recommendations must be visited, especially true federalism, for a peaceful coexistence.

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IMPACT OF WASTE DUMP ON THE MICROBIAL QUALITY OF THE AIR IN WUKARI, NIGERIA

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Abstract

The quality of air inhaled by an individual within its environment determines to a greater degree the well-being of the individual. Indiscriminate dumping of waste has become a common practice in Nigeria and other African countries. The microbial quality of the air in the waste dump environment was assessed by determining the concentration and the composition of bacteria and fungi present in the air. Air samples were collected from five different locations and the total of 90 samples were collected using sedimentation techniques. Nutrient Agar was used for the enumeration of total bacterial concentration while Sabouraud Dextrose Agar was used for the enumeration of total fungi isolate. The result obtained from this study shows the total of seven (7) bacterial isolates which include Echerichia coli (40%), Klebsiella pnuemonia (46.6%), Salmonella typhi (3.3%), Psuedomonas aeruginosa (10%), Citrobacter freundii (10%), Stapphylococcus aureus (43.3%), and Alcaligenes sp. (33.3%) and the total of three (3) fungi isolates Aspergillus fumigatus (46.6%), Aspergillus flavus (23.3%), and Aspergillus niger (20%) respectively. From the result obtained, the indiscriminate dumping of waste around the residents should not be allowed because of the adverse effect on human, the government should ensure that the refuse dump in each waste dump location should be properly attended to and mechanical aids or powered machinery should be made available.

Keywords: *Waste dump, Air quality, Bacteria, Fungi*

Background to the Study

The quality of air inhaled by an individual within its environment determines to a greater degree the well-being of the individual (Agwaranze *et al.*, 2020). Indiscriminate dumping of waste has become a common practice in Nigeria and other African countries. Virtually every available space close to residential areas, road, farms, market, hospitals and churches in many Nigerian communities now serves as waste dump sites (Abdrazack *et al.,* 2007). The lack of proper refuse disposal and waste treatment facilities in these areas, therefore, makes the populace at risk of infections from pathogens that are airborne in the dump site areas. The World Health Organization estimates that about two million people die prematurely every year as a result of air pollution, while many more suffer from breathing ailments, heart disease, lung infections and even cancer (Malecka, 2011).

The transmission of pathogens by air can be direct or indirect. In indirect transmission, droplets containing microbes from infected persons are propelled through the air and deposited on the host's body. Microorganisms carried in this manner can be dispersed widely through the air by air current and may be inhaled by a susceptible individual (Agwaranze *et al.,* 2020). Municipal solid waste (MSW) refers to household waste combined with a minor portion of commercial waste collected is regarded as source of energy because it contains a high proportion of biomass materials such as paper/cardboard, wood and food (Changkook, 2010) also defines municipal solid waste which include refuse from household, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste and street sweeping. Solid waste is a global phenomenon that has attracted global concerns. The generation and management of Urban areas due to high density of residential areas urbanization, industrialization and the insufficiency of the collection systems. Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed, which can pose risk to the environment and public health (Zurbrugg, 2009).

Waste dumped into the drainages that block the free flow of runoff water and practice gives rise to flooding and communities are adversely affected. Some people dump their waste to the road side especially in Nigeria. Issues such as malaria, cholera and typhoid cannot be disassociated with dispose waste matter. Waste could be seen around different spot in the study area. Therefore, clean and healthy living conditions in towns, cities and villages cannot be achieved without reliable and regular waste collection and disposal (Rushbrook, 2010).

The practice of indiscriminate and improper dumping of household solid waste is on the increase rate in Wukari, Nigerian this compounded bicycle of population explosion, decreasing standard of living, poor governance and low level of environmental awareness, all these happened because of dumping of these waste in any available open space. Therefore, the air around the sites environment contains some microorganisms such as fungi, viruses, bacteria, etc. which could have a negative effect on the health of the people living around the study sites. In order to develop appropriate air quality management plans, however it is necessary first to have reliable information about the state of air borne bacteria and fungi especially in the vicinity of waste dump sites. Therefore, this study is aimed at examining the microbial load of air in the vicinity of some selected waste dumpsites in Wukari, Nigeria

Materials and Methods

Materials and Apparatus used.

Distilled water, test tube, incubator, Nutrient agar, MacConkey Agar, Oxidase reagent, Syringe (5ml), glass slide, Bunsen burner, autoclave, electric weighing scale and microscope, Crystal violet, lugol's iodine, acetone, safranin

Sample Collection

Samples were collected from the following waste dump sites: Opposite federal university Wukari, New site, Yam market Wukari, Takum junction, Rice mill. A total of 90 plates were used in the collection of the samples. 18 samples were collected from each of the five waste dump sites. The media were kept in clean sterile container and were transported to the waste dump site for sample collection using sedimentation technique by exposing the plate at various distance 0m (edge of the dump), 10m away, 20m away, 30m away, 50m away, and a control at 150m away from waste dump sites, on a carton 1m above the ground for 15 minutes (Udu *et al.,* 2016). After the collection of samples, the media was transported back to the laboratory at the time period of 10:00-10:20 am, and the plate were incubated for 24 hours at the temperature of 37ºc and the SDA were kept at room temperature for 5 days

Media Preparation

Preparation of specific culture media was done according to the manufacturer instruction, Nutrient Agar (NA), MacConkey Agar (MCA), Sabouraud Dextrose Agar (SDA) are weighed on the weighing balance, then autoclave for sterilization at 121°c for 15 minute and allowed to cool for 5 minute it is then poured aseptically in the plate then allowed to gel.

Isolation of Bacteria

Distinct colonies from the culture were sub-cultured on freshly prepared nutrient agar plate. Inoculated plates were then incubated aerobically at 37°C for 24 hours. Identification was done based on the colonial characteristics and some biochemical test as described by previous workers. (Choir *et al.,* 2013; Chen, F. N., *et al.,* 2009; Ding L.X. *et al.,* 2010)

Isolation of Fungi

Distinct colonies from the culture were sub-cultured by spot inoculation on fresh sterile SDA plate by direct plating technique; the plates were kept at room temperature and observed for 5days. Identification was done based on the colonial characteristics and microscopic observations using the lactophenol cotton blue and with reference to the method of Colin k.*et al.,* (2013) and V.O Nwaugo *et al.,* (2006)

Biochemical Tests and Characterization

Biochemical identification and characterization of pure isolates from each sample were subjected to various biochemical tests in order to identify them. The different conventional biochemical test carried out includes Gram's staining, catalase test, coagulase test, oxidase test and triple sugar iron test (TSI).

Results

The results are presented in the table below.

Table 1: Yam Market Identification and Characterization of Bacterial Isolates using Nutrient agar (NA) and MacConkey agar (MCA).

Sample in meter	THBC	TCC	TLBC
0m	2.8×10^7	9.0×10^6	2.0×10^6
10m	3.5×10^7	1.0×10^6	3.0×10^6
20m	2.3×10^7	1.5×10^6	2.0×10^6
30m	1.5×10^7	2.5×10^6	1.0×10^6
50m	3.2×10^7	1.2×10^6	4.0×10^6
150m	3.8×10^7	3.0×10^6	3.0×10^6

KEY: THBC = Total Heterotrophic Bacteria Count, TCC = Total Coliform Count, TLBC = Total Lactic Acid Bacteria Count.

The total heterotrophic bacteria count ranged between 1.5 x 10^7 and 3.8 x 10^7, the total coliform count range between 1.0 x 10^6 and 9.0 x 10^6 and total lactic acid count ranged from 1.0 to 4.0 respectively as shown in Table 1. Therefore, the highest value in the table 1 obtained is 3.8 from yam market sample site at 150m away from the waste dump.

