



DIGITALIZATION OF TRAFFIC MANAGEMENT IN NIGERIA: AN ASSESSMENT OF THE TRAFFIC LIGHT IN CALABAR METROPOLIS, CROSS RIVER STATE

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Abstract

This study examined the digitalization of traffic management in Nigeria: an assessment of the traffic light in Calabar Metropolis, Cross River State. Specifically, the study sought to investigate if the installation of traffic light has helped to ease long vehicular queues among motorists in Calabar Metropolis, examine if traffic congestion related clashes among motorists have reduced due to the installation of digitized traffic lights in Calabar Metropolis and ascertain if unguided roadside parkings of vehicles by motorists have been regulated due to the installation of traffic lights in Calabar Metropolis. The study adopted the survey design and the sample size for the study was 210 respondents from Calabar South and Calabar Municipality respectively. The instrument of data collection was the questionnaire and the data collected was analyzed using the chi-square technique. From the chi-square result, it was indicated that the installation of digitized traffic lights have not significantly helped to ease long vehicular queues among motorists in Calabar Metropolis, Traffic congestion related clashes among motorists have significantly reduced due to the installation of digitized traffic lights in Calabar Metropolis and unguided roadside parkings of vehicles by motorists have not been significantly regulated due to the installation of traffic lights in Calabar Metropolis. Based on the findings of the study, it was recommended that the State government should install adequate digitized traffic lights in Calabar Metropolis to help curb long vehicular queues. the authorities concern should replace faulty digitized traffic lights that are not functioning in Calabar Metropolis so as to assists in curbing traffic congestion related clashes, long vehicular queues and unguided roadside parkings and the State government should ensure that adequate digitized traffic lights are installed in Calabar South Local Government Area to help control traffic congestion related clashes, long vehicular queues and unguided roadside parkings.

Keywords: Digitalization; Traffic Management; Nigeria; Calabar Metropolis; Chi-square
JEL: 03;Y8; Z0

1. Introduction

Transport is crucial to a nation's growth since it influences all facets of life (Ogunbodede, 2008; Solanke, 2013). Consequently, transit is an essential element in an urban environment. Modern existence would be unfeasible without mobility, since it is crucial for the transportation of people, commodities, and knowledge (Salau, 2015). Transport is the cornerstone of urban economies worldwide, facilitating communication and the trade of goods among individuals (Mahabir, Crooks, Croitoru & Agouris, 2016). Nigerian cities have seen ongoing growth, resulting in transport provision lagging behind demand, which has led to escalating urban mobility issues despite potential inside these areas (Ogunbodede, 2008; Solanke, 2013).

The challenge of urban mobility emerged with increasing urbanisation and population growth, resulting in issues such as traffic congestion. This is a primary factor influencing the extent of physical development in Nigerian cities (World Bank & UNCHS, 2016 & Amelsfort, 2015). One of these difficulties is traffic congestion, a condition on road networks that occurs with heightened use and is associated with reduced speeds, extended trip durations, and longer queues of vehicles. Congestion occurs when traffic demand exceeds the capacity for vehicle contact, resulting in a diminished flow of traffic. It is important to recognize that traffic congestion occurs when urban transport networks are unable to accommodate the amount of traffic they receive. Ogunbode (2007) and Odeleye (2008) assert that this situation is precipitated by the rapid proliferation of automobiles and the inadequate advancement of the road infrastructure.

Congestion is attributable to many specific issues, including negligent driving, noncompliance with traffic signals, substandard vehicles, and insufficient road maintenance. The majority of these diminish a road's capacity at a certain point or over a defined distance, or they increase the number of vehicles required for a specified quantity of passengers and cargo. Digitalisation can address issues arising from road congestion and provides novel ideas for enhancing traffic management. Intelligent Transport Systems (ITS) use sensors, cameras, and communication technologies to gather real-time traffic information.

This data may be used for several applications, including optimising traffic signal timing, implementing dynamic signage, and offering route assistance to vehicles, so enhancing traffic flow efficiency. However, the efficacy of digital traffic management relies on dependable infrastructure to enable efficient traffic control. With the continuous rise in urban populations and motor traffic, traffic administration and gridlock have become significant issues in metropolitan environments. These factors have led to prolonged waiting periods, fuel wastage, and environmental pollution (Kurdi, 2014; & Traffic Management Centre (TMC), 2014). The adverse impacts are especially pronounced in developing nations such as Nigeria, where infrastructure development is hindered by financial constraints and bureaucratic obstacles. Consequently, it is imperative to implement a rapid, cost-effective, and efficient sophisticated traffic management system that delivers traffic statistics to commuters and mitigates congestion problems (Lokesh & Reddy, 2014).

Traffic congestion is a significant concern in metropolitan areas across Nigeria, including Calabar Metropolis in Cross River State (Bassey, 2023). This congestion is due to reasons like population growth, insufficient public transit alternatives, and ineffective

traffic management systems. Traffic congestion makes life in metropolitan centres such as Calabar Metropolis unbearable. The crowded traffic in Calabar Metropolis results in both air and noise pollution. Emissions from automobiles, including nitrous oxide (NO₂) and carbon monoxide, provide health risks to the population of Calabar Metropolis and the environment. With the rise in traffic, the frequency of road accidents also rises.

The primary causes of deaths are traffic accidents resulting from excessive speed, overtaking, and non-adherence to road traffic signals (Sulkami & Ade, 2017). A survey from the World Health Organisation designated Nigeria as the most perilous nation in Africa, with an annual mortality rate of 33.7 fatalities per 100,000 people. Economic Intelligence Magazine's investigation showed that among 49,867 individuals engaged in traffic accidents from 2013 to 2015, 15,011 were fatalities and 34,856 sustained injuries.

These underscore the reality that traffic accidents have badly affected lives and property. It has been projected that, without intervention, road traffic accidents would emerge as the fifth major cause of mortality by 2030. The current traffic management system, which relies on a time constant, is deficient in intelligence and has the capacity to address these issues, particularly as many metropolitan areas in Nigeria transition towards smart cities (Salisu, Sadiku & Tonga, 2019).

To mitigate traffic issues in Calabar Metropolis and alleviate their adverse effects, the Cross River State administration has implemented digitalised traffic signals at key locations for efficient traffic control and management. Nonetheless, a substantial traffic congestion persists throughout the city. Incorporating protracted vehicular incidents and traffic-related complications. The inquiry is: has the implementation of traffic lights contributed to the alleviation and regulation of traffic congestion among drivers in Calabar Metropolis? Has the installation of traffic signals reduced conflicts among motorists connected to traffic congestion? Has the regulation of unguided roadside parking among motorists occurred owing to the placement of traffic lights? This research examines these and several more factors.

The primary aim of the research is to analyse the digitalisation of traffic management in Nigeria, specifically evaluating the traffic lights in Calabar the city of Metropolis Cross River State. This research is organised into five components. Section one contains the introduction, section II examines the literature review and theoretical framework, while section three focuses on the methods. Section four concentrates on the presentation of data, analysis, and discussion of findings, whilst section five provides the conclusion and policy suggestions.

2. Literature Review and Theoretical Framework

2.1 Conceptual Framework

Concept of Traffic Management

Traffic management is regulating the movement of vehicles within a designated region to mitigate congestion and enhance safety. Traffic management generally encompasses traffic control strategies like lane closures, speed regulations, one-way roads, and turn limitations. Traffic specialists use mathematical equations to analyse traffic patterns and utilise this information to design more effective traffic management strategies. Traffic handling is an approach that requires continual adaptation to changing situations.

Consistent assessment and assessment of the efficacy of traffic management methods is crucial to guarantee their relevance to the current traffic conditions.

Traffic management is crucial for ensuring secure and efficient movement of vehicles. The objective of any traffic management approach is to mitigate congestion and enhance safety. An effective traffic management strategy may mitigate the likelihood of traffic accidents and decrease the duration individuals spend in congestion.

2.1.2 The Concept of Traffic Congestion

Road traffic congestion occurs when an urban road network can no longer support the volume of traffic, leading to impediments among vehicles due to the relationship between speed and flow as the transport system nears its capacity (Goodwin, 1997; Ogunsanya, 2002). Traffic congestion is persistent and is mostly caused by the volume of vehicles, largely due to traffic accidents (US Federal Highway Administration (FHA), 2008).

Traffic congestion is a transportation situation marked by reduced speeds, extended travel durations, and heightened vehicle queuing. Traffic congestion on metropolitan road networks has significantly increased since the 1950s. Congestion occurs when high traffic demand causes vehicle interactions to impede the flow of the traffic stream.

2.1.3 The Concept of traffic lights

Traffic lights are signalling apparatuses located at road junctions, pedestrian crossings, and other sites to regulate the flow of traffic. Traffic lights typically have three signals that convey significant knowledge to road users via colours and symbols, incorporating arrows and bicycles. The standard traffic light colours are red, yellow (or amber), and green, positioned either vertically or horizontally in that sequence. Despite worldwide standardisation, discrepancies in traffic signal sequences and regulations occur at both national and municipal levels.

2.2 Literature review

2.2.1 Traffic Lights and Traffic Congestion

In their 2023 study, Ali, Brek, and Bouakkez developed a simulator that constructs a traffic grid with traffic lights at intersections identical to those within big cities, optimising vehicle flow through the grid by creating algorithms for the changing states of the traffic lights. To optimise vehicular flow over the grid, algorithm for scheduling are being devised to regulate alterations in road traffic. Due to the positive feedback on our models, they successfully attained results that decreased the period of waiting by 30% relative to the standard model.

Hyunjin, Syed, and Yujin (2020) propose a Q-learning-based traffic signal control system that optimises vehicle throughput at intersections while balancing signal timings among routes. The primary advantage of this research is its QL structure, which may be used at several crossings. The suggested approach utilises various waiting queue lengths to compute incentives after an analysis of four distinct performance crossovers. The proposed technique exhibited favourable results regarding the standard deviation of queue lengths, together reduced waiting times and queue lengths.

The research conducted by Nabila, Salah, and Mawloud (2019) introduced three synchronisation techniques to enhance traffic light management at signalised junctions.

Upon the arrival of the negotiating cars, the ICANP (intelligent context-aware negotiation protocol) first halts the green timer for the standard vehicle phases, facilitating the swift passage of the negotiating vehicles through the designated junction. The ICANP has achieved substantial reductions in vehicle negotiating wait times. Total wait times at each fire rose by 65% compared to the circulator and shown a 42% improvement over ITLC (intelligent traffic light controlling) (Neelakandan, Berlin & Tripathi, 2021). The authors also provide the Negotiations Protocol Based on Reputation (NPBR). This strategy aims to mitigate the adverse impacts of unauthorised vehicle entrance congestion.

It uses the drivers' reputations to assess the quantity of fraudulent automobiles. Compared to ITLC and ICANP, NPBR decreased car negotiation wait times by 64% as well as 45%, respectively. This paper presents an Intelligent Context Prioritisation Process (ICAPP). The highest priority cars get final evaluation. ICAPP states that they can traverse the bridge without the need for negotiation. The wait time for priority vehicles was halved using ICAPP compared to CATLS (context-aware traffic light scheduling, Younes & Boukeche, 2016).

Roopa, Ayesha, Rajkumar, Venugopal, Iyengard, and Patnaike (2020) proposed a dynamic congestion management system aimed at maximising throughput, using social factors derived from interactions based on social, behavioural, and preference data (D-TMSA). The following information is provided in the paper's annotations: 1. A dynamic congestion management system using several relationship types enhances the overtaking rate and facilitates traffic flow. 2. Optimise non-conflicting traffic flow using dynamic structure. Optimise flow to regulate traffic signals and enhance the volume of flows.

The simulation findings indicate that the D-TMSA outperforms prior efforts by attaining elevated throughput, minimising overall trip time, and lowering the median amount of time to enhance traffic flow via their social interactions. Aleko and Djahal (2020) presented the Adaptive Traffic Light Control System (ATLCS) to assist traffic management authorities in efficiently addressing urban traffic congestion. The primary objective of ATLCS is to coordinate several traffic signals controlling neighbouring intersections by postponing the intervals at which each light turns green in a specific direction. To reduce the frequency of the "stop and go" phenomena, this delay is adjusted in real-time according to the amount of cars queued at each intersection. This enables cars leaving the city centre to go considerable distances without interruption, hence reducing their trip time. In comparison to non-synchronized fixed time Traffic Light Control Systems, the median duration of travel for vehicles moving in the synchronised direction has been markedly decreased (by as much as 39%), as shown by the performance evaluation of ATLCS.

Furthermore, an overall improvement of 17% was achieved throughout the whole simulated road network. Joo, Ahmed, and Lim (2020) proposed queue length standard deviation and throughput as the primary parameters for a Q-learning-based traffic signal management system in their research. The suggested approach demonstrates superior performance regarding the standard deviations of queue lengths, including reduced waiting times and queue lengths, in comparison to prior studies using Q learning. The traffic signal administration system is said to have identified the direction of traffic flow and allocated lights accordingly. This research examined traffic signal control applicable to various junction types.

2.2.2 Traffic Accidents and Traffic Light

In order to establish appropriate re-timing for intersections along the investigated road, Rafidi and Hamid (2014) investigated the amount of automobiles on Jalan Bukit Gambier and documented the traffic timing. The results of this study lend credence to the hypothesis that the synchronisation of traffic signals on major thoroughfares will significantly enhance traffic flow. Huth et al. (2015) performed a roadside study to examine the activity and utilisation of mobile phones when the light on the road was red. A cohort of normal driving activities and 124 mobile phone users were analysed at intersections. A connection between mobile phone use and delay was assessed in instances where traffic awareness was compromised. Despite the fact that drivers tended to cease using their mobile phones when the traffic signal turned green, it was observed that standard driving practices were not adhered to.

The traffic behaviour of 39 juvenile participants who exhibited typical driving actions and secondary task actions was examined by Catalina Ortega et al. (2021). Distracted drivers were found to have committed substantial violations in terms of vehicle control when contrasted with drivers who exhibited typical driving behaviours. The burden among drivers was observed to increase as a result of the use of cell phones while travelling.

The driver behaviour of the first two automobiles that were waiting at red signals was the subject of an investigation by Gjorgjiević et al. (2021). Three distinct observational parameters were considered: demographics, diverting behaviours, and their response to traffic signals. In general, an automotive that continued stationary for a period exceeding two seconds after the traffic signal transitioned from red to green was regarded as delayed. It was noted that 608 of the 1008 drivers included in the study encountered distraction at traffic signals. The most prevalent form of distraction was identified as in-vehicle preoccupation, with a rate of 44.8%. The percentage of individuals who used mobile phones was 7.4%. It was discovered that 126 drivers exhibited delayed behaviour, and 88.1% of these drivers were distracted.

Sieklicka et al. (2022) conducted research on the behaviour of vehicles at a signalised intersection during periods of high traffic. Drivers were required to pause at least once at a red signal in the event of excessive traffic. The results of the field research indicated that 60% of drivers who had halted their vehicles after the red light had illuminated were using their mobile phones. Furthermore, the survey findings indicated that less than 40% of drivers acknowledged engaging in this conduct.

Bakhtari Aghdam et al. (2022) conducted a study to investigate the conduct of drivers at traffic signals. Behavioural patterns were observed during the early morning, noon, and late-night hours in the study, which involved 946 drivers. They discovered that 13.6% of drivers at traffic signals were using mobile phones. Furthermore, it was determined that the rate of mobile phone utilisation among female drivers was twice the amount of male drivers. It was noted that drivers aged 26–40 and 41–50 used cellular phones less frequently than those under the age of 25.

Sharma et al. (2022) completed a study on the calculation of stationary gasoline consumption at signalised intersections. The dormant petroleum consumption of a total of 341 vehicles was assessed. Approximately 950 intersections in Delhi were evaluated in the survey itself. Greenhouse gas emissions were estimated in addition to petroleum

consumption. Upon examination of the results, it was observed that 9036 L of petrol, diesel, and LPG were consumed. Furthermore, an estimated 37 tonnes of CO₂ emissions were generated each day.

2.2.3 Unguided Roadside Parking and Traffic Light

Biswas, Chandra, and Ghosh (2017) endeavour to evaluate the worldwide state-of-the-art regarding the numerous repercussions of on-street parking, both good and negative, within an urban road setting, and further investigates the effectiveness and degree of these consequences. This research concludes that parking on the streets should be limited on important roadways. It may be permitted on small roadways since it has the capacity to enhance safety for road users in that setting. When permitted, on-street parking ought to operate parallel rather than angled, since the latter poses hazards in several aspects. The report further advocates for the restriction of on-street parking in proximity to certain particular areas, such as designated pedestrian crossings, intersections, and schools.

Canmanie and Donmez (2020) performed an on-road instrumented car research with 28 participants travelling in downtown Toronto, Canada, to investigate the impact of looking for parking on the street on drivers. Participants navigated two routes in a counterbalanced sequence: one route included a parking search task, while the other served as a baseline. Vehicle instrumentation recorded speed and lane location, physiological sensors monitored heart rate and galvanic skin reaction, and a head-mounted eye-tracker captured gaze position. Participants administered the NASA Task Load Index after each tour. Participants exhibited reduced speed and proximity to the curb when seeking for parking, resulting in an increased perception of effort. Although no statistically significant effects were seen in physiological parameters, there was an increase in heart rate nearing statistical significance. An in-depth study of eye-tracking data indicated a significant change in gaze behaviour during parking searches, characterised by an increase in prolonged off-road looks (>2 s) and a reduction in brief off-road glances (<1.6 s). Certain demonstrated behaviours, such as deceleration, may serve to mitigate the adverse impacts of heightened demands related to parking searches, whilst others, such prolonged off-road looks, might elevate the likelihood of collisions. This research serves as a crucial first step in elucidating alterations in driving performance, physiological responses, and gaze behaviour induced by the search for parking in a real-world urban context.

Greibe's (2003) modelling study revealed that both driving and road width were important predictors of accident rates on road linkages, with parking's contribution to higher collision rates being more than that of roadway width. This indicates that elements beyond road width must contribute to the increased collision risk associated with on-street parking. In intricate urban settings, drivers must observe the motions of both humans and automobiles. Stationary vehicles may impede visibility of the roadway, complicating the observation of crossing pedestrians. Stationary vehicles may abruptly transition to moving vehicles and re-enter the flow of traffic. Research indicates that the presence of moving cars in a scene adversely impacts awareness of the situation and hazard avoidance (Gugerty, 1997), whereas stationary vehicles may exacerbate this issue, since they need observation to ascertain their motion status. The presence of parked vehicles thereby heightens ambiguity, cognitive burden, and possible hazards within the roadway context.

2.3 Summary of Literature Review

This present research reviewed studies on the relationship between traffic light and traffic congestion, the relationship between traffic accidents and traffic lights as well as studies relating to unguided roadside parking and traffic light by different authors, scholars and researchers in Nigeria and outside Nigeria. To the best of my knowledge, in the course of the literature review, there is no study that investigate the digitalization of traffic management in Nigeria; an assessment of the traffic light in Calabar Metropolis, Cross River State. Based on this, the present study attempts to fill this research gap.

2.4 Theoretical Framework

Modernization Theory

Modernisation theory is employed to elucidate the process of modernisation within societies. Traditional societies are expected to evolve as they adapt more contemporary practices, according to modernisation theory. Modernisation is either essential or at least preferred to the status quo due to advancements in data technology and the necessity of updating conventional processes in transport, communication, and production. Rostow (1971) observed that societies will become more highly developed through increased investment, increased exposure to modernised western society, as well as modifications in traditional culture and values, while the theory examines the internal factors of a country and assumes that with assistance, "traditional" countries can be that are brought to development in the same manner as more developed countries had been.

Modernisation theory endeavours to both identify the social variables that contribute to the social progress and development of societies and to elucidate the process of social evolution. Modernisation theory posits that the progression of societies follows a singular trajectory, thereby dividing all nations into Western and non-Western cultures.

It investigates a variety of internal factors, including the implementation of innovative technologies and social and cultural structures. This theory posits that the absence of digitisation is the root cause of underdevelopment in countries and that advancement for these nations can only be made by increasing their prosperity, which is contingent upon their availability of technology, education, entrepreneurial freedom, and free trade.

The relevance of this theory to this study is that the Cross River State government has implemented the deployment of digitalised traffic lights at strategic locations to address the traffic challenges within Calabar Metropolis and mitigate their negative effects. This approach aims to reduce traffic congestion, traffic-related clashes, and unguided roadside parking of vehicles.

3. Methodology

This research used a survey methodology to evaluate the digitalisation of traffic management in Nigeria, specifically assessing the traffic lights in Calabar Metropolis, Cross River State. The subject of investigation is Cross River State. Cross River. The study population consists of the whole adult demographic of Calabar South and Calabar

Municipality Local Government Areas. The 2006 National Population Census indicates that the two Local Government Areas have a combined population of 321,022, which is the population for this research. This research utilises stratified sampling, quota sampling, and accidental sampling methodologies. The stratified sample method improves the division of the research population into driver and passengers. The quota approach allowed for an equal distribution of respondents, with 150 assigned to Calabar South and 150 to Calabar Municipality, while the incidental sampling technique facilitated the researcher in administering questionnaires to two accessible individuals. The study's sample size is 210, representing 70 percent of the total population. The primary tool for data collection was a questionnaire, which was designed with a five-point Likert Scale including Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. The data for this investigation was ultimately analysed using the chi-square statistical method.

4. Data Presentation, Analysis and Discussion of Findings

Table 4.1:
Summary of respondents

Questionnaire	Responses	Total	Percentage (%)
No. returned	200	200	95.2
Not returned	10	10	4.8
Total	210	210	100

Source: Field survey by the Author, 2024

Table 4.1 indicates that respondents were administered two hundred and ten (210) questionnaires. Of these, 200 questionnaires were returned, while 10 questionnaires were not returned. The total number of questionnaires returned was 200, which represents 95.2% of the respondents. The total number of questionnaires that were not returned was 10, which represents 4.8% of those who responded who never returned their questionnaire.

4.2 Test of Hypotheses

Hypothesis One

H₀₁: The installation of digitized traffic lights have not significantly helped to ease long vehicular queues among motorists in Calabar Metropolis.

Figure 4.1

Summary of Chi-square computation to show if the installation of digitized traffic lights have significantly helped to ease long vehicular queues among motorists in Calabar Metropolis.

Test Statistics	
	Installation of digitized traffic lights and long vehicular queues among motorists in Calabar Metropolis.
Chi-Square	22.493 ^a
Df	14

Asymp. Sig.	.117
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Source: Researcher's computation, 2024.

From figure 4.1 above, it can be observed that since the chi-square calculated value of 22.493 is less than the table value of 23.68 at 14 degree of freedom and the p-value of 0.117 is greater than 0.05 chosen significance level. We therefore accept the null hypothesis which states that the installation of digitized traffic lights have not significantly helped to ease long vehicular queues among motorists in Calabar Metropolis. This result implies that installation of digitized traffic lights has not contributed in reducing long vehicular queues among motorists in Calabar Metropolis.

Hypothesis Two

HO2: 2. Traffic congestion related clashes among motorists have not significantly reduced due to the installation of digitized traffic lights in Calabar Metropolis.

Figure 4.2

Summary of Chi-square computation to show if traffic congestion related clashes have significantly reduced due to the installation of digitized traffic lights in Calabar Metropolis.

Test Statistics

	Traffic congestion related clashes among motorists and installation of digitized traffic lights in Calabar Metropolis.
Chi-Square	205.611 ^a
Df	12
Asymp. Sig.	.000

Source: Researcher's computation, 2024.

Figure 4.2 indicates that the estimated chi-square value of 205.611 exceeds the table value of 21.03 at 12 degrees of freedom, and the p-value of 0.000 is larger than the selected significance threshold of 0.05.

Consequently, we reject the null hypothesis asserting that traffic congestion-related conflicts among drivers have not significantly diminished due to the implementation of digitised intersections in Calabar Metropolis, and we conclude that such conflicts have indeed significantly reduced as a result of this installation. This result indicates that the implementation of digitised traffic signals in Calabar Municipality has greatly decreased traffic congestion-related conflicts among motorists.

Hypothesis Three

HO3: Unguided roadside parkings of vehicles by motorists have not been significantly regulated due to the installation of traffic lights in Calabar Metropolis.

Figure 4.3

Summary of Chi-square computation to show if unguided roadside parkings of vehicles have been significantly regulated due to the installation of traffic lights in Calabar Metropolis.

Test Statistics

	Unguided roadside parkings of vehicles by motorists and the installation of traffic lights in Calabar Metropolis.
Chi-Square	24.014 ^a
Df	15
Asymp. Sig.	.104

Source: Researcher's computation, 2024

The chi-square computed value of 24.014 is less compared to the table value of 25.00 at 15 degrees of freedom, and the p-value of 0.104 is greater than the 0.05 chosen significance level, as shown in figure 4.3 above. We therefore adopt the null hypothesis, which posits that the implementation of traffic signals in Calabar Metropolis has not substantially regulated the unguided roadside parking of vehicles by motorists.

Discussions of Findings

From the results, the installation of digitized traffic lights have not significantly helped to ease long vehicular queues in Calabar Metropolis. This finding could be as a result of insufficient digitized traffic lights in Calabar Metropolis to help curb long vehicular queues. It could also be as a result of faulty digitized traffic lights that are not functioning in Calabar Metropolis. Furthermore, it could be as a result of no installation of digitized traffic lights in Calabar South Local Government Area. This finding is not consistent with the findings of Aleko and Djabal (2020), Nabila, Salah and Maroloud (2019) who all suggested that digitized traffic lights could help to control long vehicular queues.

Furthermore, from the results, Traffic congestion related clashes have significantly reduced due to the installation of digitized traffic lights in Calabar Metropolis. This result may be as a result of the presence of road enforcement officers on major roads in Calabar Metropolis that have gone a long way to reduce traffic congestion related clashes significantly. It could also be due to the setting up of speed bumps on major roads in Calabar Metropolis which helps to slow motor – vehicle traffic in order to improve safety conditions and traffic congestion related clashes in Calabar Metropolis.

Finally, from the results, unguided roadside parkings of vehicles have not been significantly regulated due to the installation of traffic lights in Calabar Metropolis. This

finding could be as a result of insufficient digitized traffic lights in Calabar Metropolis to help curb unguided roadside parkings. It could also be as a result of faulty digitized traffic lights that are not functioning in both Calabar South and Calabar Municipality. Furthermore, it could be as a result of lack of digitized traffic lights in Calabar South Local Government Area.

5. Conclusion and Policy Recommendations

Traffic management is of utmost important in our cities due to the problem of congestion of road traffic. Hence, this study examines the digitalization of traffic management in Nigeria: an assessment of the traffic light in Calabar Metropolis, Cross River State. From the findings of the study, it is concluded that the installation of digitized traffic lights have not significantly helped to ease long vehicular queues in Calabar Metropolis, Traffic congestion related clashes have significantly reduced due to the installation of digitized traffic lights in Calabar Metropolis and unguided roadside parkings of vehicles have not been significantly regulated due to the installation of traffic lights in Calabar Metropolis..

Based on these research findings, the following recommendations are made:

- i. The State government should install adequate digitized traffic lights in Calabar Metropolis to help curb long vehicular queues.
- ii. The authorities concern should replace faulty digitized traffic lights that are not functioning in Calabar Metropolis so as to assists in curbing traffic congestion related clashes, long vehicular queues and unguided roadside parkings.
- iii. The State government should ensure that adequate digitized traffic lights are installed in Calabar South Local Government Area to help control traffic congestion related clashes, long vehicular queues and unguided roadside parkings.

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GREEN ECONOMY: CHALLENGES AND OPPORTUNITY FOR ECONOMIC GROWTH IN NIGERIA

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Abstract

This paper examines the Green economy framework and its challenges to sustainable growth and development of the Nigerian economy. Adopting the political economy approach, the study explores relevant concepts, identifying the core meaning of the concept of sustainable development and Green economy. Few sectors were analysed in terms of green growth policies to see what economic benefits Nigeria stands to gain if transiting into the green economy. The study revealed that the green economy holds a lots of opportunities especially for those sectors studied. Recommendations to enable Nigeria transit into green economy includes that institutional capacity is needed to integrate environmental policies with economic policies among others will help Nigeria transit into green economy.