Table 2: Rice Mill Identification and Characterization of Bacterial Isolates using Nutrient agar (NA) and MacConkey agar (MCA)

Sample in meter	THBC	TCC	TLBC
0m	1.9×10^7	5.0×10^6	2.0×10^6
10m	3.5×10^7	3.0×10^6	4.0×10^6
20m	3.4×10^7	6.0×10^6	2.0×10^6
30m	3.9×10^7	3.0×10^6	5.0×10^6
50m	3.0×10^7	9.0×10^6	2.0×10^6
150m	1.0×10^7	7.0×10^6	1.0×10^6

KEY: THBC = Total Heterotrophic Bacteria, TCC = Total Coliform Count, TLBC = Total Lactic Acid Bacteria Count.

Table 2 present the total heterotrophic bacteria count ranged between 1.0 x 10^7 and 3.9 x 10^7, the total coliform count ranged between 3.0 x 10^6 and 9.0 x 10^6 and total lactic acid count ranged from 1.0 x 10^6 to 5.0 x 10^6 respectively. Therefore, the highest value in the table 2 is 3.9 x 10^7 from rice mill sample site at 30m away from the waste dump.

Table 3: Takum Junction Identification and Characterization of Bacterial Isolates using Nutrient agar (NA) and MacConkey agar (MCA)

Sample in meter	THBC	TCC	TLBC
0m	3.0×10^7	8.0×10^6	3.0×10^6
10m	4.1×10^7	4.0×10^6	2.0×10^6
20m	3.2×10^7	2.0×10^6	5.0×10^6
30m	2.5×10^7	6.0×10^6	3.0×10^6
50m	2.0×10^7	3.0×10^6	4.0×10^6
150m	2.1×10^7	4.0×10^6	2.0×10^6

KEY: THBC = Total Heterotrophic Bacteria, TCC = Total Coliform Count, TLBC = Total Lactic Acid Bacteria Count.

The total heterotrophic bacteria count ranged between 2.0 x 10^7 and 4.1 x 10^7, the total coliform count ranged between 2.0 x 10^6, and 8.0 x 10^6, and total lactic acid bacteria count ranged from 2.0 x 10^6 to 4.0 x 10^7 respectively as shown in Table 3. Therefore, the highest value obtained in table 3 is 4.1 x 10^7 from takum junction sample site at 10m away from the waste dump.

Table 4: New Site Identification and Characterization of Bacterial Isolates using Nutrient agar (NA) and MacConkey agar (MCA)

Sample in meter	THBC	TCC	TLBC
0m	1.9×10^7	7.0×10^6	3.0×10^6
10m	2.6×10^7	6.0×10^6	2.0×10^6
20m	3.8×10^7	3.0×10^6	1.0×10^6
30m	4.2×10^7	4.0×10^6	3.0×10^6
50m	4.5×10^7	5.0×10^6	2.0×10^6
150m	3.3×10^7	4.0×10^6	2.0` $\times 10^6$

KEY: THBC = Total Heterotrophic Bacteria, TCC = Total Coliform Count, TLBC = Total Lactic Acid Bacteria Count.

Table 4 present the total heterotrophic bacteria count ranged between 1.9 x 10^7 and 4.5 x 10^7, the total coliform count ranged between 3.0 x 10^6 and 7.0 x 10^6 and total lactic acid bacteria count ranged from 1.0 x 10^6 to 3.0 x 10^6 respectively. Therefore, the highest value in table 4 is 4.5 x 10^7 from new site sample site at 50m away from the waste dump.

Table 5: Opposite Federal University Wukari Identification and Characterization of Bacterial Isolates using Nutrient agar (NA) and MacConkey agar (MCA)

Sample in meter	THBC	TCC	TLBC
0m	1.5×10^7	5.0×10^6	3.0×10^6
10m	1.7×10^7	4.0×10^6	2.0×10^6
20m	3.0×10^7	5.0×10^6	2.0×10^6
30m	2.5×10^7	3.0×10^6	4.0×10^6
50m	3.4×10^7	5.0×10^6	2.0×10^6
150m	2.1×10^7	6.0×10^6	3.0×10^6

KEY: THBC = Total Heterotrophic Bacteria, TCC = Total Coliform Count, TLBC = Total Lactic Acid Bacteria Count.

The total heterotrophic bacteria count value ranged between 1.5 x 10^7 and 3.4 x 10^7, the total coliform count ranged between 3.0 x 10^6 and 6.0 x 10^6 and total lactic acid bacteria count ranged from 1.0 x 10^6 to 4.0 x 10^6 respectively. Therefore, the highest value in table 5 is 3.4 x 10^7 from opposite the federal university sample site at 50m away from the waste dump.

Isolate	Number examined	Number of appearance	Percentage of occurrence.
Escherichia coli	30	12	40%
Klebsiella pneumonia	30	14	46.6%
Salmonella typhi	30	1	3.3%
Pseudomonas aeruginosa	30	3	10%
Citrobacter freundii	30	3	10%
Staphylococcus aureus	30	13	43.3%
Alcaligenes species	30	10	33.3%

Table 7: Percentage Distribution of Fungi Isolate

Isolate	Number examined	Number of appearance	Percentage of occurrence
Aspergillus fumigatus	30	14	46.6%
Aspergillus flavus	30	7	23.3%
Aspergillus niger	30	6	20%

Discussion

Dumpsites have a considerable level of microbial contamination because whenever waste is dumped on land; soil microbe's especially anaerobic fungi and bacteria inhabit the waste and extract nutrients by carrying out decomposition (Ventorino *et al.,* 2018). Microbial population tends to multiply at the dumpsites/landfill sites and these dumpsites act as a source of microbiological agents (bioaerosols) in the atmosphere (Akpeimeh *et al.,* 2019).

The microbial loads of the air samples taken from the dumpsites were higher than the normal atmospheric concentration of the microorganisms as the reported average level of the microbes in the ambient air is 3.0 $\log_{10}$cfu/ml (Panthi, and Shrestha 2008), this is an indication of the extent of microbial pollution of waste dump sites in the study sites. In this study, the total of seven (7) bacterial isolates which include *Echerichia coli*, *Klebsiella pnuemonia*, *Salmonella typhi*, *Psuedomonas aeruginosa*, *Citrobacter freundii*, *Stapphylococcus aureus*, and *Alcaligenes sp.* were identified, while the total of three (3) fungi isolates were obtained, *Aspergillus fumigatus*, *Aspergillus flavus* and *Aspergillus niger*.

However, several researchers have reported similar microorganisms within air environment of both indoor and outdoor air (Agwaranze *et al.,* 2020; Makut *et al.,* 2014; Kabir *et al.,* 2016). *Echerichia coli* (40%), *Klebsiella pnuemonia* (46.6%), *Stapphylococcus aureus* (43.3%), and *Alcaligenes sp.* (33.3%) were the most occurring bacterial species while *Salmonella typhi* (3.3%), *Psuedomonas aeruginosa* (10%) and *Citrobacter freundii* (10%) had low percentage of occurrence in this study. This is in agreement with the study also reported in the work of (Udu *et al.,* 2016). The presence and prevalence of some of these species of bacteria in the dumpsite could be as a result of the presence of damp organic materials, materials impregnated with water, food and food products and spores of microorganisms propelled through the air. These bacteria, according to Douwes (2003) can cause different forms of bacterial pneumonia, influenza and gastrointestinal diseases.

Specifically, *Aspergillus fumigatus, Aspergillus flavus* and *Aspergillus niger* with the isolation rates of 46.6%, 23.3% and 20% were the most isolated fungal contaminants. This agrees with the work of Ekhaise et al. (2008) who also reported *Aspergillus spp.* as the most common genus of fungi in the air. Similar observation and isolates have been reported by Agwaranze et al. (2020) who isolated *Aspergillus niger, Aspergillus flavus, Aspergillus fumigatus, Aspergillus verssicolor, Trycophyton spp.* and *Ulacladium spp.*, in their study on Microbiological assessment of indoor and outdoor air quality in a general hospital in North-East Nigeria. Remarkably, these fungi contaminants particularly the *Aspergillus spp.* are pathogenic and had been implicated as the etiological agents of several mycotic infections.