Key words: Green economy, sustainable development, environment, institutional capacity, gross domestic product, deforestation and over grazing

Introduction

The notion of a "green economy" has garnered substantial interest in the recent past due to its ability to mitigate the current overuse of the environment while taking economic growth into account. According to the 2005 report on the Millennium Ecosystem Assessment, excessive human use has caused the degradation of 60% of the world's main ecosystems, including both terrestrial and aquatic ecosystems, in the last few years. The agreement among scientists is that any increase in Earth's average temperature over 2°C is likely to have unanticipated and perhaps catastrophic consequences, such the global rainforest's extinction, a notable rise in sea levels, and eventually the extinction of all species. The green economy is a unique notion that presents a possible solution to lessen current environmental exploitation while taking economic development into account.

Two distinct economic models that support environmental preservation and sustainable growth are the "green economy" and the "blue economy." An economic paradigm known as the "green economy" emphasizes using renewable resources and cutting carbon emissions. The term "blue economy" pertains to an economic framework that prioritizes the sustainable utilization and administration of marine resources. The blue economy

consists of industries like fishing, tourism, maritime transportation, and so on, whereas the green economy consists of industries like renewable energy, sustainable agriculture, and waste management. Both want to lessen their influence on the environment while generating jobs and economic progress.

The United Nations Environment Program (UNEP) estimates that by 2050, the transition to a green economy may provide millions of jobs worldwide and up to \$10 trillion in yearly economic developments is a possibilities. In a similar vein, research from the World Bank and the Organization for Economic Cooperation and Development in 2022 indicates that the blue economy might provide over \$3 trillion in economic value annually by 2030 and support millions of jobs worldwide. The main benefits of both green and blue economies are the creation of jobs, the reduction of carbon emissions, and economic growth. The main drawbacks are that they are highly dependent on government policies and subsidies, which are vulnerable to change based on political goals.

Shifting the focus to the sustainable consumption and production (SCP) program will safeguard the environment and open up new avenues for investment and commerce. This would help Nigeria's green economic framework by encouraging green growth and sustainable development.

The main objective of this article is to examine whether Nigeria's shift to a green economy is necessary, taking into account both the benefits and challenges it poses for sustainable development.

Conceptual Literature Green Growth

Sustainable development has been closely linked to the idea of economic growth that also satisfies environmental objectives. In many nations, national environmental planning and the formulation of international environmental policies are still based on the fundamental idea of sustainable development. In fact, the governmental organizations that are currently pushing green growth assert that it is a means of attaining sustainable development rather than a replacement for it (Michael Jacobs 2012). "In a classical definition, a development path is sustainable if and only if the stock of overall capital assets remain constant or rise over time," state Todaro and Smith (2011). Noting that manufactured capital (machines, factories, roads, human capital, knowledge, experience, and skills) and environmental capital (forests, soil quality, range land) are intended to be included in the total capital assets. According to this concept, sustainable development calls for the preservation of these total capital assets and the determination of the appropriate level of sustainable net national income (NNI)—that is, the amount that may be spent without reducing the capital stock—through continuous improvement. Therefore, sustainable development is that pattern of growth that, generally speaking, requires at least a minimal level of environmental preservation and allows future generations to live at least as well as the current generation.

To put it simply, green growth is defined as economic expansion (gross domestic product, or GDP growth) that also significantly protects the environment. There are many who question whether economic expansion and potential environmental enhancements can coexist. In the words of the World Bank (2012), it is "growth that is resilient in that it accounts for national hazards and the role of environmental management and natural

capital in preventing physical disasters, clean in that it minimizes pollution and environmental impacts, and efficient in its use of natural resources." According to the Organization for Economic Co-operation and Development (2011), "green growth" refers to promoting development and expansion of the economy while making sure that natural resources continue to offer the resources and environmental services that are essential to human survival.

The words "green growth" and "sustainable development" have the same meanings; the only differences arise from governments' perceived lack of commitment to sustainable development and the ongoing deterioration of the state of the environment worldwide. However, policy makers also realized that in a world where GDP growth and the jobs it creates continue to be the primary concerns of businesses and voters, as well as the primary goal of government policy, an environmental discourse that emphasizes costs, limits, and the need to restrain growth in order to assess them would not likely garner political support. This is particularly true in the context of climate change, where the focus of international discussions has been on how to divide the global "burden," with the prevailing rhetoric being around the economic cost of mitigation Stern (2007). As a result, the rhetoric around green growth now serves a more constructive function rather than its original, politically unappealing one. But unlike sustainable development, it takes a direct approach to the problem of growth. By rephrasing the economic goal as development and avoiding the underlying question of whether growth and environmental preservation are compatible, sustainable development was a purposeful attempt to maintain a broad coalition of political support. In addition to requiring this compatibility, green growth asserts that stronger growth might result from environmental protection. This illustrates its distinct provenance. Green growth has arisen from the more mainstream and pragmatic group of environmental economic policy makers, whereas the notion of sustainable development originated in the environmental movement, where ideological dispute about the limitations to growth was prevalent (Michael Jacobs: 2012).

Green Economy

A green economy is described as "one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" in the UNEP study "Towards a green economy." Three main pillars support the green economy: (1) low-carbon technology; (2) resource efficiency; and (3) growth that is inclusive of society. A structure like this is very crucial for Nigeria. In many respects, Nigeria's extreme poverty in the midst of abundance and the widespread environmental degradation found throughout the country are related to the country's heavy reliance on the unproductive exploitation of natural resources for livelihood purposes, which feeds the vicious cycle of underdevelopment. Nigeria might have enormous chances to capitalize on her abundant natural resource endowments as it works toward sustainable development if it adopts a green economy paradigm. However, in order to reap the rewards of a green economy, the Nigerian government must establish the institutional framework, central to which would be a dynamic and well-functioning national council of sustainable development (NCSD).

Nigeria has to make the most of the findings from the UNEP's Trade Policy and Planning Unit if it is to make a seamless and successful transition to a green economy.

A crucial part of the Trade Opportunities and Green Economy Project (GE – TOP) is this study. According to the research, commerce in environmentally friendly products and services, standards and certification, and the greening of international supply chains are the main opportunities brought about by the shift. Subsequently, the paper included an extensive sectoral analysis. Growing prospects for additional value and market attractiveness support the need for greener goods and processes. Productive growth in sustainable farming practices is possible, and business-to-business commerce in the certification and verification of products and production processes is expected to rise. Furthermore, emerging economies are becoming major actors in the trade of environmental goods and services, and the green energy sector represents a rising and potentially substantial business.

The study lists the following five enabling criteria.

Strategic expenditure and investment: access to renewable energy, specialized education programs, technical support, and economic infrastructure should all be seen as essential.

Market-based tools: Price policies should take social and environmental costs into account and modify subsidies to unsustainable products. Enhancing country-specific regulatory structures, accountability, and transparency

International frameworks: These are essential for the transfer and diffusion of technical skills and resources.

Improving communication and developing capacity: Promote and assist emerging trade prospects, especially those involving access to export markets.

Sustainable Consumption and Production (SCP)

This mechanism makes it easier for those who are skeptical of environmental protection to see that green growth, which is facilitated by the green economy, not only supports but also accelerates economic growth by creating job opportunities and improving food security, well-being, and poverty alleviation, among other benefits. Policies designed to ensure sustainable patterns of consumption and production, along with technologies that will support economic expansion while the ecosystem continues to supply resources and services, are known as the SCP effort. The following presumption is essential to sustainable consumption:

1. Resource efficiency combined with a reduction in waste and pollution. The adoption of environmentally benign technology, the utilization of renewable resources to the fullest extent of their ability for renewal, longer product life cycles, and justice between and among generations are imperatives.

Without a doubt, businesses in Nigeria would prosper more under the sustainable production approach, which offers a plethora of chances for growth, profit, and job creation. Beyond this, though, negative externalities will be freed from sustainable production. It is becoming more and more advantageous for companies to take sustainability into account early in the product creation process as the market for goods grows and environmental issues like climate change have a greater impact on laws and enterprises.

Challenges

Green Economy: One of the major challenges of green economy in the world especially in Nigeria is the lack of political will to implement sustainable policies and practices. Despite Nigeria government's commitment to achieving sustainable development goals, there are several instances where environmental policies are disregarded or not enforced properly. Another challenge of green economy in Nigeria is limited access to finance and high transition cost, particularly for small and medium-sized enterprises (SMEs). Green businesses require significant investments in research and development, technology, and infrastructure, which SMEs may not be able to afford. Furthermore, access to green finance is limited, and the cost of capital is high, making it difficult for businesses to make the transition to a green economy.

Inadequate infrastructure is another challenge that hinders the development of a green economy in Nigeria. The country lacks the necessary infrastructure, such as public transport systems, waste management facilities, and renewable energy infrastructure, to support sustainable development. This lack of infrastructure makes it difficult to transition toward a green economy.

Opportunities

Green Economy: Nigeria as a Nation should take a significant steps toward building a green economy by investing in renewable energy sources like solar, wind, and hydropower and schemes like Green Hydrogen Mission, Energy Transition, Energy Storage Projects, Renewable Energy Evacuation. If Nigeria will set an ambitious Target of achieving over 200 Gigawatt (GW) of renewable energy capacity by 2030 which may includes 100 GW of solar power, 60 GW of wind, 10 GW of small hydro, 30 GW of Bioenergy. This target is expected to create several employment opportunities in the renewable energy sector.

Apart from renewable energy, Nigeria can also benefit from green economy opportunities in the agriculture and forestry sectors. Sustainable agriculture practices such as organic farming can help reduce greenhouse gas emissions and protect soil health. Similarly, sustainable forestry practices can help conserve biodiversity and reduce deforestation. In addition, there are opportunities in the manufacturing sector to produce eco-friendly products that are biodegradable, recyclable, and made from sustainable materials.

Empirical Literature

The idea of a "green economy" is presented by Hellena Pavese (2011) in her paper "Towards a green economy: pathway to sustainable development and poverty eradication," which makes evident how severely ecosystem services are being degraded. The author discusses the green economy project, which was started with the goal of determining the costs and hazards to society and economy associated with the existing practice of excessive use of natural resources, as well as the prospects for a shift to more sustainable practices.

The UNEP study was critically evaluated by Alexandre P'Avignon and Luiz Anthonia (2011).

They declare that the introduction of values beyond utility maximization in the report is a qualitative leap. They highlight the need to approach the shift to a green economy from

a systemic perspective, in which human activity is only one component of civil society, which is a subsystem of the biosphere and all of its inanimate and biological components.

The link between the notions of sustainable development and the green economy was examined by Donald Sawyer (2011). The author warned against the possibility that the green economy might take on purely commercial characteristics, favoring market mechanisms and resource pricing over alternative policies. He claims that additional aspects, including social, ethical, cultural, political, and judicial ones, are pertinent to the green economy. According to him, in order for the green economy to be implemented in a way that is complementary to and connected with the more abstract, diplomatic, and governmental concept of sustainable development, policies that uphold the rights of all people and preserve the interconnected functions of ecosystems are necessary.

Renato Roseberg, Ernani Kuhn, and Francisco Gaetani gave a summary on the state of the green economy in Brazil. They said that Brazil is a leader in environmental energy because of its wealth of national resources and its numerous environmental conservation laws and regulations. The country has some of the greatest greenhouse gas emissions in the world, according to the authors, but it is changing this by setting voluntary objectives for emissions reduction. They provide an overview of the primary steps Brazil has been taking to develop a green economy in areas like water resources, solid waste management, and forestry, among others. Maria Cecilia J. Lustosa examined the significance of environmental innovations as a way to shift the existing technological paradigm—which is heavily reliant on fossil fuels for energy and raw materials—into one that is more environmentally responsible. She discussed how environmental challenges have emerged historically and how they relate to economic activity. Next, with an emphasis on environmentally sound technologies, the author presents the circumstances in which and in which directions such changes might occur, highlighting the significance of the inventive process in technological transformation and paradigm shift. The key characteristics of the innovations related to environmental challenges in Brazilian enterprises were discovered by the author through additional investigation. The author comes to the following conclusions: creating a green economy requires environmental advances, and expanding company capacity is essential and, where appropriate, linked to state-sponsored incentives. She also concluded that poor innovation investment in the productive sector is undoubtedly a contributing cause to the further inhibition of environmental innovation in Brazil.

Theoretical Literature

Understanding the economy through the lens of technology as a tool for social change in human societies is made easier by the neo-Schumpeterian idea. In order to facilitate a smooth transition to a green economy, this strategy takes into account other, adaptable, locally relevant alternatives.

According to Pollin et al. (2008), enhancing the environment can play a part in reviving economies that had been severely hit by recession and encouraging growth, especially in the area of employment. Simple Keynesian theory, which maintained that governments should replace lost private sector demand with public expenditure during a downturn, served as the main defense of government spending. Further income and employment growth are subsequently produced by this multiplier impact. Spending of this kind need not be environmentally friendly, but a green stimulus package has distinct advantages due

to the scope of environmental options and the added benefits to health and amenities they provide.

These claims are somewhat supported by estimates of the effects of the green stimulus programs implemented in 2008–2010. The US stimulus package's environmental components were predicted to have generated about 500,000 net new employment (Barbier 2010a), while comparable measures implemented in South Korea were expected to have produced up to 960,000 jobs (OECD 2010). According to some estimates, green measures in the US created 20% more jobs than traditional infrastructure spending, indicating that the green stimulus measures may have been more successful in creating jobs than their proponents had predicted.

Analysis

Economic growth is achieved through the combination of labor, physical capital, human capital, and technology, according to mainstream economic theory. When these variables raise overall productivity, economic development follows. It is anticipated that productivity will only rise in this way if a specific percentage of output is reinvested in better technology, higher wages and salaries, and other fringe benefits intended to encourage labor for higher productivity as well as better healthcare and education for the workforce. The pace of economic growth is determined by the rate of investment in these elements of production. The core of the green economy is the comparison between the environment and other industrial parameters. Actually, the natural environment is a component of production; it functions as capital in three ways: it supplies resources, absorbs waste, and offers a variety of environmental services necessary for living, such as maintaining ecosystem health and regulating climate. Because of this complete disregard, natural resources are overused, resulting in reduced fisheries, over abstraction of water, erosion of soil, and depletion of forests. We allow ecosystems that offer important functions, like forests and wetlands, to deteriorate. These arise from the inability of the market to determine the proper prices, if any, for our natural resources. The market fails when it fails to account for the entire value of the activities that take place inside it. Therefore, the green growth paradigm holds that the existing rates of economic development are unsatisfactory and inefficient.

This implies that, in the case of Nigeria, the government must intervene at this point, when there is undeniable proof of market failure, and provide the infrastructure and take-off initiative to draw in private investment. In addition to creating new market possibilities and increasing market rivalry, this will significantly lower the high rates of environmental deterioration.

This means for Nigeria that, just as she did in the power sector, the government must now intervene to provide the initiative and take-off infrastructure to attract private participation, given that the country's environmental capital is fundamentally underpriced and, consequently, a victim of market failure. In addition to creating new market possibilities and fostering competition in the market for environmental products and services, this will significantly lower the high rate of environmental deterioration.

Analysis of Selected sectors in Nigeria:

Agricultural Sector:

A number of detrimental environmental effects, such as the ongoing loss of biodiversity and ecosystem services, the depletion and erosion of top soil nutrients, the growing scarcity of freshwater, the worsening of water pollution due to inadequate nutrient management, the release, disposal, emissions, and waste of hazardous chemicals, and trade that is carried out on a business-as-usual basis, pose a threat to Nigerian agriculture's future. In the medium and long term, sustainable agriculture may either maintain or boost agricultural output while lowering resource use, protecting the environment, and enhancing food safety.

The use of sustainable farming techniques can boost output, make it easier to enter global supply chains, and meet the need for more organic and sustainable products worldwide. Growers of cocoa, rubber, rice, cassava, groundnuts, and other crops will see increases in output as well as an improvement in their general well-being and a secure and successful future.

Put another way, improving the environment via investment will lead to an enhanced ecosystem, and the only way to maintain this improvement in the environment is to participate in the SCP project. This will stop the environment from getting worse while leading to an increase in organic goods and services. In the end, this will improve the overall well-being of over half of the country's rural residents, as well as their access to income and production.

Fisheries:

The Niger-Delta zone's aquatic culture is in almost complete collapse and deterioration. The reason behind the incapacity of these prominent fishermen to catch fish is not overfishing, but rather the unsustainable use of fossil fuels in the area. However, Nigeria imports fish and other fish products worth millions of dollars every year. This can be changed by practicing sustainable exploitation, and by certifying fish products for sustainability, Nigeria's fisheries management systems can be strengthened overall.

Climate change is sending most of these species farther into the Atlantic, increasing the difficulty and cost of fishing. The sea level is also rising as a result. It is also possible to argue that, although non-sustainable fishing practices in coastal areas have severely damaged the environment and negatively impacted aquatic life, the increasing prevalence of unsustainable fishing methods, particularly in Oguta Lake, has severely aggravated the declining fishing conditions. These unsustainable fishing methods, which included the use of dynamite and gamaline 20 underwater explosive, had abruptly gained popularity among young men in Oguta Lake. Either way, aquatic life suffers a fatal blow with the destruction of additional aquatic habitat in addition to eggs and fingerlings.

Even if there may be a way to turn things around, it will need sincere and dedicated efforts from all parties involved, particularly the government, which has to put more pressure on regulations. Better aquatic life will translate into more income opportunities and a better quality of life for the rural residents of the Escravos River and the entire southern riverine region.

Forestry:

Nigeria's forest reserves in the states of Edo, Delta, Taraba, Buichi, and Ondo are currently seriously threatened by the rise of illicit logging. This trend is made worse by the acts of local government officials, who have integrated themselves into the illegal trade. On the other hand, traceability and transparency in the forestry sector may be greatly enhanced by sustainable commerce in wood and non-timber forest products, especially through certificate systems.

Renewable Energy:

Numerous issues confronting Nigeria's energy industry today can be resolved by the use of renewable energy resources. The Nigerian power industry is in a dire state; not even the reforms implemented over the years, which have seen public investments transferred to politicians and their allies, have helped the industry in any way. Instead, consumers are still required to pay high rates for energy that is not used through monthly estimated billing, even in the event of a blackout. Nigeria's electricity output plummeted to 2,887.8 megawatts by June 2014 (Business July 2014).

With the right laws governing low-carbon emissions and energy-efficient renewable energy-based technology, this trend may also be reversed. Nigeria has abundant wind and solar resources that, if used, may propel the country into the enviable status of sustainable energy self-sufficiency, output growth, and job creation.

Conclusion/ Recommendations

In Nigeria, the green economy through green growth is both desirable and realistic as it can combine the creation of jobs and revenue with the fight against poverty and the preservation of natural resources. Naturally, accomplishing this is essential to fulfilling Millennium Development Goal No. 7. Consequently, the economy that generates a steady rise in the natural capital stock is known as the "green economy."

The following suggestions are made in order for Nigeria to effectively transition into the green economy, reap the benefits, and meet Millennium Development Goal 7:

- (1) Integrating environmental and economic policy requires the development of institutional capability.
- (2) The indispensability of institutional capacity to develop an environmental indicator system capable of quantifying and tracking the returns on investments in natural capital.
- (3) The green economy must be viewed by Nigeria as a means of achieving its goals of economic growth. Nigeria's economy is still in its early stages of development and does not have the lock-in effect of the more developed countries, therefore implementing some green growth strategies may be simpler for her.
- (4) In conclusion, Nigeria may profit economically and socially from environmental rules rather than viewing them as a problem that has to be solved.

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OFFICER, IT'S THE DEVIL'S WORK: THE PRAGMATICS OF DEFENCE IN POLICE-SUSPECT INTERROGATIONS IN NIGERIA

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Abstract

In the Nigerian context, the clause "Officer, it's the devil's work" serves as a culturally resonant defense mechanism, reflecting deeply embedded societal and religious beliefs. Hence, this paper examines the pragmatics of defense in police-suspect interrogations in Nigeria. Within Nigeria's legal and cultural context, suspects often employ language to frame their actions and provide justifications under the intense psychological pressures of interrogations. The paper adopts Grice's maxims (quality, quantity, relevance and manner) as the theoretical framework for analysis. This framework is considered appropriate as it offers a structured lens for examining the pragmatic strategies employed by suspects during interrogations. Four documented cases involving offences such as kidnapping, rape, grievous harm, and murder were purposefully selected from online news articles, social media reports, and the transcript of a recorded police-suspect interrogation video. Findings revealed that the recurring invocation of "the devil's work" demonstrates how language can serve as a tool for psychological evasion and manipulation during interrogations. This clause not only shifts blame to an external force but also invokes a cultural framework that resonates with both the speaker and the audience, thereby softening the perception of culpability. The study concludes that these strategies employed by suspects are not merely attempts to evade guilt; they also serve as tactics to manage the psychological pressures of the interrogation process and, importantly, to shift the burden of proof back onto law enforcement.

Keywords: Pragmatics, defence, police-suspect, interrogation

Background

The language used in police-suspect interactions has evolved significantly, particularly in Nigeria. Ajayi (2014) suggests that the term "interrogation" is no longer employed by the Nigerian Police, following campaigns by human rights activists who opposed its use. In contrast, Almeida (2018) contends that police officers design their actions to secure confessions, thereby justifying the term "police interrogation" to describe these interactions. This shift highlights the complex dynamics between language, power, and human rights within the context of law enforcement. In police-suspect interrogations, suspects often employ linguistic strategies as pragmatic defenses to explain, justify, or

rationalize their actions in ways that mitigate their legal culpability. These strategies serve to reframe the narrative, offering suspects an opportunity to avoid full responsibility for their alleged actions. Such defenses are deeply influenced by linguistic, psychological, cultural, and situational factors, reflecting a complex interplay between language, power dynamics, and social context. This discussion explores the pragmatics of defense in interrogations, examining how suspects use language—such as the phrase "it's the devil's work"—to shape their narratives and achieve specific communicative goals, often as a reaction to the psychological and linguistic pressures exerted by interrogators.

Language in police-suspect interrogations is crucial in shaping the criminal justice process, influencing power dynamics and negotiation. Stokoe (2018) highlights that interrogation discourse is driven by both the interrogator's and suspect's strategies, where language serves as a tool for negotiation, resistance, and self-representation. Suspects often use verbal tactics to justify their actions, such as invoking cultural or psychological explanations. For instance, a suspect might claim, "Officer, it's the devil's work," which reflects cultural or religious beliefs and challenges traditional legal interpretations, raising important questions about the role of culture and belief in the interrogation process. Cultural beliefs, particularly in societies where spirituality and the supernatural play significant roles, can shape how individuals perceive and explain their actions. For some, attributing wrong doing to external, supernatural forces may be a genuine reflection of their worldview rather than a deliberate attempt to evade responsibility. Similarly, psychological factors, such as stress, fear, or cognitive dissonance, may drive suspects to frame their actions in ways that align with their belief systems. Matsumoto & Hwang (2021) argue that cultural belief systems profoundly influence how individuals explain behavior. In societies where spirituality is significant, references to supernatural forces may be genuine attempts to contextualize actions rather than mere excuses.

This interplay between language, culture, and psychology underscores the complexity of police interrogations. It challenges legal practitioners to consider how these factors might influence the interpretation of suspect statements and, ultimately, the pursuit of justice. According to Beloof (2021), in adversarial legal systems, suspects' statements during interrogations are not just evidentiary but also reflective of their psychological states and cultural frameworks, requiring careful interpretation to avoid misjudgment. Recognizing and understanding such defenses, however unconventional, can foster a more nuanced approach to the interrogation process—one that balances cultural sensitivity with legal rigor.

In exploring the phrase "Officer, it's the devil's work" within the context of police-suspect interrogations, it becomes apparent that such statements carry nuanced meanings, reflective of both linguistic strategies and cultural factors. The phrase embodies a common form of linguistic evasion often seen in suspect responses during police interviews, where invoking supernatural or external forces serves to deflect guilt or responsibility. This review will examine the concept from multiple angles, using literature from pragmatics, discourse analysis, and criminology to unpack its functions within interrogation settings.

Pragmatics in Police-Suspect Interrogations

Pragmatics provides a lens to analyze how language functions in police interrogations, particularly in the context of psychological and cultural defense mechanisms. Speech Act

Theory (Austin, 1962; Searle, 1969) underscores that statements like "Officer, it's the devil's work" transcend mere communication, functioning instead to mitigate guilt and manage social perception. Gudjonsson (2003) highlights that invoking supernatural forces is often a strategy to deflect personal responsibility, shaped by cultural beliefs. Furthermore, recent studies emphasize how suspects' language choices—particularly metaphors or justifications — are attempts to negotiate perceptions during high-stakes interactions.

Suspects employ language as a mechanism to frame their actions in ways that align with their personal beliefs, cultural values, or emotional states. Their responses often reflect a conscious or subconscious effort to preserve their self-image, reduce culpability, or avoid severe consequences. Below are ways in which suspects construct narratives and seek. Language is often used to diminish the suspect's perceived role in the offense. Blaming external factors, such as peer influence or systemic issues, can serve to reduce personal accountability. Smith (2023) examines how language used in police interrogations influences perceptions of guilt and responsibility, focusing on how suspects' involvement is portrayed through rhetorical strategies. In interrogations, language can reduce a suspect's accountability by shifting blame to external factors, such as peer pressure or systemic problems.

Language, Psychological Defense Mechanisms, and Strategies of Evasion

Language in police-suspect interrogations goes beyond mere communication, serving as a psychological tool that profoundly shapes the interaction between the interrogator and the suspect. Ajayi (2017, p. 225) emphasizes that police interrogations often involve psychological manipulation, with officers using various tactics to influence the suspect's emotions, thoughts, and behavior. These tactics can range from subtle strategies, such as exploiting the suspect's fears or guilt, to more direct methods like intimidation, all aimed at encouraging the suspect to cooperate or confess.

Ogolekwu (2021) asserts that language is fundamental to all human activities, serving as a tool for communication and identification. In the context of police interrogations, this concept can be extended to the suspect's use of language. Suspects strategically use language to express their version of events, justify their actions, or assert their innocence. Their choice of words, tone, and narrative strategies often reflect personal, cultural, or psychological factors, revealing their mindset, background, and intentions. This makes language not only a tool for communication but also an identifier of the suspect's emotional and cognitive state. The way language is employed can influence the suspect's willingness to cooperate, confess, or alter their story.

From a psychological perspective, language in interrogations serves as a deliberate strategy to achieve specific objectives, such as extracting confessions, clarifying facts, or increasing compliance. One notable psychological tactic employed by suspects is the invocation of supernatural explanations as a defense mechanism. Studies by criminologists (Gudjonsson, 2003) show that suspects may invoke culturally resonant metaphors, such as blaming their actions on the "devil," in an effort to distance themselves from guilt and avoid direct moral judgment. This aligns with Denault's (2023) observation that interrogations often become negotiations, with suspects attempting to shift responsibility and influence perceptions of their actions.

Cultural Perspectives on Supernatural Attribution

Cultural factors play a significant role in shaping the language used in police interrogations, particularly in societies where beliefs in supernatural forces are prevalent. In many African, Caribbean, and Latin American cultures, invoking supernatural agents is a culturally ingrained way to express ideas about good and evil, especially in difficult or morally ambiguous situations (Nwoye, 2017). By invoking the “devil,” suspects tap into a culturally understood framework, which may influence how they view their own culpability or how they believe interrogators will interpret their actions.

In culturally diverse societies, suspects may frame their defenses within the context of deeply held beliefs or values. Supernatural Justifications: Invoking external, metaphysical forces, as in statements like “It was the devil’s work,” reflects a worldview where human behavior is influenced by spiritual or supernatural elements. Osisanwo & Adegbohin (2023) observe that during interrogations, suspects often blame the devil after confessing to committing a crime, portraying the devil as the ultimate instigator and source of all wrongdoing. In some societies, attributing actions to traditions or familial obligations provides context for behavior that may otherwise seem irrational or unjustifiable in a legal framework.

The Role of Language in Interrogation: A Comprehensive Overview

Forensic linguistics plays a pivotal role in bridging the gap between language and law, providing critical insights that aid in solving crimes, securing justice, and enhancing legal processes. According to Ogolekwu (2020), forensic linguists examine spoken language by analyzing features such as accent, dialect, pronunciation, tone, and speech speed (p.43). Language extends beyond mere communication in these settings; it becomes a dynamic tool through which authority is asserted, persuasion is employed, and psychological strategies are applied. Interrogation, a cornerstone of law enforcement, plays a vital role in uncovering the truth, gathering essential information, and ensuring justice is served. This discussion examines the multifaceted role of language in interrogation, focusing on its strategic, psychological, and cultural dimensions, while addressing the ethical implications and grounding the analysis in empirical evidence.