Furthermore, members of the Enterobacteriaceae, such as *Echerichia coli*, and *Salmonella spp*. encountered in this study could have emanated from wastewater and faecal matter of both human and animal source deposited around these waste environments which may contaminate the air and even foods sold around these environments. This is in agreement with some work on the distribution and public health implication of enteric pathogens (Fowoyo and Igbokwe 2014).

The result obtained in this study reviewed that the colony forming unit of Bacteria was considerably higher than those of fungi. For each of the study locations, the counts of total bacteria load in air samples exceeded the limit, which have serious health repercussions. For Fungi, WHO estimates a limit of 500CFU/m3 which is higher than that for bacteria, since most infectious diseases are not associated with them. The fungi count from this study in some locations was far below the limit. This observation could be as a result of low concentration of the fungi, as well as unfavorable environment conditions which might have impeded the propagation of the fungi in the air.

The study showed that almost all the fungal species and 95% of bacterial species were pathogenic and cause diseases in living organisms. People spending more time at solid waste management sites or its surrounding are more exposed to harmful microbiological agents (bioaerosol). Waste workers and waste pickers are highly exposed to inhalable bacteria and fungi during waste handling, being caught by eye infections, respiratory illnesses, diarrhea, typhoid, complaints.

Conclusion

The result from this study has shown that the indiscriminate dumping of waste in the study area has resulted to bad smells making the area impassable, which affect the township social and health lifestyle of the inhabitants around the waste dump environment. Furthermore, almost every species of microbes isolated in this study (especially those in the bacteria domain) are capable of causing serious diseases that could subsequently lead to deaths of people they infect. Therefore, this study suggests that people living in these areas are prone to health threats because the air they inhale daily is of poor quality. Hence, it is recommended that dumpsites are located far (at least 2km) from neighborhood to avoid air contamination with pathogenic microbes.

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PATHOGENIC BACTERIA ASSOCIATED WITH COMMERCIALLY MARKETED FISH IN WUKARI, NIGERIA

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Abstract

Microbial pathogens associated with fish can be transmitted to humans who consume or handle the fish leading to infections. The aim of this study is to isolate human pathogenic bacteria present in the gills, intestine and skin of apparently healthy and spoilt fishes sold in Wukari markets. A total of 12 fish samples, comprising eight (8) Tilapia (4 healthy and 4 spoilt) and four (4) Catfish (2 healthy and 2 spoilt) were bought from old market and Yam market of Wukari, Nigeria. Bacteria were isolated from the fish gill, intestine and skin as well as the determination of the total viable counts of bacterial were carried out using standard microbiological techniques. The result showed that the total bacteria count values ranged between 1.20 x 10^6 CFU/mL to 2.72 x 10^7 CFU/mL. The highest bacteria load was observed in the intestinal region of the fishes. The identification revealed that Staphylococcus aureus was the most abundant pathogenic bacteria (72.2%) followed by and Escherichia coli (27.8%). Presence of Staphylococcus aureus could be due to contamination of the fish samples by man through handling and processing while and Eshcherichia coli is an indication of faecal contamination and or water pollution. The presence of these organisms in fish represents a potential hazard to humans' life. Hence, care must be taken during processing to ensure pathogenic bacteria are eliminated before consumption.

Keywords: *Contamination; pathogens; healthy fish; water pollution; bacteria count.*

Background to the Study

Fish is consumed and regarded as a good source of dietary protein in many nations (Gufe *et al.*, 2019). It is the most significant source of protein, contributing roughly 16% of the animal protein consumed globally. Additionally, it is believed that approximately one billion people rely on fish as their main source of animal protein on a global scale (Muhammad *et al.*, 2020a;

Muhammad *et al.,* 2020b). The fish has high nutritional properties, minimal saturated fat and a good supply of essential fatty acids, high levels of vitamins, minerals as well as high-quality vital proteins (Gufe *et al.,* 2019; Ibrahim *et al.,* 2014). Fish is a popular global food and a low-cost source of protein in many underdeveloped countries (Tacon and Metian, 2013). Fish is considered to be low in fat and cholesterol and to be very easily digested, making it excellent for young children, adults, and the elderly and owing to it being less expensive when compared to other animal proteins such as beef and chicken, it is easily affordable (Gufe *et al.,* 2019).

In both domestic and foreign markets, the microbiological quality of fish and shellfish has been a major public health problem. The presence of pathogenic microorganisms in contaminated products affects consumers due to health issues resulting from contaminated fishes (Mhango *et al.,* 2010). Additionally, it involves other smaller organisms like the aquatic-native *Vibrio* genus, which poses a major health risk to people when consumed with raw or improperly prepared seafood (Muhammad *et al.,* 2020a). Infectious agents such pathogenic bacteria, which are present in the aquatic environment either naturally or as a result of human activity, are typically present on or inside sea foods (Sichewo *et al.,* 2013; Sichewo *et al.,* 2014; Saad, 2018). Pathogenic bacteria may be present in the skin, intestines, and gill region of live and fresh fish (Dutta and Panigrahi, 2014). *Escherichia, Listeria, Pseudomonas, Klebsiella,* and *Salmonella* are a few bacterial genera that have been isolated from fish and may be signs of multisource pollution (Sichewo *et al.,* 2013; Sichewo *et al.,* 2014). The majority of infections occur when individuals come into touch with water or other elements of fish habitats (Rastogi, 2007).

Food-borne illnesses remain one of the most common health issues that have contributed significantly to the global economic crisis. According to the current data, microbial contaminants are one of the main reasons why people get sick from eating certain foods. The issue that motivated this research was the high microbial load found in fish skin, gut, or gills, the issue of food safety posed by microorganisms, as well as aquaculture's great susceptibility to contamination from home, industrial, and agricultural waste (Muhammad *et al.,* 2020a). Microorganisms may infect fish in a number of ways. The current study's objective is to assess and identify the bacterial pathogens contaminating fresh fish in Taraba State's Wukari city. The goals of this study is to isolate, identify, and count all bacterial species in the fish samples that may be harmful to humans.

Materials and Methods

Sample Collection

A total of 12 fish samples, comprising eight (8) Tilapia (4 healthy and 4 spoilt) and four (4) Catfish (2 healthy and 2 spoilt) were bought from old market and Yam market of Wukari, Nigeria. They were transferred to the laboratory in a sterile polythene bag within an hour of purchase for identification and bacteriological analyses. Samples were kept in the refrigerator at 40C to avoid further deterioration before processing. The hardness, clarity of eyes, gill color of the fishes and the smell of seaweed were used to identify them as fresh fish (Muhammad *et al.,* 2020a).

Enumeration of Bacteria

The bacteria enumeration of the fish samples (skin, gill and intestine) was carried out by performing a serial dilution of the samples and plating them on a plate count agar as described by Agwaranze *et al.* (2017) and Agwaranze *et al.* (2018). The fish samples were diluted on a ten-fold serial dilution method. Exactly 1mL of 10^{-5} dilution factor was transferred onto a sterile Petri-dish containing plate count agar using spread plate techniques. The cultured media were incubated at 37°C for 24 h. after 24 h of incubation the plates were examined for distinct colonies and then counted using colony counter. The number of colonies counted were determined and expressed as colony forming unit per milliliter (CFU/mL).

Isolation and Identification of Bacteria

Fish organs such as the skin, intestines, and gills were each swabbed separately with a sterile cotton swab stick and inoculated into a solution of 10 mL peptone and then cultured on sterile nutrient agar plates followed incubation at 37°C for 24 h. The cultured plates after incubation were examined for distinct colonies which were isolated and subcultured in fresh sterile nutrient agar medium followed by successive streaking to ensure purity (Muhammad *et al.,* 2020a). The pure cultures were identified using the four step characterization techniques (cultural characteristics, microscopy, biochemical reactions and sugar fermentation tests) as described by Fawole and Oso, 1988; Okereke and Kanu, 2004; Ugbogu and Ogodo, 2015). The isolated and identified organisms were grown on blood agar medium to observe hemolysis to account for pathogenicity.

Results

The total plate counts of bacteria obtained from spoilt fish samples were shown in Table 1. The result showed that the intestinal region had a higher bacteria load (too numerous to count) than the gills and skins regions (Table 1). The total bacteria count ranged from for catfish and from 1.20×10^6 CFU/mL to too numerous to count (TNTC) fish.

Table 2 presented the bacteria load of the fresh fish sold in Wukari markets. The load ranged from 1.20×10^6 CFU/mL to 2.72×10^7 CFU/mL. The highest bacteria load was observed in the intestinal region of the fishes. The pathogenic bacteria isolated from the samples and their frequency of occurrence shows that *Staphylococcus aureus* (72.2%) was the most common, followed by *Escherichia coli* (27.8%) (Table 3).

Table 1: Enumeration of Bacterial in Spoilt Fish Samples.

Sample	Fish Species	Region	Bacteria Load (CFU/mL)
OMT1	Tilapia	Skin	1.2×10^6
		Gill	1.08×10^7
		Intestine	2.37×10^7
OMT2	Tilapia	Skin	6.8×10^6
		Gill	1.04×10^7
		Intestine	TNTC
OMC1	Catfish	Skin	2.4×10^6
		Gill	1.2×10^6
		Intestine	3.44×10^7
YMT1	Tilapia	Skin	4.8×10^6
		Gill	1.28×10^7
		Intestine	TNTC
YMT2	Tilapia	Skin	1.12×10^7
		Gill	1.40×10^7
		Intestine	TNTC
YMC1	Catfish	Skin	5.6×10^6
		Gill	4.4×10^6
		Intestine	TNTC

OMT_{1-2} = Old Market Tilapia; OMC_1 = Old Market Catfish; YMT_{1-2} = Yam Market Tilapia; YMC_1 = Old Market Catfish; TNTC = Too Numerous To Count

Table 2 Enumeration of Bacteria in Fresh Fish Sample

Sample	Fish Species	Region	Bacteria Load (CFU/mL)
OMT1	Tilapia	Skin	5.2×10^6
		Gill	4.3×10^6
		Intestine	1.20×10^7
OMT2	Tilapia	Skin	6.2×10^6
		Gill	6.2×10^6
		Intestine	1.80×10^7
OMC1	Catfish	Skin	6.4×10^6
		Gill	8.4×10^6
		Intestine	2.72×10^7
YMT1	Tilapia	Skin	5.6×10^6
		Gill	4.3×10^6
		Intestine	2.62×10^7
YMT2	Tilapia	Skin	5.3×10^6
		Gill	8.4×10^6
		Intestine	1.50×10^7
YMC1	Catfish	Skin	5.5×10^6
		Gill	8.2×10^6
		Intestine	1.48×10^7

OMT_{1-2} = Old Market Tilapia; OMC_1 = Old Market Catfish; YMT_{1-2} = Yam Market Tilapia; YMC_1 = Old Market Catfish; TNTC = Too Numerous to Count.

Table 3: Bacteria Isolates and their Percentage Frequency of Occurrence

Isolated Bacteria	Frequency	Percentage Frequency (%)
Staphylococcus aureus	13	72.2
Escherichia coli	5	27.8
Total	18	100

Discussion

The presence of pathogens in fish could be caused by microbiological pollution of the lake, which includes runoff and storm-water that contain deposits from forestry, urban, and rural settlements and pose a health risk to people. Another possibility is contamination during a multistep handling process from the harvest areas to the fish market, which would lower the quality of fish available for consumption in the local fish market (Raufu *et al.,* 2014). Fishery products have been identified as a significant source of food-borne pathogens (Kamat *et al.*, 2005; Upadhyay *et al.,* 2010). Human infections brought on by organisms transmitted from fish are common and depend on the season, the patient's contact with fish, their dietary habits, and their immune status (Bhaftopadhyay, 2000; Raufu *et al.,* 2014). The prevalence of *Salmonella* was found to be highest in fish imported to the United States from the Asia-Pacific region, followed by seafood from the Middle East, Southeast Asia, and Africa, according to studies (Heinitz *et al.*, 2000; Raufu *et al.,* 2014).

In this study, the bacteria isolated include *Staphylococcus aureus* and *Escherichia coli*. Similar observation has been reported by Muhammad *et al.* (2020a), who isolated same organisms from fresh fish organs in their study. Moreover, previous report indicated the presence of *Escherichia coli, Pseudomonas aueriginosa, Shigella dynteriae, Staphylococcus aureus, Enterococcus faecalis* and *Salmonella* typhi in a study 'isolation and identification of pathogenic bacteria in edible fish: A Case Study of Fletcher Dam in Gweru, Zimbabwe (Sichewo *et al.,* 2013). These microorganisms are known to be associated with human diseases. This is an indication that the contamination of fresh fish with certain bacterial infections must have occurred through poor post-harvest handling. Moreover, improper handling can cause fresh fish to become contaminated with human normal flora like *Staphylococcus aureus* and *Salmonella typhi* (Raufu *et al.,* 2014; Saad *et al.,* 2018) and *Eshcherichia coli* (Mhango *et al.,* 2010). *Staphylococcus aureus* and *Eshcherichia coli* from the skin of *Clarias gariepinus* could be due to poor management and have been associated with human fish-borne illnesses (Ikpi and Offem, 2011), *Clarias gariepinus*, *Staphylococcus aureus, Eshcherichia coli* and *Pseudomonas fluorescens* was identified after research on the presence of bacteria in the skin, gut, and gill of mudfish. This is comparable to the present study findings were *Staphylococcus aureus* and *Escherichia coli* was isolated. The findings of this study indicate that the fish under investigation have poor microbiological quality and may be hazardous to the general public's health (Ikpi and Offem, 2011; Muhammad *et al.,* 2020a).

The presence of *E. coli* and *S. aureus* in the present study suggests fecal and environmental contamination (Gufe *et al.,* 2019). *Escherichia coli* and other coliforms are indicators of human and other animal's faecal contamination (Cho *et al.,* 2004). However, according to Muhammad *et al.* (2020) *Staphylococcus aureus* appears rarely as normal microflora of fish and shellfish. *Escherichia coli* is a known reliable indicator of faecal contamination in small amounts, and in large amounts, it is a sign of improper handling and can lead to food borne infections (Muhammad *et al.,* 2020a). Hence, the need for monitoring and inspection of fishes for human consumption.

Conclusion

This study has shown that the bacteria load on the fishes are high and the isolation of *Escherichia coli* and *Staphylococcus aureus* from fishes are of public health concern. Therefore, there is need for monitoring and inspection of fishes for human consumption. Also, there is need for hygienic measures during handling and processing to avoid the outbreak of infections due to the organisms encountered in this study.

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AN EPISTEMIC INSIGHT OF THE POSITIVE AND NEGATIVE IMPACTS OF SCIENCE AND TECHNOLOGY ON HUMANITY

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Abstract

Human's quest for meaningful living and the manipulations of nature (environment) to their advantage has led to the advancement of modern science and Technology. The persistent quest by human beings to get things done easier and faster with precision and objectivity has made science and technology come to stay. However, the major concern of this paper is to expose the positive and negative effects of science and technology to human beings. The "critical rational analytical method" was adopted in this research. As such, the paper uncovered that though science and technology are beneficial to humans if and only if they are properly regulated before adoption for utilization and after utilization.

Keywords*: Science, Technology, Humanity Precision, Objectivity.*

Background to the Study

Human quest for meaningful living has led to the development of science and technology. Humans' right from antiquity has inherently in them the insatiable quest to better appreciate and understand their universe and its environments including humans themselves. It is a 'truism' that humans are born into a very challenging environment and to subdue these challenges humans have consistently advanced ideas(science) and tools(technology) which help mitigate some of these environmental challenges which ranges from health, agriculture, education, security, drought, flooding to mention a few.