Language as a Strategic Instrument in Police -suspect interrogations

In interrogations, language is meticulously crafted to achieve targeted outcomes, such as clarifying inconsistencies, eliciting confessions, or extracting valuable intelligence. Johari (2013, p. 662) states that police forces globally use a unique language that is often incomprehensible to those outside law enforcement. Johari further argues that police jargon is intentionally complex and designed to confuse the public, particularly during police-suspect interrogations. Its use capitalizes on inherent power imbalances between interrogator and suspect. Language performs the following function in police -suspect interrogations.

a. Questioning Techniques and Framing

Interrogators strategically tailor their questions to shape narratives and guide responses. In police interrogations, different types of questions are employed strategically

to control the flow of information, steer the conversation, and ultimately influence the suspect's narrative, often with the goal of obtaining a confession.

1. **Open-ended questions:** These invite suspects to provide more detailed responses, which can lead to unintended disclosures or inconsistencies that the interrogator can later exploit (Newbury & Johnson, 2006). Open-ended questions such as "What happened that night?" allow the suspect to elaborate without constraints, often revealing more than they initially intended.
2. **Closed questions:** These are designed to confirm specific facts or challenge the suspect's account by limiting the possible answers. For example, "Did you take the money?" forces a yes or no answer, making it easier for the interrogator to track inconsistencies or contradictions in the suspect's responses.
3. **Leading questions:** In police-suspect interrogations, leading questions are employed to subtly guide suspects toward specific answers by suggesting that certain facts are already established. This technique pressures suspects to confirm or deny the interrogator's assumptions, which can distort the course of the interrogation and hinder the suspect's ability to provide an independent response. Such psychological tactics often manipulate the suspect into aligning with the interrogator's narrative, potentially leading to false confessions or inaccurate information (Gudjonsson, 2020). Such tactics exploit emotional vulnerabilities and can distort the interrogation process, as suspects are led to confirm assumptions, even when those assumptions do not reflect the truth.
4. **Repetition and paraphrasing:** These tactics serve to emphasize contradictions or compel the suspect to reconsider their earlier statements. By repeating a question or restating the suspect's words, interrogators can highlight inconsistencies, subtly reinforcing their desired version of events and pressuring the suspect to conform to that narrative.
5. **Suggestive questions:** Suggestive language in interrogations can influence suspects by framing questions to align with the interrogator's assumptions. For example, asking "You didn't mean to hurt anyone, did you?" implies the suspect's actions were unintentional, which may lead them to conform their response to fit this narrative, potentially causing a false confession. As Gudjonsson (2003) points out, such questions exert psychological pressure on the suspect to align their story with the interrogator's perspective, thereby distorting the truth.

Interrogators sometimes use suggestive language that guides the suspect toward a particular narrative. For example, asking, "You didn't mean to hurt anyone, did you?" implies an expectation of innocence or good intent, which might lead a suspect to admit guilt or downplay the severity of the crime. This manipulation is psychologically potent, as it plays on the suspect's fear of consequences and desire for approval from authority figures. Suggestive language in interrogations, like asking "You didn't mean to hurt anyone, did you?" can lead suspects toward admitting guilt or minimizing the crime. This tactic plays on the suspect's fear of consequences and desire to please authority, subtly influencing their responses.

b. Establishing language of Dominance and Authority

These questioning techniques highlight how interrogation dynamics are shaped by the power of language, influencing how suspects construct their narratives and potentially leading to false confessions under pressure. Mason (2023) examines how linguistic strategies and power dynamics in interrogations can confuse suspects, compel compliance, and sometimes result in false confessions. Mason explores how police leverage linguistic strategies and power dynamics during interrogations to control suspects, often leading to confusion, compliance, and false confessions. Below are instances of the language of dominance usages and suspects' defences.

➤ **Coercive Versus Persuasive expressions**

Language is a powerful tool in obtaining confessions, but its misuse can lead to coercion and unethical practices. Anumudu & Abaya (2019) analyzed the language patterns employed by the Nigerian police during crime investigations, identifying techniques such as formalization, interruptions, and targeted questioning to exert control. Similarly, Mason (2023) calls for procedural reforms to mitigate coercion and foster fairness in interrogations, emphasizing that these linguistic strategies often reinforce power dynamics and perpetuate social inequalities.

Verbal coercion in police interrogations can be highly influential, even in the absence of physical force. Statements like “This could go easier for you if you just tell us what happened” create psychological pressure by implying leniency or inevitability, which can lead suspects to confess regardless of guilt. Ahmad (2020) highlights that communication, involving the exchange of information, ideas, emotions, and attitudes through verbal and non-verbal means, plays a critical role in suspect interrogations, where it can be utilized either to gather information or exert coercion. Such tactics exploit the suspect’s vulnerability, risking false confessions and compromising the integrity of the interrogation process.

➤ **Suspect Defenses: Constructing Narratives and Seeking Justifications**

In the high-stakes environment of police interrogations, suspects do not merely endure the linguistic and psychological pressures imposed by interrogators; they actively engage in the interaction, crafting responses and narratives to navigate the situation. According to Wright & Roberts (2023), ethical rules place additional obligations on defense counsel to fulfill in their practice. Language binds people together and in the same way, it unbinds them depending on its variations of usage (Ogolekwu, Jibrin & Agu, 2022). Language of justification serves as a tool for suspects to rationalize, justify, or downplay their actions. Rather than being passive recipients of the interrogation process, suspects exhibit agency, utilizing language to shape their portrayal and influence the interpretation of their behavior.

The Ethical and Legal Implications of Language in Police-Suspect Interrogation

Language in police interrogations functions as more than just a means of communication; it is a potent tool that can significantly influence the interaction between the interrogator and the suspect. The way language is used in these encounters carries profound ethical and legal consequences, potentially affecting the fairness of the process, the rights of the suspect, and the outcome of the interrogation. Cetkovic (2017) emphasizes

that police discourse, especially during interrogations, often closely mirrors legal language. The strategic deployment of language by interrogators can result in confessions, uncover essential information, or, on the other hand, risk breaching justice. Ogolekwu & Ekpang (2023) argue that the communication strategies employed by legal professionals and the linguistic environment significantly influence language use. This discussion delves into the ethical and legal complexities inherent in the language used in police-suspect interrogations.

1. Ethical Considerations in the Use of Language

a. Coercion and Manipulation

One of the primary ethical concerns surrounding language in interrogations is the potential for coercion and manipulation. While interrogation tactics often involve psychological strategies aimed at encouraging cooperation or eliciting confessions, these techniques must not cross the line into coercion. Kassin, Drizin, Gisso, Gudjonsson, Leo & Redlich (2010) Such tactics risk undermining the integrity of the interrogation process and the validity of the confession obtained. These methods may create a heightened risk of false confessions by manipulating the suspect's perception of the evidence or their legal standing. This highlights the ethical and legal challenges of ensuring that language used in interrogations does not compromise justice.

b. Minimization and False Confessions

A tactic commonly employed in interrogations is minimization, where the interrogator downplays the severity of the crime to create an environment where the suspect feels comfortable confessing. Osisanwo & Adegboosin (2023) assert that suspects adopt a range of strategies to pursue their objectives, which can be viewed as manifestations of power. This technique is often effective in gaining a confession, it raises ethical concerns, particularly when the suspect is vulnerable or under psychological pressure. In some cases, suspects may confess to crimes they did not commit in response to minimization tactics or promises of leniency.

2. Legal Implications of Language Use

➤ Right to Silence and Miranda Warnings

From a legal standpoint, the language used during an interrogation must respect the suspect's rights, particularly the right to remain silent and the right to legal counsel. This is because, statements made by the suspect have the potential to either implicate or exonerate them (Osisanwo & Adegboosin, 2023). In the United States, for example, the Miranda warning mandates that suspects be informed of these rights in clear and understandable language before being questioned. Henning (2017) argues that defenders in U.S. courts often contribute to racial disparities in the juvenile and criminal justice systems, either through complicity or by directly harming Black youth through implicit bias, colorblindness, neglect, and discrimination. A violation of a suspect's rights can render confessions inadmissible in court, where linguistic analysis is frequently used to address ambiguities in legal principles.

Solan (2018, p. 354) explains that this approach allows the law to interpret and clarify unclear or ambiguous expressions, ensuring that legal proceedings and judgments are based

on precise understanding and application of language. This practice highlights the interplay between legal frameworks and linguistic analysis in achieving fairness and accuracy in judicial outcomes. According to Ekpang and Ogolekwu (2023), the presiding judge plays a unique and crucial role during the court proceedings, ensuring fairness and maintaining the court's credibility. The legal principle that underpins these rights is the recognition that suspects should not be coerced into providing self-incriminating information through ambiguous or misleading language.

The Intersection of Ethical and Legal Concerns

The ethical and legal dimensions of language in police interrogations are closely intertwined. Ethical considerations regarding coercion and manipulation can have direct legal consequences. If an interrogation tactic is deemed unethical, it can undermine the legal validity of the confession obtained. Ekpenyong & Tanyi (2019) suggest that language selection in any social or discursive situation is closely linked to the context and domain in which it is applied. For example, if an interrogator uses manipulative or coercive language to elicit a confession, this may violate the suspect's right to a fair trial or due process, resulting in the suppression of the confession as evidence.

In police-suspect interrogations, the vulnerability of suspects, especially those who are young, mentally ill, or emotionally distressed, must be carefully considered from both ethical and legal perspectives. Legal protections are designed to prevent coercion, but interrogators are ultimately responsible for ensuring these safeguards are respected by using language that upholds the suspect's rights and dignity. Ajayi & Akinrinlola (2020) highlight the role of non-verbal communication, specifically laughter, in police-suspect interactions. Their study explores how laughter, used by both the Investigating Police Officers (IPOs) and suspects, serves various purposes such as building rapport, reducing tension, manipulating verbal communication, deceiving, mocking, evading questions, and maintaining social order. Thus, this study provides insights into how suspects used external-syndrome as a strategy to escape lawful punishment.

Theoretical Framework

This paper adopts Grice's Maxims as the theoretical framework for analysis. This framework is considered appropriate as it offers a structured lens for examining the pragmatic strategies employed by suspects during interrogations. The maxims are outlined below:

1. Maxim of Quality

This maxim emphasizes truth and evidence in communication. The tenets of the Maxim of Quality include the following principles:

- **Truthfulness:** Speak only what you believe to be true.
- **Evidence-based assertions:** Provide information supported by adequate evidence.
- **Avoid deception:** Do not knowingly convey falsehoods or fabricate information.
- **Clarity in intent:** Ensure that the information provided is not misleading, even indirectly.

2. Maxim of Quantity

This maxim ensures that communication is efficient and informative without being excessive or insufficient. The tenets of the Maxim of Quantity include:

- **Provide sufficient information:** Share as much information as is necessary for the conversation.
- **Avoid overloading with unnecessary details:** Do not provide more information than is required.
- **Be concise and focused:** Ensure your contributions are relevant and to the point.

3. Maxim of Relation/Relevance

This maxim demands that contributions be relevant to the ongoing conversation. This maxim helps to ensure coherence and focus in communication. The tenets of the Maxim of Relevance (or Relation) include:

- **Stay on topic:** Ensure that your contributions are directly related to the subject of the conversation.
- **Avoid irrelevance:** Do not introduce unrelated or distracting information.
- **Maintain context:** Align your responses with the situational and conversational context.

4. Maxim of Manner

This maxim focuses on avoiding ambiguity, obscurity, or disorder in communication. This maxim principle emphasizes clarity and simplicity to enhance understanding in communication. The tenets of the Maxim of Manner include:

- **Avoid ambiguity:** Communicate clearly and ensure your message is not open to multiple interpretations.
- **Be concise:** Use brief and straightforward expressions without unnecessary complexity.
- **Avoid obscurity:** Avoid using overly technical, vague, or difficult language.
- **Be orderly:** Present information in a logical and organized manner.

Grice's maxims offer a robust framework to decode the pragmatic layers of communication in police-suspect interrogations. They help uncover underlying strategies, cultural influences, and the dynamics of truth, relevance, and clarity in high-stakes dialogue.

Methodology

This research investigates the role of language in police-suspect interrogations in Nigeria, with a focus on pragmatic dimensions. Using a qualitative approach, the study explores the pragmatic functions and implications of the clause "Officer, it's the devil's work" as employed by suspects during interrogations. Four documented cases (Appendices 1–4) serve as primary and secondary data, involving offenses such as kidnapping, rape, grievous harm, and murder. The data were purposely sourced from online news articles, social media reports, and a transcript of a recorded police-suspect interrogation video. This paper adopts Grice's Maxims as a theoretical framework for analysis. The framework is

deemed appropriate because it provides a structured lens to explore the pragmatic strategies employed by suspects during interrogations.

The selection of data was based on two essential criteria: accessibility and authenticity. Accessibility denotes how readily the texts comprising the corpus could be accessed (Nwogu, 1997), whereas authenticity emphasizes the validity and trustworthiness of the evidence, ensuring it originates from credible and dependable sources (Mongalakwe, 2006). The data corpus includes four documented cases (Appendices 1–4) involving different criminal offenses: kidnapping, rape, grievous harm, and murder. These cases were selected because they are prevalent in Nigerian society today. The cases provide a diverse basis for analysis, highlighting variations in how the clause "It's the devil's work" is used across offences. The data were sourced from online news articles, social media content, and a transcript of a recorded interrogation between police and a suspect.

Each case offers a unique perspective as indicated below:

1. **Kidnapping (Appendix 1):** The suspect, who conspired to kidnap a neighbor and her child, attributed his actions to "the devil's work" during interrogation, pleading for mercy.
2. **Rape (Appendix 2):** A teacher accused of molesting pupils repeatedly claimed, "It's the devil's work," while attempting to justify his actions.
3. **Grievous Harm (Appendix 3):** A mother who poured boiling water on her daughter blamed the devil for her violent act during police questioning.
4. **Murder (Appendix 4):** A transcript of a Delta State police-suspect interrogation reveals the suspect confessing to stabbing a woman and attributing his crime to "the devil's work."

The analysis of these cases is anchored on linguistic pragmatics, exploring the clause's contextual usage and its implications.