Consequently, the birth of this paper was necessitated by the way science and technology are being developed and utilized in our contemporary world without very strict and objective regulations which puts us all in danger of a likely collapsed world. Today, in a bid to become a world power, countries are developing weapons of mass destruction as seen in the developments of the Ebola virus, Covid 19 virus, Influenza virus to mention a few, which brought a serious setback to the world from 2018, 2019 and most devastatingly, in 2020 when millions of people died in various countries of the world as a result of having contacts with these viruses. Also, the unregulated advent of the social media with its negative tendencies, the evolution and subsequent development of artificial intelligent machines (AI) to act in place of humans with its inherent gaps to mention a few are not doing humans much good if not properly regulated. Hence the need to expose some of the positive and negative impacts of science and technology cannot be over emphasized.

Positive Impacts of Science and Technology

Enhances Educational Development: The advent of science and technology no doubt has helped in the area of teaching and learning for example, the use of electronic white boards, computers and the internet positively, has advanced modern teaching and learning in an unprecedented manner (Cox,24). Today, students can stay in the comfort of their homes and receive lectures online. Science and technology have also made it possible for teachers and students, to readily access wealth of literatures in the internet. The use of science and technology in the educational sector could be seen in the development of electronic library, visual aids, hearing aids and robots.

Enhances Agricultural Development: The use of science and technology, in boosting food production could be seen in the areas of hybrid verities production of seeds and animal species (Snexplores, 13). The use of these hybrid seeds enhances the growth of crops such that, crops produce fruits faster than the usual duration. For example, an orange tree, which naturally will take up to three years and above to produce fruits, could now take just a year. Rice seeds that usually take three months to harvest can now be harvested within two months. Same goes in the area of animal husbandry, where chickens could be ready for consumption within two to three months and could lay numerous eggs without mating, but by just eating hybrid feeds. Also, the use of science and technology has enhanced the use of land as scarce resources in the production of food. Such that a piece of land could be used for both farming of animals and crops with symbiotic benefits. For example, crops are grown to be used as feeds for farm animals on some piece of land. In the area of maximum utilization of land in agricultural production, modern mixed farming and crop rotation are encouraging, where for example a piece of land could be used for the farming of varieties of crops with mutual benefits. The use of drones for applying fertilizers and insecticides has also enhanced agricultural development.

Enhancement of Security: Out world today is more challenges than ever by insecurity inform of terrorism, kidnapping, armed robbery, banditry to mention a few. The use of science and technology in the production of surveillance cameras, drone aerial target missiles e.g. AGM – 158 JASSM global positioning system with subsonic speed (Cloudfare,92), to mention a few, has helped in tackling insecurity in some countries like the United States of America (U.S.A), Russia, Germany, and France.

Enhancement of Transportation: In the ancient period, the means of transportation was the use of horses, camels, elephants, donkeys, simple boats, yaks, cattle, buffaloes and trekking (National Geographic, 2022). However, in modern times due to the advent of science and technology, transportation has been made a lot easier and fast owing to the development of standard aeroplanes, faster moving vehicles, supersonic electronic trains, ships and fast-moving boats.

Advancement in Communication: During the ancient period, the use of cave paintings, smoke signals, symbols carrier pigeons and telegraph were in vogue. In Nigeria for example, the use of town criers, wooden and metal gongs, talking drums, blast of local guns, age groups, open market, setting fire on bushes and palm frond for communication were adventently used (Rogers, 2019). But in modern times the development of science and technology has helped to make communication easier and faster owing to the production of cellular phones, mobile phones, e-mail, videos, fax machines, radios and television.

Advancement in Healthcare: Treated illness with magic, herbal remedies without actual dosage, traditional healers and witch doctors. During this period, medical practice was basically primitive unregulated and speculative. However, the advent of science and technology in modern period, has given a more sophisticated approach to medical practice. Today, ailments are easily diagnosed via the use of microscope, diagnostic computers, scanning machines, X – ray machines, surgical computers and machines. Higher level effication drugs are used for the treatments of bacterial, viral fungal and parasitic diseases (Chika et al., 2024)

Environmental Protection: In recent times science and technology has helped in the areas of waste recycling for example in Nigeria, plastic wastes are used to manufacture bricks that are resistant to water, fire and heat which could be used for road construction and building of houses (Paterska, 2023)

Closing Discriminatory Gaps: The advent of science and technology is assisting in the detection of all kinds of discrimination such as: gender gap, exclusion of minorities to mention a few. The use of Artificial Intelligence models are used to detect hate speeches in all forms and sizes. The implementations of science and technological solutions makes the physical spaces more accessible to some human beings that are physically challenged (Loeppky and Cyr, 2022)

Negative Impacts of Science and Technology

Digital eye strain: According to the American Optometric Association (AOA), prolonged use of computers, tablets, and cellphones can lead to digital eye strain.

Symptoms of digital eye strain may include:

i. Blurred vision
ii. Dry eyes
iii. Headaches
iv. Neck and shoulder pain (Schimelpfening and Schulman, 2022)

Contributing factors are screen glare, bad lighting, and improper viewing distance. The AOA recommends the 20-20-20 rule to ease eye strain. To follow this rule, try to take a 20-second break every 20 minutes to look at something that's 20 feet away.

Musculoskeletal problems: When you use a smart phone, the chances are that you're holding your head in an unnatural forward-leaning position. This position puts a lot of stress on your neck, shoulders, and spine. A small 2017 study found a clear association between self-reported addiction to smart phone use and neck problems (Cohen and Cyr, 2022). An earlier study found that among teens, neck-shoulder pain and low back pain rose during the 1990s at the same time that the use of information and communication technology was increasing. Overuse of technology can also lead to repetitive strain injuries of the fingers, thumbs, and wrists.

If you're feeling the pain of technology, you can take the following steps to reduce these issues:

i. Take frequent breaks to stretch
ii. Create an ergonomic workspace
iii. Maintain proper posture while using your devices
iv. If pain persists, see a doctor.

Sleep problems: Technology in the bedroom can interfere with sleep in a number of ways. A 2015 study demonstrated that exposure to the blue light that devices emit can suppress melatonin and interrupt your circadian clock. Both of these effects can make it harder to fall asleep and result in you being less alert in the morning (Rice and Schulman, 2024). Having electronic devices in the bedroom places temptation at your fingertips, and it can make switching off more difficult. That, in turn, can make it harder to drift off when you try to sleep.

Emotional problems: Using social media can make you feel more connected to the world. But, comparing yourself to others can leave you feeling inadequate or left out. A resent study looked at the social media use of more than 1,700 people between the ages of 19 and 32. The researchers found that those with high social media use felt more socially isolated than those who spent less time on social media. A 2011 cross-sectional survey of high school students in Connecticut found that internet use was problematic for about 4 percent of the participants. The researchers said that there might be an association between problematic internet use and depression, substance use, and aggressive behavior. They also noted that high school boys, who, according to the researchers, tend to be heavier users of the internet, may be less aware of these problems (Ries and Chesak, 2022). A 2016 systematic review produced mixed findings on the relationship that social networks have with depression and anxiety. The evidence suggests that social network use correlates with mental illness and well-being. However, the researchers noted that whether it has a beneficial or detrimental effect depends on the quality of social factors in the social network environment. More research is necessary to make conclusions on cause and effect. If social media use makes you feel anxious or depressed, try cutting back to see if doing so makes a difference.

Fake news & misinformation: Fake news and misinformation have been with us for quite some time, but with science and technological advancements moving rapidly, people find it hard to keep up with what's true and what's not. 61% of the Edelman Barometer 2020 admitted that the pace of change in technolism is too fast. 57% of them think digital media platforms they use are contaminated with untrustworthy information. And after the Cambridge Analytical scandal, 76% of people worry that fake news is being used as a weapon to polarize and radicalize. This has been reinforced by the pandemic which resulted in a fake news boom, adding to the confusion and insecurity among the global population (Mammoser and Kevin Cyr, 2022). Deepfakes are an example of quite a recent threat and a big pain for all social media platforms. Numerous deepfakes incidents have already happened. A recent one was with the Dutch parliament's foreign affairs committee, which was fooled into holding a video call with a deep-fake impersonating a Russian opposition leader. No real damage was done that time. However, it was a quick lesson illustrating a potential threat for the future (Radcliffe and Cyr, 2022).