Data Presentation
Table 1

EXCERPT 1	EXCERPT 2	EXCERPT 3	EXCERPT 4
I'm pleading for Mercy, it's the work of the devil , I don't really know what has come over me," he confessed. (APPENDIX 1)	At the police station, the teacher pleaded, "Please, spare me; I didn't know what came over me. The effect of what I did just dawned on me. I did not rape them. I only had sex with them. It's the devil's work. " (APPENDIX 2)	A woman residing in Lagos state, has blamed the devil for using her after she poured boiling water on her 13-year-old daughter's body in the Ilupeju area of the state on Tuesday July,30th....Mrs XXXX(name withheld) blamed the devil for using her to harm her daughter. (APPENDIX 3)	Police: You stabbed her from neck, hand and stomach Suspect: Yeah Police: Okay, how do you feel now? Suspect: I say, na devil's work. (APPENDIX 4)

Data Discussions

1. Maxim of Quality (Truthfulness)

In Excerpt 1, the statement "It's the work of the devil" lacks verifiable evidence, shifting blame to a supernatural force. This violates the maxim of quality as it evades personal accountability. The suspect's claim of remorse ("I don't really know what has come over me" further undermines sincerity, portraying himself as a passive victim of external forces rather than an active participant. Also in Excerpt 2, the statement likely violates the maxim of quality because, claiming that an external supernatural force caused his actions lacks evidence and challenges credibility. This defense may be seen as an attempt to evade accountability by attributing blame to a culturally significant entity, thus deflecting personal guilt.

In Excerpt 3 above, the case is not different. The mother's statement attributes her action to an external supernatural force that violates the maxim of quality. This is because the claim lacks evidence and truthfulness, serving as a defense mechanism to evade personal accountability for the harm inflicted on her daughter. Also, the suspect in Excerpt 4 initially provides vague or incomplete information, such as "Sometimes I dey do some kind things," which appears evasive. Later, the admission of "I dey lash her" and the subsequent narrative seem more truthful, likely due to the police's persistence. However, the final statement, "na devil's work," violates the maxim by attributing responsibility to an external, unverifiable force, diluting the sincerity of his earlier confession.

2. Maxim of Quantity (Adequacy of Information)

In Excerpt 1, the suspect violates the maxim of quantity because, the confession provides selective details: while the suspect admits receiving ₦60,000 for the ransom, he avoids explaining how the plan was executed or how the victims were targeted. By limiting the information, the suspect minimizes his role in the crime, adhering to a strategy of partial admission. The teacher in Excerpt 2, provides minimal information regarding his actions. While admitting to "having sex," he denies rape and shifts focus to "the devil," which omits critical details about intent, consent, or circumstances. This partial confession may be aimed at reducing perceived severity.

The violation of this maxim is also observed in Excerpt 3. The suspect's explanation does not provide enough information about her actual motivations or decision-making process. By blaming the devil, she omits key details that could clarify the rationale behind her behavior, making her statement incomplete. The suspect in Excerpt 4 offers sparse details initially, forcing the police to repeatedly probe for clarification. For example, the suspect's description of stabbing the victim evolves only after specific questions about the location and number of stabs. While this eventually provides sufficient information, the suspect's early reluctance shows an attempt to limit his liability by blaming the supernatural force (the devil) for his actions.

3. Maxim of Relevance/Relation (Staying on Topic)

In Excerpt 1, mentions of "the devil's work" and requests for mercy the suspect detracts from the main point, which is the intentional and premeditated nature of the crime. These irrelevancies shift focus away from the logical interrogation process, leveraging cultural beliefs to elicit empathy. The invocation of supernatural influence "It's the devil's work" in Excerpt 2 diverges from the factual interrogation of the incident. Instead of directly addressing his criminal behavior, the teacher introduces a culturally resonant but irrelevant explanation, attempting to realign the focus from his personal culpability to external forces.

In the same vein, the invocation of supernatural causation by the suspect in Excerpt 3 deviates from the immediate relevance of the interrogation's purpose, which is to understand the woman's intent and responsibility for the crime. Her statement shifts the focus from her own culpability to external which is a non-verifiable factor. The suspect's narrative frequently strays from direct relevance, such as referencing unrelated justifications. Evident in Excerpt 4 is the statement "She say make I gather money for her" where the suspect shifts the focus from the "stabbing incident" to a "financial grievance". The final statement, "na devil's work," similarly diverges, using culturally familiar rhetoric to deflect personal accountability.

4. Maxim of Manner (Clarity and Ambiguity)

As exemplified in Excerpt 1, claiming "it's the work of the devil" obfuscates his motives and direct involvement. The teacher's statement in Excerpt 2 is ambiguous and imprecise. By vaguely referencing "the devil," he avoids providing a clear rationale for his actions. This ambiguity serves to obscure intent and may function as a face-saving mechanism in a socially stigmatized scenario. The statement is vague and ambiguous, obscuring the true nature of her intentions.

By using a culturally resonant but unclear explanation, the female suspect in Excerpt 3 potentially attempts to mitigate societal and moral judgment, leaving the interrogators with limited actionable insight. In Excerpt 4, the suspect's language is ambiguous and informal, with phrases like "I dey lash her" requiring further clarification by the police. Additionally, the sequence of events is muddled, requiring the interrogator to repeatedly seek specific details, for instance "You stabbed her from back or from front?" This lack of clarity complicates the narrative and may reflect intentional obfuscation.

Pragmatic Considerations and Implications

In the Nigerian context, invoking the devil operates as a culturally resonant defense mechanism deeply rooted in societal and religious beliefs. This speech act serves as a face-saving strategy, reflecting a broader societal tendency to externalize blame and attribute actions to supernatural forces. By referencing the devil, suspects strategically distance themselves from their actions, portraying themselves as victims of uncontrollable influences rather than deliberate actors. Pragmatically, such statements function as tools for mitigating judgment and reducing both social and legal culpability. They leverage shared cultural and religious beliefs to blend expressions of remorse with an implicit appeal for empathy and leniency.

Supernatural explanations for wrongdoing are common in Nigerian society and often resonate with interrogators and the public. By invoking culturally accepted narratives of spiritual influence, suspects use language to negotiate perceptions, reduce stigma, and align their actions with shared societal values. These statements also operate as speech acts aimed at eliciting empathy and leniency, reflecting the interplay of cultural norms and pragmatic considerations in high-stakes interactions. The suspect's invocation of "Officer, it's the devil's work" encapsulates these dynamics, functioning as both a face-saving act and a calculated bid for leniency. This highlights how culturally ingrained defense mechanisms shape language use during interrogations, underscoring the need to consider the pragmatic and cultural dimensions of such interactions in Nigerian society.

Discussion of Findings

The analysis reveals that the suspect's confession is marked by deliberate violations of Grice's Maxims, particularly those of truthfulness, quantity, and relevance. These linguistic strategies are employed to minimize personal guilt, deflect responsibility, and align the narrative with culturally resonant themes. For instance, the recurring invocation of "the devil's work" demonstrates how language can serve as a tool for psychological evasion and manipulation during interrogations. This clause not only shifts blame to an external force but also invokes a cultural framework that resonates with both the speaker and the audience, thereby softening the perception of culpability. The teacher's plea further illustrates a calculated use of language to influence perceptions in the interrogation setting. By managing guilt and deflecting responsibility, the suspect strategically navigates the high-stakes interaction, leveraging culturally embedded narratives to appeal to the interrogator's potential biases. This aligns with the thematic focus of "Officer, it's the devil's work," where language functions as both a defensive mechanism and a reflection of cultural beliefs.

On the whole, the findings highlight the complex role of language in mediating guilt, cultural norms, and institutional power dynamics during police-suspect interactions. Pragmatic and discourse analyses, supported by criminological literature, suggest that such utterances are not merely defensive but are also deeply rooted in cultural narratives. These statements often serve to shield the individual's identity from direct blame while maintaining coherence within their cultural and psychological context.

Summary and Conclusion

The paper underscores the pivotal role of language in shaping police-suspect interrogations, particularly through the lens of Grice's Maxims of communication. It explores how suspects strategically employ pragmatic defense tactics—such as denial and mitigation—often drawing upon cultural and religious frameworks, like invoking spiritual explanations "It's the Devil's work", as a means of managing power imbalances during interrogations. These defence strategies align with Grice's Maxim of Relevance, as suspects invoke what they perceive as contextually relevant explanations to shift the focus away from personal guilt, thereby deflecting suspicion.

The Maxim of Quantity also comes into play, with suspects providing just enough information to avoid direct incrimination while maintaining ambiguity. In adhering to the Maxim of Manner, suspects often present their defense in a manner designed to reduce the psychological pressure of interrogation, using familiar cultural and religious language that both reinforces their innocence and serves to confuse or disarm the interrogator. The Maxim of Quality is subtly negotiated here, as the suspect's invocation of religious or spiritual explanations, while not necessarily verifiable, taps into culturally accepted truths that are not intended to deceive but to align with the expectations of their audience, the interrogators. These strategies are not simply attempts to evade guilt; they are also tactics to manage the psychological pressures of the interrogation process and, importantly, shift the burden of proof back to law enforcement.

The study reinforces the need for a detailed understanding of the pragmatic and cultural dimensions of such interactions. Recognizing these dimensions can enhance interrogation practices by helping law enforcement distinguish between culturally motivated expressions of guilt and genuine attempts at evasion. This calls for interdisciplinary approaches that integrate insights from pragmatics, discourse analysis, criminology, and cultural studies to better understand the interplay of language, culture, and psychology in legal and institutional settings.

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APPENDIX 1

Crime/offence: kidnapping
Suspect: XXXXX (name withheld)
Victim: Neighbour's wife and her 8-months old baby
Place of crime: Adamawa State

Man confesses to organizing the kidnap of his neighbour and her 8-months old baby in Adamawa One XXXXXX (name withheld) a.k.a Mallam, confessed to have connived with a syndicate of kidnappers from Taraba and Adamawa to kidnap his neighbour XXXXX (name withheld) and her 8 months old son. XXXXXX (name withheld) a trusted neighbour to one XXXXX (name withheld) a resident in Yulde Pate, Yola South Local Government Area of Adamawa State, made the confession in Yola while he was being paraded by Adamawa Commissioner of Police, CP Olubenga Adeyanju at the command headquarters on Wednesday, September 16. According to him, he was approached by a herdsman named XXXX (name withheld) to strike the deal, saying that XXXX's brother (name withheld) who is a top government official in the state will pay millions of naira as ransom.

XXXX (name withheld) admitted that the family of Aliyu has been good to him and blamed the act on the devil. "Honestly, I don't know them and I don't know where they have taken them to. All they say was that they will give me money and it was sixty thousand naira of the one million ten thousand naira they collected as ransom. I'm pleading for Mercy, **it's the work of the devil, I don't really know what has come over me,**" he confessed. Narrating his ordeals, XXXX (name withheld) said he feels bad that XXXX (name withheld) who he had always perceived as a good neighbour could do such thing to his family. "The ugly experience of the fateful day of 11th July 2020 can't be erased in his mind, the kidnappers actually stormed my house to search for me," he said.

Credit: lindaikojisblog.com

Details in: <https://m.lindaikojisblog.com/2020/9/its-the-work-of-the-devil-man-confesses-to-organizing-the-kidnap-of-his-neighbour-and-her-8-months-old-baby-in-adamawa.html>

APPENDIX 2

Crime/Offence: Rape
Suspect: Class Teacher
Victim: School pupil
Place of the crime: Osogbo, Oyo State

At the police station, the teacher pleaded, "Please, spare me; **I didn't know what came over me.** The effect of what I did just dawned on me. I did not rape them. I only had sex with them. **It's the devil's work.**" But the proprietress of the school, Mrs. XXXX (name withheld) denied insinuations by neighbours that the teacher was notorious for sleeping

with minors. Alao said XXXXX (name withheld) was perceived as a religious and diligent person and nobody suspected that he could commit such a crime. Explaining that her children also attend the school, XXXXX (name withheld) said she would not have tolerated such a crime if she knew XXXXX (name withheld) was doing it. The proprietress said she was unaware of the tutorials organised by XXXXX (name withheld) saying that only one of the two affected girls is a pupil of her school, while the other only attended XXXX'X (name withheld) tutorials. Both girls were taken to police clinic at XXXXX (name withheld), Osogbo, where a medical officer attended to them. The medical officer, who chose to be anonymous, said the teacher did not penetrate the vaginas of the girls, adding that his organ, however, had an impact on their pubic areas. Police Public Relations Officer in the state, Mr. Taiwo Olugbemileke, said the case would be investigated since it had been reported to the police.

Credit: African news hungry Blogspot

Details in: <https://africannewshungary.blogspot.com/2010/09/bizarre-stories.html?m=1>

APPENDIX 3

Crime/offence: Causing Grievous Hurt

Suspect: Victim's Mother (name withheld)

Victim: Suspect's daughter (name withheld)

Place of crime: Adamawa

A woman residing in Lagos state, has **blamed the devil** for using her after she poured boiling water on her 13-year-old daughter's body in the Ilupeju area of the state on Tuesday July 30th. Identified as Mrs XXXX (name withheld), the woman accused her daughter, XXXX (name withheld), of stealing N500. While interrogating her, the girl denied the allegation and was attempting to walk out on Mrs XXXX (name withheld) when she lifted the boiling water from the cooker and poured on her daughter's body. XXXX (name withheld) sustained serious burns on her back and buttocks. She was rushed to the Gbagada General Hospital where she is currently being treated. Activist Harrison Gwamnishu in a chat with LIB, said Mrs XXXX (name withheld) is currently being detained at the Ilupeju Police station and will be charged to court this morning August 2nd, for grievous harm on her daughter. XXXX (name withheld) told LIB that when the mother was interrogated, Mrs XXXX (name withheld) **blamed the devil for using her to harm her daughter.**

Credit: lindaikojisblog.com

Details in: https://m.lindaikojisblog.com/2019/8/graphic-its-the-devils-work-mother-says-after-pouring-boiling-water-on-daughter-in-lagos.html#google_vignette

APPENDIX 4

A TRANSCRIPT OF POLICE -SUSPECT INTERROGATION IN DELTA STATE COMMAND

Crime/offence: Murder

Suspect: XXXXX (name withheld)

Victim: Woman (name withheld)

Place of crime: Delta State

Police: What is your name?
 Suspect: XXXX (name withheld)
 Police: XXXX who?
 Suspect: XXXX XXXX
 Police: The woman, XXXX (name withheld), who is she to you?
 Suspect: Okay, she's my friend for bakery there.
 Police: What kind of friend is she to you?
 Suspect: Sometimes I they do some kind things
 Police: Don't waste my time. What kind of friend is she to you? you get waiting you dey tell us before
 Suspect: I dey lash her
 Police: You dey lash her?
 Suspect: I dey lash her. She say make I gather money for her say she go give me but she no come give me the money
 Police: How much be the money?
 Suspect: N100,000
 Police: Oh yes continue
 Suspect: She Come vex. Early in the morning she say make I escort him* (her) go market I think saying Im go give me the money. I follow her waka go in front so I use knife chook
 Police: At what point did you stab her?
 Suspect: When she was already going.
 Police: Where, you stabbed her from back no from?
 Suspect: No, from neck
 Police: She was backing you or facing you?
 Suspect: She was not facing me, she was backing me
 Police: You stabbed her from back how many times
 Suspect: Three times
 Police: Where and where and where?
 Suspect: Neck, hand and belly
 Police: You stabbed her from neck, hand and stomach
 Suspect: Yeah
 Police: Okay, how do you feel now?
 Suspect: I say, na **devil's work**

Credit: SP Bright Edefe @Brightgoldenboy (in X.com)

<https://x.com/Brightgoldenboy/status/1787770577710702811?s=09>



POPULATION DYNAMICS, SAVINGS AND ECONOMIC DEVELOPMENT IN NIGERIA

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Abstract

The Nigerian government has consistently implemented economic and social policies aimed at enhancing the social welfare of individuals, which will serve as a catalyst for economic growth and development. However, the nation's low capital accumulation and rapidly growing population have rendered all of their efforts futile. Nigeria's current economic situation is not promising. This research examined Nigeria's population dynamics, savings rates, and economic growth from 1980 to 2020. This analysis establishes the presence of a long-run link between the dependent and independent variables using the Autoregressive Distributed Lag (ARDL) framework. The results showed that indicators of population dynamics are negatively correlated with economic growth and that throughout the research period, both short- and long-term effects of population dynamics on economic development in Nigeria were seen. On the other hand, the adverse impact is negligible in the near term but substantial in the long term. Additionally, the study's findings indicate that Nigeria's savings rate had a significant negative impact on the country's economic development over the study period, both in the short and long terms. This suggests that the percentage of GDP saved in this economy has a negative effect on economic development. The findings also showed that, over the long and short terms, population dynamics and savings in Nigeria had a positive and substantial association. As a result, it is clear from this study that Nigeria has a low savings rate since the country has not been able to capitalize on its enormous population to increase productivity and the labor force. It is sufficient to infer that the Nigerian government must make investments in the development of human capital, as this would inevitably enhance capital formation and, eventually, contribute to national growth.

Key Words: population , Dynamics, Saving, Economics Development, ARDL
JEL Code: E21,J11,O1

1. Introduction:

Like many other developing nations, Nigeria has implemented a plethora of economic policies (such as stabilization and structural reforms) in an effort to raise the standard of life for its people and promote sustainable economic growth and development. It is evident that the nation is extremely fortunate in terms of the number of people living there, in addition to being endowed with an abundance of natural resources (such as lumber and crude oil, among many others). As a result, the World Bank reports that the nation has the largest population in Africa as of 2020. And according to World-meter's elaboration of the most recent United Nations data, Nigeria today has a population of about 200 million people. Any workable strategy for economic development must take demographic characteristics into account, especially for a nation with such a large population.

Nigeria has tried somewhat in the past to slow down population growth. Nigeria adopted its first population policy in 1988. The policy's objective was to limit a couple's kid count to four by 1995. Nevertheless, the policy's objectives—which included lowering the fertility rate and lowering the number of early marriages, which would have lowered the rate of population growth—were not met. Another population policy, "The National Policy on Population for Sustainable Development (NPP)" was proposed by Nigeria in 2005. Its failure was attributed to political will, fraud, and a lack of policy implementation. The NPP was intended to raise the standard of living and provide a high-quality livelihood for Nigerian citizens.

A high rate of population expansion is linked to food problems, such as hunger and malnutrition, according to Malthusian theory. But according to Bloom and Freeman (1998), low income and poverty—rather than rapid population growth—are the real causes of the food crisis. When money is sufficient to purchase just enough food, the population and food problems may be resolved since prices will then offer sufficient incentives for production. However, in order to fulfill their rising need for food, emerging economies would have to boost their exports, accept foreign help, or borrow money from international organizations. In addition to having a negative effect on the improvement of food supply, rapid population increase has also placed restrictions on savings, foreign exchange, and human resources. (United Nations Food and Agriculture Organization, 2017)

Naturally, savings are crucial to the expansion and development of the economy. The ability of a country to invest and create is determined by its savings, and this has an impact on economic growth. Fast population expansion usually slows the accumulation of physical capital per worker and lowers per capita savings. Additionally, there is a greater demand for social infrastructure, and public spending must be directed toward meeting this need rather than directly funding the production of assets. Increased pressure on the balance of payments due to population growth is probably going to exacerbate the foreign exchange restrictions. Food imports will need the growth of new sectors for export growth and/or import replacement. The growing number of people entering the labor market and the quick rise in the population of school age put increasing strain on training and educational facilities and impedes the improvement of educational quality, which is a concern in emerging nations. Furthermore, a dense population increases the demand on employment and the amount of investment available per labor market participant, therefore exacerbating the difficulty of improving population health (Martin 2009).

A country's ability to create and consume more products and services may increase with population growth, resulting in economic expansion. But this is only possible if individuals have access to the required education and skills and if work possibilities are growing at a rate at least as fast as the labor force. Nigeria's fast population expansion would have detrimental effects on the country's development, including poverty, extreme economic disparity, a drop in national savings, and security concerns. The links between Nigeria's population dynamics, national savings, and economic development will be examined in this study.

2. Literature Review

The main purpose of a literature review is to evaluate the significance of significant contributions made to a field of study and to identify any gaps in the literature that still need to be filled. To make things easier to comprehend, the study will evaluate some pertinent literature that is related to the topic of this research project.

2.1.1 Concepts of Population Dynamic

Population dynamics is the study of how a population's size, demographic composition, and geographic dispersion vary over time. These shifts can be linked to shifts in the natural environment, shifts in the political and economic landscape, shifts in the technology used to manage reproductive health, and eventually shifts in the location and reproductive choices made by humans. Department of Economic and Social Affairs, United Nations, 2013). There is a link between population dynamics and economic development, and population dynamics is important for a country's economic growth. Per capita income affects growth rates, employment, social infrastructure, labor force participation, agricultural development, aggregate demand, capital creation, and the environment. For economists, population dynamics are just as significant as population size. If population growth is outpacing other economic indicators, the government and economists would like to know.

2.1.2 Concepts of Savings

Savings are defined by Ayanwu & Oaikhenan (1995) as the amount of revenue per capital at a given moment that is not spent by economic units. It meant that a portion of the household's discretionary income would not be spent on imported or domestically manufactured consumer goods and services. It stands for undistributed commercial profits for the company. One flow variable that is being measured over time is savings. Savings may be simply described as money that is not spent after taxes. It is reasonable to refer to this as "deferred consumption," as it represents income set aside for potential capital investments or for prudential and speculative purposes in the future. The phrase "disposable income less consumption" sums up saves nicely. Private savings are the primary means of accumulating wealth for investments in developing nations, particularly Nigeria. According to Nkahi (1997), saves are defined as the portion of income that is not spent on economic units on a daily basis. In light of the foregoing, Samuelson et al (1998) defined saves as income less consumption. Individuals and corporate entities, like as corporations, can both make savings—personal or private savings or corporate savings or retained savings. Corporate savings are the portions of a company's earnings that are not

paid out as dividends to shareholders, whereas personal savings are the portion of discretionary income that is not spent. As a result, the total amount of savings that are accessible for a nation is equal to the sum of its foreign and domestic savings.

According to Igbatayo & Agbada (2012), increased national savings encourage greater investment, which raises production. This is true since the amount of savings affects how much capital accumulates. However, as the amount of total production impacts the amount of capital accumulation and savings that families and businesses make, the level of output also influences the amount of total profits.

2.1.3 Concept of Economic Development

The process by which a country, region, local community, or individual's economic well-being and quality of life are enhanced in accordance with certain aims and objectives is known as economic development.

Although the idea has been around in the West for much longer, the phrase has become widely used in the 20th and 21st centuries. Terms like "industrialization," "Westernization," and "modernization" are also frequently employed in discussions about economic progress. Economic development strategies used to be primarily concerned with industrialization and infrastructure, but since the 1960s, they have become more and more focused on reducing poverty.

Todaro (1992) defined economic development as a process that includes structural modifications, faster economic growth, less inequality, and the abolition of absolute poverty. Economic growth is a phenomena of increased GDP and market productivity; economist Amartya Sen refers to economic growth as "one aspect of the process of economic development." Economic development is the implementation of policies with the goal of improving the well-being of the populace. While community economic development experts are also interested in social development, economists are generally concerned with the growth side of the economy and the economy as a whole.

2.2. Theory of Demographic Transition

Theory of Demographic Transition is a theory that throws light on changes in birth rate and death rate and consequently on the growth-rate of population.

Along with the economic development, tendencies of birth-rate and death rate are different. Because of it, growth rate of population is also different.

Demographic transition refers to a population cycle that begins with a fall in the death rate, continues with a phase of rapid population growth and concludes with a decline in the birth rate. According to this theory, economic development has the effect of bringing about a reduction in the death rate.

The relationship between birth and death rates changes with economic development and a country has to pass through different stages of population growth. C.P. Blacker divided population into five types as high, stationary, early expanding, low stationary and diminishing. According to the theory of demographic transition, population growth will have to pass through these different stages during the course of economic development.

The four stages of demographic transition mentioned by Max are explained as follows:

First Stage: This stage has been called high population growth potential stage. It is characterised by high and fluctuating birth and death rates which will almost neutralize each other. People mostly live in rural areas and their main occupation is agriculture which is in the stage of backwardness. The tertiary sector consisting of transport, commerce banking and insurance is underdeveloped. All these factors are responsible for low income and poverty of the masses. Social beliefs and customs play an important role in keeping birth rate high. Death rate is also high because of primitive sanitation and absence of medical facilities. People live in dirty and unhealthy surroundings as a result, they are disease ridden and the absence of proper medical care results in large deaths. The mortality rate is highest among the poor. Thus, high birth rates and death rates remain approximately equal over time so that a static equilibrium with zero population growth prevails.

Second Stage: It is called the stage of Population Explosion. In this stage the death rate is decreasing while the birth rate remains constant at a high level. Agricultural and industrial productivity increases, means of transport and communication develops. There is great mobility of labour. Education expands. Income also increases. People get more and better quality of food products. Medical and health facilities are expanded.

During the stage economic development is speeded up due to individual and government efforts. Increased use of better technology, mechanization and urbanisation takes place. But there is no substantial change in the men, attitude of the people and hence birth rate stays high i.e., economic development has not yet started affecting the birth rate. Due to the widening gap between the birth and death rates, population grows at an exceptionally high rate and that is why it has been called the population explosion stage. This is an Expanding stage in population development where population grows at an increasing rate, as shown in figure, with the decline in death rate and no change in birth rate.

Third Stage: It is also characterised as a population stage because the population continues to grow at a fast rate. In this stage, birth rate as compared to the death rate declines more rapidly. As a result, population grows at a diminishing rate. This stage witnesses a fall in the birth rate while the death rate stays constant because it has already declined to the lowest minimum. Birth rate declines due to the impact of economic development, changed social attitudes and increased facilities for family planning. Population continues to grow fast because death rate stops falling whereas birth rate though declining but remains higher than death rate.

Fourth Stage: It is called the stage of stationary population. Birth rate and death rate are both at a low level and they are again near balance. Birth rate is approximately equal to death rate and there is little growth in population. It becomes more or less stationary at a low level.

These stages of demographic transition can be explained with the help of diagram given below:

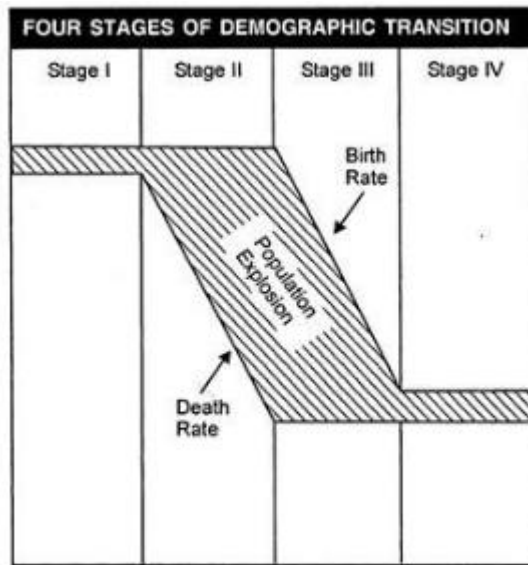


Fig. 6.1. Stages of Demographic Transition

High birth and mortality rates as well as a slow rate of population expansion define Stage I.

Stage II is marked by a high and steady birth rate, a quickly dropping mortality rate, and an extremely quick population growth.

Stage III is marked by a fast increasing population, a low and constant mortality rate, and a declining birth rate.

Stage IV is defined by a low level of stagnant population, a low birth rate, and a low death rate.

The demographic transition theory clarifies variations in the birth and death rates, and therefore the population growth rate, which is utilized in this work to estimate population dynamics.

2.3 Empirical Review

2.3.1 Population dynamics and Economic Development

In 2014, Kehinde carried out research on the impact of population dynamics on Nigeria's economic growth. In his research, he examined how Nigeria's population dynamics affected the country's economic expansion between 1980 and 2010. Techniques from Vector Auto Regressive econometrics were used to examine the data. The findings indicated that Nigeria's population decline will help the nation's development.

In this regard, Aidi, Emecheta, Ngwudiobu, and Ikenna (2016) used time series data covering the years 1970 to 2014 to investigate the link between population dynamics and economic growth in Nigeria. The ordinary least squares estimation approach was used to analyze the data. The findings showed, among other things, that there is an adverse relationship between economic development over the studied time and all three of the study's primary variables: net migration, fertility, and death.

According to Ukpolo (2002), he used the Johansen and Granger causality model to examine the economic link between population increase and economic growth in Africa.

The research is predicated on yearly time series data collected from the two nations (Cote d'Ivoire and Nigeria) on the variables of interest (i.e., population and economic growth). The estimation findings indicate that both variables have a long-term association, but only in Nigeria and not in Cote d'Ivoire, indicating that there is a long-term inverse link between Nigeria's population increase and economic growth rate.