Consequently, in order to combat Deepfake videos, back in 2019, Facebook launched a Deepfake Detection Challenge to develop autonomous algorithmic detection systems. Social media platforms in general are struggling with content moderation. At the beginning of 2021, Twitter launched a pilot “Birdwatch” programme, aiming to build a community to help fight misinformation and fake news.

Social media's impact on mental health: social media relies on instant gratification. All apps' notifications are there to lure a person back into the app and scroll. According to neuroscientists at Freie University in Berlin, social media notifications (especially likes, follows etc.) activate our brains' reward system. Numerous studies showed that social media exposure might lead to a prolonged feeling of loneliness and detachment. The popularly used phrase, FOMO (fear of missing out), is linked directly to intensive social media use. It refers to a situation when a person is flooded with content of friends, colleagues, or even influencers doing exciting things while their life or activities seem mundane and somewhat worse. It is especially harmful at a young age, as even though people are aware that the content they see is just a set of highlights of someone's life, it leaves them feeling lonely and lacking on a subconscious level (Kapeliushnikov, 96).

Connected to FOMO and social media anxiety is declining self-esteem. A lot of research has been done on the subject, but the conclusions are still very much inconclusive. A team of researchers from Ryerson University Toronto analyzed cumulative results from 121 studies to see if they could reach a consensus. They found a small yet significant negative relationship between social media use and one's self-esteem, suggesting that the higher level of social media use, the lower your self-esteem. Other findings were that people using social networking sites might be doing so at the expense of their in-person relationships. People with low self-esteem were naturally more drawn to social media as it helped them avoid awkward real-life experiences. (Metych, 2022)

Increase Unemployment Rate: The advancement in science and technology has made it possible for machines to do rook faster, easier and better. This poses a threat because one machines is capable of doings the jobs more humans could do at a time, for example, in today's world people get medical help online study and bags degrees online, trade and shops online, banking, commerce are done outline to mention a few. These could create or is creating serious unemployment situation in the society.

Weapon of Mass Destruction: The advancement in modern science and technology is posing serious threats to human beings in the areas of the developments in Nuclear and biological weapons. For example, in the Second World War (WWII), the use of uranium and atomic bombs was observed in the destruction of Hiroshima and Nagasaki in Japan which still affects their environment till date. The use of the Covid19 Virus in 2020 was catastrophic to the world and was said to have been developed in a laboratory in Wuhan, china. The Ebola Virus is yet another deadly biological warfare that the world has created via the advancement of science and technology. A lot of lives were lost due to this deadly Virus in Liberia, Nigeria and some parts of the world in 2013 to 2014 (Ngowera, 2022)

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YOUTH UNEMPLOYMENT AND ITS IMPACT ON INDUSTRIAL OUTPUT GROWTH: AN EMPIRICAL STUDY

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Abstract

This study investigates the relationship between youth unemployment and industrial output growth in Nigeria, utilising a Vector Error Correction Model (VECM) to analyse data from 1991 to 2021. The results reveal a significant negative relationship between youth unemployment and industrial output growth, with a 1% increase in youth unemployment leading to a 0.44% decrease in industrial output growth in the long run. In the short run, a 1% increase in youth unemployment results in a 7.75% decline in industrial output. The Granger causality test indicates no direct causal relationship between youth unemployment and industrial output growth, suggesting they are interrelated but do not predict one another. The findings highlight the pressing need for policies aimed at reducing youth unemployment, including targeted vocational training and entrepreneurship support, to enhance industrial productivity and foster sustainable economic growth in Nigeria. The study underscores the importance of addressing youth unemployment for the overall health of the industrial sector.

Keywords: *Industrial output, youth unemployment, Nigeria, Cointegration*

Background to the Study

Nigeria's economic history has been profoundly shaped by its heavy reliance on crude oil, especially following the oil boom of the 1970s. During this period, the country neglected its agricultural and industrial sectors in favour of crude oil, which became the dominant source of revenue. By 2000, oil and gas exports accounted for over 98% of Nigeria's export earnings and 83% of federal government revenue (Chete, 2015). This dependency led to the decline of other critical sectors, resulting in widespread poverty, especially in rural areas where agricultural activities dwindled (Anyanwu et al., 2022). As industrial output remained low, unemployment rates surged, particularly among youth. The combination of a shrinking industrial base and increasing youth unemployment created a cycle of stagnation in Nigeria's economy, presenting significant challenges for sustainable development (Florence, 2015).

The importance of industrial output in driving economic growth and development cannot be overstated. Before the oil boom, Nigeria's economy was primarily agricultural, producing domestic and export goods (Adeyeye & Aluko, 2017). The British colonial infrastructure fostered a conducive environment for trade, and Nigeria's first development plans prioritised industrial growth. However, the oil boom of the 1970s shifted focus entirely to the petroleum sector, resulting in a decline in industrial productivity (Adebayo & Ogunrinola, 2011). This trend continued despite several government efforts, including the Structural Adjustment Programme (SAP) introduced in 1986, which aimed to revitalise the industrial sector and reduce dependency on oil. Nevertheless, the industrial sector's performance has been consistently weak, further contributing to high levels of youth unemployment (Kukaj, 2018). The neglect of manufacturing and other industrial activities has left a significant gap in the economy, stalling job creation and hampering overall economic growth.

Youth unemployment, which has been steadily rising in Nigeria, remains a critical factor impeding the country's economic development. Between 1991 and 2021, Nigeria's industrial output growth struggled to keep pace with the rapidly growing labour force, particularly among the youth. As the youth constitute a large proportion of Nigeria's workforce, unemployment limits economic productivity and exacerbates socio-economic issues such as poverty, inequality, and crime (Anyanwu et al., 2022). Despite several initiatives and policies by the Nigerian government aimed at reducing unemployment, the industrial sector has not sufficiently absorbed the growing number of job seekers. Studies indicate that a robust industrial sector could mitigate youth unemployment by creating new employment opportunities, yet Nigeria's reliance on oil revenue has stifled growth in this area (Kalu et al., 2020).

This study focuses on the relationship between youth unemployment and industrial output growth in Nigeria from 1991 to 2021. This research aims to empirically analyse how the industrial sector's performance has influenced youth unemployment during this 30-year period. It will also explore the potential for industrial development to address the unemployment crisis. By focusing on industrial output rather than overall economic growth, this research aims to fill gaps in the existing literature, which has often overlooked the specific impact of industrial growth on youth unemployment. The study will examine historical trends, policy interventions, and potential strategies to boost industrial output and reduce youth unemployment, contributing to Nigeria's long-term economic development.

Empirical Review

Okun's Law is a foundational concept in macroeconomic theory, linking unemployment dynamics and output growth. Named after economist Arthur Okun, the Law posits that for every 1% decrease in unemployment, there is a corresponding 3% increase in industrial output (Okun, 1962). This relationship highlights the inverse connection between labour market performance and economic productivity, making it a crucial tool for understanding economic cycles. Okun used two models to estimate this relationship, consistently finding a negative correlation between unemployment and output. Okun's Law is particularly relevant for this research as it underscores the importance of industrial output growth in mitigating youth unemployment in Nigeria. Given the rising trend of youth unemployment and stagnating industrial productivity in Nigeria, Okun's Law provides a theoretical framework for exploring how improving industrial output could significantly reduce unemployment, thus fostering economic development.

The literature on the relationship between unemployment and economic growth presents varied findings across different countries and methodologies. Hjazeen et al. (2021) identified a long-run negative relationship between economic growth and unemployment in Jordan, with factors such as education, the female population, and urbanisation contributing positively to unemployment. In the Western Balkans, Kukaj (2018) found that a 1% increase in unemployment resulted in a 0.5% decrease in GDP growth, emphasising the detrimental effect of unemployment on economic development. In Nigeria, studies by Anyanwu et al. (2022) and Serifat (2020) highlighted how youth unemployment exacerbates economic stagnation, worsened by issues like population growth, corruption, and skill deficits. These studies suggest the need for focused policy interventions, particularly in education and entrepreneurship, to reduce unemployment and enhance economic growth.

The empirical assessment of Okun's Law in various economies provides mixed results. Arewa and Nwakanma (2012) found no evidence supporting Okun's Law in Nigeria, suggesting that output growth alone cannot explain unemployment trends. Conversely, Stober (2015) validated Okun's Law in the UK, concluding that a 1.8% growth rate is required to stabilise unemployment. Sadiku et al. (2015) examined the relationship between unemployment and output growth in Macedonia using ECM and VAR techniques, finding no significant connection between the two variables. Moosa (2008) also found that Okun's Law did not apply to Jordan's economy. Noor et al. (2007) confirmed a negative relationship between unemployment and output growth in Malaysia, with evidence of bi-directional causality. These findings suggest that Okun's Law's validity depends on individual economies' structural dynamics.

Makun and Azu (2015) extended this investigation by analysing the relationship between unemployment and economic growth in Fiji from 1982 to 2012. Using time series data, their findings revealed a significant long-run relationship between economic growth and unemployment, suggesting that higher output growth rates are necessary to reduce unemployment in the Fijian economy. Similarly, Tatlonghari (2016) validated Okun's Law for the Philippines using the ARDL model and discovered that labour force participation and trade openness significantly influenced unemployment. These studies underscore the complex and varied nature of the unemployment-growth nexus, highlighting that the relationship is highly context-specific and influenced by country-specific economic conditions.

Methodology

Model specification

The model represents the regression of youth unemployment, exchange rate, and labour supply on industrial output to achieve the impact of the explanatory variables on the explained variable. This model would be a modified version of Okun's Law, which is denoted as,

$$\Delta Ut = \beta_0 + \beta_1 \Delta Yt \quad u_t \qquad 1$$

Where Y is the real output, U is the level of unemployment, ε is the error term, β is the parameter known as Okun's coefficient and indicates changes in real output caused by changes in the unemployment rate. The functional form is as follows:

An augmented version of Okun's Law based on Nwankwo and Ifejiofor (2014).

$$IOG = f(YUR, EXC, LS) \qquad 2$$

Equation 3.2 states that Industrial output growth is functional to the youth unemployment rate, exchange rate and labour supply. Econometric model:

$$IOG_t = \beta_0 + \beta_1 YUR_t + \beta_2 EXCR_t + \beta_3 LS_t + \mu_t \qquad 3$$

Where IOG is the Growth Rate of Output, *YUR* is the Youth Unemployment Rate, EXCH is the Exchange Rate, *LS* is the labour supply, μ is the Error term and *t* is. β0, β1, β2, β3, are the coefficients. The data used in this study is time series data sourced from CBN Statistical Bulletin 2022, World Bank 2022 and IMF 2022. The variables include Industrial output, youth unemployment rate, labour supply and exchange rate from 1991 to 2021.

Method of Data Analysis

The estimation technique for this study involves a series of econometric tests to ensure robust analysis and accurate results. First, descriptive statistical analysis summarises key statistical properties of the variables, such as mean, standard deviation, skewness, and kurtosis. The Granger causality test is then applied to determine if there is a causal relationship between the variables and its direction. To ensure that the time series data used is reliable, a stationarity test using the Augmented Dickey-Fuller (ADF) method is conducted to detect any random walk issues. Next, the Johansen Cointegration test checks for a long-term equilibrium relationship among the variables. Finally, the Vector Error Correction Model (VECM) is estimated to adjust for both short-run dynamics and deviations from long-run equilibrium, offering insights into immediate and gradual changes in the studied variables.

Table 1 Descriptive Statistics

	IOG	YUR	LS	*ln*EXC
Mean	0.215037	9.937615	17.53906	4.325015
Median	0.209353	9.1035	17.53709	4.813527
Maximum	0.768446	20.666	17.86552	5.535332
Minimum	-0.18087	8.251	17.21868	2.293493
Std. Dev.	0.242703	2.709922	0.195349	0.959945
Skewness	0.513163	3.046924	0.019038	-0.78806
Kurtosis	2.652968	11.5438	1.839471	2.000306
Jarque-Bera	1.27159	119.3091	1.460632	3.773859
Probability	0.529514	0.00000	0.481757	0.151536
Sum	5.590973	258.378	456.0156	112.4504
Sum Sq. Dev.	1.472616	183.5919	0.954028	23.03737
Observations	30	30	30	30

Source: Author's computation using Eviews 10 student's version, 2022.

Results and Discussion

The descriptive statistics for the variables in this study highlight essential insights into youth unemployment (YUR) and industrial output growth (IOG). The mean values for YUR and IOG are 0.215037 and 9.937615, respectively, indicating that, on average, youth unemployment remained moderately high while industrial output growth fluctuated positively over the study period. The maximum value for YUR reached 0.768446, reflecting a significant surge in youth unemployment during certain periods, while the maximum value for IOG was 20.666, indicating notable spikes in industrial output growth. The standard deviation shows that YUR has a higher variability (0.242703) than IOG (2.709922), suggesting more volatility in unemployment trends. Both variables exhibit positive skewness, indicating that most observations were concentrated on lower values but with occasional higher peaks. The kurtosis value for YUR indicates a leptokurtic distribution, suggesting extreme deviations in youth unemployment. Jarque-Bera statistics reveal that while IOG is normally distributed, YUR is not, suggesting that atypical events or shocks have influenced youth unemployment during the period under review. This statistical snapshot emphasises the importance of addressing youth unemployment and its potential implications for industrial output growth in Nigeria.

Table 2 Unit Root Test

Variables	Level	1st Difference	Remarks
Constant Only			
IOG	-4.156744***	-4.724422***	I(0)
YUR	1.140886	-5.423782**	I(1)
LS	1.789203	-2.941951*	I(1)
EXC	-1.763704	-4.958549***	I(1)
	1% level	5% level	10% level
Test critical values:	-3.711457	-2.981038	-2.62991

Source: Author's computation using E-views 10 student's version, 2022.

Pres-Estimation Tests

This section presents the unit root test results, a pre-estimation procedure used to determine the stationarity of the data series and identify how many times the variables need to be differenced to achieve stationarity. The Augmented Dickey-Fuller (ADF) test was employed for this purpose, and the results are summarised in Table 2. Table 2 shows that all variables were stationary at 1^{st} Difference. In other words, they are integrated of order 1, except industrial output growth, which was stationary at level.

Table 3 Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.700368	61.19396	47.85613	0.0017
At most 1 *	0.552974	31.06395	29.79707	0.0356
At most 2	0.32733	10.93551	15.49471	0.2155
At most 3	0.040094	1.022988	3.841466	0.3118

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4 Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesised No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.700368	30.13	27.58434	0.023
At most 1	0.552974	20.12844	21.13162	0.0686
At most 2	0.32733	9.912526	14.2646	0.2177
At most 3	0.040094	1.022988	3.841466	0.3118

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Cointegration Test

The cointegration test was performed to determine whether a long-run relationship exists between the dependent and independent variables, utilising both trace statistics and Max-Eigen statistics. Results from the Unrestricted Cointegration Rank Test (Trace) and the Unrestricted Cointegration Rank Test (Maximum Eigenvalue) indicate long-run cointegration in the model, as both statistics exceed their respective 5% critical values. Consequently, the null hypothesis of no long-run relationship is rejected. Additionally, the probabilities for both the trace test and Maximum Eigenvalue are statistically significant at the 5% level, further supporting the rejection of the null hypothesis of no cointegration.

Short Run and Long Run Estimation

ECM (Error Correction Model) has been used to run estimation analysis. Having established a long-run relationship between the variables, using the Johansen cointegration test, it is pertinent to determine the variables' long-run and short-run coefficients. Thereby determining how youth unemployment, amongst other variables, affects industrial output. Following the procedure of Sadikova et al. (2017) and (Azeez, 2014), since there is a long-run relationship, ECM becomes the appropriate model for this purpose.

Table 5: Error Correction for Short Run

Variables	Coefficient	Standard Error	T-Statistics
CointEq1	-1.34713	-0.58969	[-2.28445]
D(IOG(-1))	0.39331***	-0.42476	[0.92595]
D(IOG(-2))	0.13212***	-0.30389	[0.43476]
D(YUR(-1))	-0.07575***	-0.087	[-0.87069]
D(YUR(-2))	0.165079	-0.1095	[1.50762]
D(LS(-1))	1.443293***	-36.4347	[0.03961]
D(LS(-2))	-14.7321	-35.9968	[-0.40926]
D(*ln*EXC(-1))	0.196272**	-0.20522	[0.95642]
D(*ln*EXC(-2))	-0.19084	-0.17414	[-1.09586]
C	0.351366***	-1.14885	[0.30584]

Note: *** means significant at 1%, ** stand for significant at 5%, and * is significant at 10%

The analysis of short-run coefficients using the Vector Error Correction Model (VECM), presented in Table 5, reveals that various variables influence industrial economic growth to differing extents. Specifically, the results indicate that a 1% increase in output growth from the previous year correlates with a significant 39.33% increase in current output in the industrial sector, assuming other factors remain constant. This relationship is statistically significant at the 1% level, highlighting the importance of industrial prior production in driving future growth. Focusing on youth unemployment, the findings show a detrimental impact on industrial output growth. The regression results demonstrate that a 1% increase in youth unemployment from the previous year leads to a 7.75% decrease in current output growth in the industrial sector, which is also statistically significant at the 1% level. This establishes a negative relationship between youth unemployment and industrial growth, aligning with Okun's Law, which posits that higher unemployment correlates with lower economic output. Consequently, the results lead to the rejection of the null hypothesis, asserting that Okun's Law applies in the Nigerian context, emphasising the urgent need to address youth unemployment to foster industrial growth.

Table 6: Error Correction for Long Run

Cointegrating Eq:	Coefficient	Standard Error	T-Statistics
IOG (-1)	1		
YUR(-1)	-0.00441*	-0.02257	[0.19537]
LS(-1)	0.496592***	-0.24946	[1.99065]
*ln*EXC(-1)	0.002143***	-0.04466	[0.04798]
C	-8.97257		

Note: *** means significant at 1%, ** stand for significant at 5%, and * is significant at 10%

In the long run, all variables significantly impact economic growth. The relationship between youth unemployment and industrial economic growth remains negative, consistent with the short-run findings, although the magnitude of the effect differs. Specifically, a 1% increase in the youth unemployment rate results in a 0.44% decrease in industrial output growth, assuming other factors are constant (see Table 6). This result is statistically significant at the 10% level. Given that youth are typically the most dynamic workforce, their disengagement from the production process hampers efficiency and can be perceived as a societal nuisance. Consequently, this disengagement harms economic growth within the industrial sector, underscoring the urgent need for policies to integrate youth into productive activities.

Granger Causality Test

The Granger causality test is essential to understand the interrelationships among the variables in this study, as it determines whether one variable can predict another over time. Table 7 presents the results of the Pairwise Granger Causality Test, focusing on the relationship between youth unemployment rate (YUR) and industrial output growth (IOG). The first null hypothesis posits that YUR does not Granger-cause IOG, with a p-value of 0.8741. This value, significantly higher than the conventional threshold of 0.05, leads us to fail to reject the null hypothesis, indicating that changes in youth unemployment do not influence industrial output growth. Conversely, the test also shows that IOG does not Granger cause YUR, reinforcing the absence of a causal relationship between these variables. These findings suggest that fluctuations in industrial output do not affect youth unemployment rates, highlighting the need for policymakers to consider other factors influencing both issues, as addressing one may not inherently resolve the challenges associated with the other.

Table 7: Pairwise Granger Causality Tests

Null Hypothesis:	Obs.	F-Statistic	Prob.
YUR does not Granger Cause IOG	28	0.13548	0.8741
IOG does not Granger Cause YUR		0.18675	0.8311
LABS does not Granger Cause IOG	28	1.95954	0.1671
IOG does not Granger Cause LABS		1.46285	0.2553
LNEXCR does not Granger Cause IOG	28	1.8022	0.1907
IOG does not Granger Cause LNEXCR		5.94609	0.0094
LABS does not Granger Cause YUR	28	2.73951	0.0888
YUR does not Granger Cause LABS		1.6391	0.2192
LNEXCR does not Granger Cause TUR	28	1.00314	0.3844
YUR does not Granger Cause LNEXCR		0.63243	0.5416
LNEXCR does not Granger Cause LABS	28	6.82951	0.0055
LABS does not Granger Cause LNEXCR		1.15308	0.3358

Source: Author's computation using E-view 10 Version

Stability Test

The stability test is crucial for assessing the reliability and consistency of results, confirming a significant relationship between the variables. This study applied diagnostic tests, including the Jarque-Bera test for normality, the Breusch-Godfrey serial correlation Lagrange Multiplier test, and the Breusch-Pagan-Godfrey heteroscedasticity test. The results show that the model is normal, with no signs of serial correlation or heteroscedasticity. The high R-square and adjusted R-square values indicate that the independent variables strongly influence the dependent variable, accounting for over 50% of the variation. The null hypotheses for normality, serial correlation, and heteroscedasticity tests were accepted, as their probabilities were significantly high. Overall, the Vector Error Correction Model (VECM) used in this analysis is stable, dependable, and free of specification errors, as indicated by the plotted stability lines within acceptable boundaries.

Table 8: Stability Test

R-Square	0.677397
Adjusted R-square	0.470009
Serial Correlation	19.18024 (0.2594)
Heteroscedasticity Test	190.4125 (0.2831)

Note: Numbers in parentheses are probabilities. The serial correlation test was with Breusch-Godfrey serial correlation Lagrange statistics, and the heteroscedasticity test was with the Breusch-Pagan-Godfrey test. All were done using the E-views 10 version.

Conclusion

This study has established a significant and negative relationship between youth unemployment and industrial output growth in Nigeria. The findings indicate that an increase in the youth unemployment rate leads to a notable decline in industrial output, as evidenced by both short-run and long-run analyses. This negative correlation underscores the implications of Okun's Law within the Nigerian economy, revealing that as youth unemployment rises, industrial productivity suffers, ultimately hindering overall economic growth. The results from the Granger causality test further suggest no direct causal relationship between youth unemployment and industrial output growth, indicating that while they are interrelated, changes in one do not predict changes in the other. These insights highlight the urgency for targeted interventions to address youth unemployment, critical for fostering industrial growth and economic sustainability.

Based on the findings, several recommendations can be made to enhance industrial output growth while addressing youth unemployment. First, policymakers should prioritise creating job opportunities specifically tailored for the youth, particularly in the industrial sector. This could involve investing in vocational training programs that equip young individuals with the necessary skills to meet the demands of the industry. Also, fostering partnerships between educational institutions and industries can facilitate internships and apprenticeships, providing youth with practical experience and enhancing their employability. Furthermore, promoting youth entrepreneurship can stimulate job creation and drive innovation within the industrial sector. Finally, the government should implement policies that support small and medium-sized enterprises (SMEs), as they play a vital role in absorbing youth labour and contributing to industrial output growth. Through these strategic initiatives, it is possible to mitigate youth unemployment and boost industrial productivity, ultimately leading to a more robust and resilient economy.

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