Using ordinary least squares regression analysis, Afzal (2009) from Pakistan also looked at population growth and economic development in Pakistan from 1981 to 2005. The outcome demonstrates a highly substantial negative relationship between population expansion and development and economic growth.

However, the findings of Gideon, Gachanja, and Obere's (2013) study on the relationship between population growth and economic growth in Kenya showed that the two variables are positively correlated, meaning that an increase in population will have a positive effect on the nation's economic growth. They utilized yearly time series data covering the years 1963 to 2009 using the Vector Auto Regression estimate approach.

Furthermore, Adewale (2012) used the ordinary least square technique of analysis to look at how Nigeria's population growth affected the country's economic performance between 1981 and 2007. The findings showed that population expansion significantly and favorably influences economic growth.

Similar assessments of the relationship between population increase and economic growth in Nigeria from 1980 to 2010 were made by Tartiyus, Dauda, and Peter (2015). Descriptive statistics and regression analysis were used to examine the data. The findings showed that population increase and economic growth are positively correlated.

The dynamics of a nation's population have a significant impact on its saving rate. Nigeria's population expansion causes a significant bulge in the age pyramid's bottom part, which raises the proportion of young dependents. This shows that the nation is paying a heavy price for its rapid population increase, which lowers the saving rate and, as a result, slows economic expansion. In light of this, scholars have conducted studies on savings and economic growth, which are discussed below.

2.3.2 Savings and Economic Development

The issue of low savings and capital accumulation as it relates to economic growth was addressed by Osundina & Osundina (2015) in their paper "capital accumulation, savings and economic growth of a nation-evidence from Nigeria." Its scope was based on data spanning thirty-three years (1980-2012). The variables in the model were inflation, real gross domestic product, savings deposit rate, gross national savings, and gross fixed capital creation. Multiple regression analysis was used to analyze the data. A 22% rise in savings would be explained by a percentage change in real gross domestic product, according to the data, and there was a positive correlation.

In his analysis of the connection between savings and economic expansion in Kenya, Odhiambo (2008) found that there existed Granger causality between the two variables and that savings were necessary for the financial sector's expansion. Using panel data from 1991 to 2005, the study sought to determine the causal link between savings, economic growth, and the fiscal deficit. His work stood out from earlier studies of this kind because he placed a strong emphasis on two-way causation.

The direction of the causal link between savings and economic growth in Nigeria between 1970 and 2006 was examined by Olajide & Oladipo (2009) using the Toda and Yamamoto technique. The results showed a unidirectional causal association between savings and economic growth. However, the study's findings differed from those of previous research in this field; Nuruden (2010) discovered a causal relationship between economic growth and saving, suggesting that saving is caused by Granger and economic growth comes first. According to Adeleke (2014), there is a reciprocal relationship between savings and economic growth in Nigeria.

Using a vector error correction model, Anorou & Ahmad (2001) examined the connection between savings and economic growth in seven African nations: Congo, Cote d'Ivoire, Ghana, Kenya, Nigeria, South Africa, and Zambia. The outcome suggested that savings and economic growth had a long-term link. Additionally, they discovered that there is bidirectional causality in South Africa and Cote d'Ivoire and that savings granger drives growth in the Congo.

Romm (2005) examined the link between savings and growth in South Africa using the Johansen VECM estimating approach. The study found that the private savings rate influences economic growth both directly and indirectly.

Sinha & Sinha (1998) used multivariate Granger causality tests and multivariate co-integration tests to investigate the link between savings and economic development for Mexico between 1960 and 1996. The findings showed that savings and economic growth had a long-term favorable correlation.

Masih and Peters (2010) conducted a more current research in which they used generalized variance decomposition analysis, Toda and Yamamoto causality techniques, and the Johansen co-integration methodology to reexamine the savings-growth nexus in Mexico as it converged between 1960 and 1966. They discovered unmistakable proof of a long-term feedback link between economic development and public savings.

Tang & Chau (2009) used the OLS technique and a nonparametric co-integration test to perform a study on the link between savings and growth in Malaysia. The study reveals that saves is an engine of economic growth through its influence on capital creation. It concluded that savings and economic growth are co-integrated and favorably associated in the long term.

Seng & Sothan (2014) looked at the relationship between domestic savings and economic development in the context of Cambodia. The study found that GDS and economic growth in Cambodia are independent of one another since it could not identify any causal relationships between GDS and growth or growth and GDS.

Mphuka (2010) used the bivariate vector auto-regression (VAR) estimation approach to examine the causal relationship between savings and economic development in Zambia. The test revealed that savings are a direct cause of economic growth, despite the article's contention that savings may have an indirect effect because they lead to capital accumulation and the infusion of developed-nation technologies—which, in actuality, are essential to economic growth.

2.3.3 Relationship Between Population Dynamics And Savings

Savings is a crucial and essential component of economic expansion. This is due to its favorable link with investment levels, which in turn leads to economic expansion and growth. Numerous factors have been found in the literature to affect savings, and demographic and population characteristics are one of these key aspects. Scholars have vigorously debated the impact of population dynamics on economic aggregates, and the theory that a big and growing population will boost consumption at the expense of savings has a storied history. However, Leff (1969) was the one who provided solid empirical support for this claim. He looked into how savings were affected by dependence ratios and population increase. His research is grounded in the Ando and Modigliani life cycle theory, which links savings to demographic variables and takes into account effects on households and the economy. He contends that total savings are reliant on the savings of the working population today and the dissaving of dependents, or the young and retired population of today. He distinguished between two effects of population expansion on savings: growth effects and dependence effects. According to the dependency effect, a high dependence ratio and poor saving are the results of the dependent population growing faster than the working population. However, the growth impact shows that when the working population surpasses the population that is dependant and does not save, the population expansion increases overall growth and saving. He came to the conclusion that although savings and the reliance effect are negatively correlated, there appears to be a positive correlation between the two. However, Goldberger's (1973) evidence contradicts Leff's (1969) reliance hypothesis. Goldberger (1973) argues that the empirical findings on savings and dependence rates published by Leff (1969) are implausible. He maintained that the fundamental information Leff created was inherently contradictory for every nation under investigation. He discovered that the product of the savings ratio and per capita income and per capita savings differ significantly. Regarding the empirical literature on demography and saving, Deaton (1992, Pp. 51) made the following assessment: "although some studies find an influence of population growth or demographic effects, the results are typically not robust and there is no consensus on the direction of the effect on saving."

Further evidence that demographic change affects aggregate saving comes from more recent empirical investigations (Mason, 1988; Fry and Mason, 1982; Higgins, 1994 and 1998; Blanchet, 1991). According to Fry and Mason (1982), young workers' wages are higher than pensioners' incomes—who may be using their savings—in nations experiencing strong economic expansion. If this is the case, a higher level of overall family and national saving would result from the workers' concentrated earnings. Mason (1988) created a model known as the "variable rate-of-growth effect" in an attempt to connect teenage dependence ratios with national saving rates. He discovered strong empirical evidence for the model, demonstrating a negative association between young reliance, income growth, and savings, by using cross-section data for seven Asian emerging nations. This is consistent with the argument made by Coale and Hoover (1958) that high rates of teenage reliance would make it more difficult for a nation to save enough money for growth. Deaton and Paxson (1997) state that micro-level studies provide little evidence for a significant relationship between saving and population. They contended that although age variation is small enough to have little or no effect on overall saving, changes in age structure do affect household saving rates. Instead, they are influenced by the

demographics of the family. According to Weil's (1993) research, a 1% shift in population from the working to the senior age groups would result in a 0.81% decrease in the nation's savings. While juvenile dependency and overall reliance ratios show no significant influence, Callen and Thimann (1997) revealed that the elderly dependency ratio has a negative and substantial connection with savings. The total dependence ratio finding runs counter to Leff's (1969) proposal.

Nigeria's population has more than quadrupled since 1960, according to an analysis of demographic statistics in the country. Nigeria has a population of approximately 140 million as per the findings of the 2006 census, with a projected annual growth rate of more than 3 percent. The ability of the economy to develop proportionately and sustainably may be more indicative of the situation than the population's absolute size. It follows that the pace of population growth in Nigeria is unsustainable and has an impact on macroeconomic variables and performance both directly and indirectly. In spite of this, scholars haven't done much to look at the relationship between Nigeria's macroeconomic performance and population demographics. Therefore, using data from Nigeria, econometric examination of the impact of population dynamics on savings is required.

Evaluation of empirical literature review and values added.

A shifting age structure brought on by variations in population growth may be used to characterize the demographic transition that nations experience. The impacts of the demographic transition are disregarded by standard neoclassical growth theory, which assumes a steady rate of population growth. Furthermore, the majority of research have a strong bias towards population dynamics and growth in emerging nations. Despite the fact that emerging nations share many objectives and issues, it is risky and insufficient to draw too many generalizations about them due to their diverse topography, resource depletion, historical and colonial past, and political, social, and cultural systems. In order to synthesize the experiences of all emerging nations, it is crucial to identify shared features that might not actually exist. Thus, the emphasis of this study is Nigeria. The literature evaluated by different academics has acknowledged population dynamics and savings as distinct units in the process of economic growth, as evidenced by the preceding information. However, the prior studies did not take into account population dynamics, savings, or economic progress, which is why this research is crucial.

3. Research Methodology

According to Esene (2005), who quoted Yomere and Agbonigbo (1999), research methodology is the set of techniques, protocols, or strategies the researcher plans to use to achieve his goals. As a result, a summary of the data collecting procedure and the statistical method used to verify the validity of the previously developed hypotheses are also included in this chapter. An ex-post facto research design is used in this paper. Osuagwu (1999) defined ex-post facto research design as the kind of study that involves events that have already happened. Since no effort is taken to regulate or modify pertinent independent factors, data are already available. Data from annual time series covering the years 1980–2020 are utilized in the analysis. Inflation rate (INFL), net migration (NR), birth rate (BR), death rate (DR), savings rate (SR), and human development index (HDI) are among the

factors. The sources of all data were CBN, 2020 and WDI, 2020. ARDL is the estimating approach method. Two models were created for the examination.

3.1 Model specification

The model for this work anchors on theories of demographic transition and life cycle hypothesis to explain the relationship between population dynamics, savings and economic development .

Model 1:

HDI= f(Population dynamics, Savings)

Where Population Dynamics is proxy by birthrate, death rate and Net- migration.

Savings= savings rate.

$$HDI=F(BR+DR+NM+SR+INFR).....Eqn (1)$$

The econometric model can be mathematically written as

$$HDI=\beta_0 + \beta_1 BR_t + \beta_2 DR + \beta_3 NM + \beta_4 SR + \beta_5 INFR + \mu_1.....Eqn(2)$$

The ARDL representation of eqn (3) is specified as:

$$\Delta HDI=\beta_0$$

$$\sum_{i=1}^n \beta_1 \Delta HDI_{t-1} + \sum_{i=1}^n \beta_2 \Delta BR_{t-1} + \sum_{i=1}^n \beta_3 \Delta DR_{t-1} + \sum_{i=1}^n \beta_4 \Delta NM_{t-1} + \sum_{i=1}^n \beta_5 \Delta INFLR_{t-1}$$

$$+ \beta_1 BR_t + \beta_2 DR_t + \beta_3 NM_t + \beta_4 SR_t + \beta_5 INFLR_t + \mu_1.....Eqn(3)$$

Equation (3) is derived from Eqn (2) and the interpretation of each variable remains the same Δ denotes the first difference operator.

Model 2:

SR= f(Population dynamics)

Where, Population dynamics is proxy by birthrate, death rate and Net-migration.

$$SR = F(BR+DR+ NM).....Eqn(1)$$

The econometric model can be mathematically written as:

$$SR = \beta_0 + \beta_1 BR_t + \beta_2 DR + \beta_3 NM + \mu_1.....Eqn(2)$$

The ARDL representation of eqn(3) is specified as:

$$\Delta SR=$$

$$\sum_{i=1}^n \beta_1 \Delta SR_{t-1} + \sum_{i=1}^n \beta_2 \Delta BR_{t-1} + \sum_{i=1}^n \beta_3 \Delta DR_{t-1} + \sum_{i=1}^n \beta_4 \Delta NM_{t-1}$$

$$+ \beta_1 BR_t + \beta_2 DR_t + \beta_3 NM_t \dots \dots \dots Eqn(3)$$

Equation (3) is derived from Eqn(2) and the interpretation of each variable remains the same Δ denotes the first difference operator.

4.1 Data Presentation

Because secondary data were utilized in the study, a unit root test must be performed on the data in order to prevent erroneous regression. Appendix 1 contains the data utilized for this investigation. In the interim, more econometric tests will be conducted, as shown below:

4.2: Augmented Dickey Fuller Unit Root Test.

The ADF stationary test is used to test for the stationarity of the variable used for this study.

Table 4.2: Augmented Dickey Fuller Unit Root Test Result

Thus, Table 4.2 show results for ADF Unit root test result.

Variables	ADF T Statistics	Critical value (0.05)	P-value	Order of Integration	Remarks
HDI	-2.613379	-3.526609	0.2768	1(0)	not stationary
D(HDI)	-6.165139	-3.536601	0.0001	1(1)	Stationary
BR	-1.888249	-3.529758	0.6415	1(0)	Not stationary
D(BR)	-1.392098	-3.529758	0.8477	1(1)	Not stationary
DR	-2.602648	-3.529758	0.2813	1(0)	Not stationary
D(D R)	-2.236967	-3.529758	0.4568	1(1)	Not stationary
NM	-5.182593	-3.529758	0.0007	1(0)	Stationary
D(NM)	-3.736244	-3.529758	0.0315	1(1)	Stationary
SR	-1.539171	-3.526609	0.7988	1(0)	Not stationary
D(SR)	-4.808734	-3.529758	0.0021	1(1)	Stationary
INFLR	-3.772319	-3.529758	0.0290	1(0)	Stationary
D(INFLR)	-5.830890	-3.529758	0.0001	1(1)	Stationary

Source: Authors computation 2022.

Since these variables were found not to be stationary using ADF, the PPT was used to check the stationarity. Table 4.2 above demonstrates that NM, INFLR were stationary at level and first difference, HDI, SR were not stationary at level but stationary at first difference, and BR, DR were not stationary at level and first difference.

4.3: Unit Root Test using Phillip Perron.

Since the ADF test suggests that some of the variables were not stationary even at first difference, the Phillips Perron test was used to determine if the variable was stationary.

Table4.3:Test of stationarity: Philip-Perron Unit Root Test

Variables	Ppt T Statistics	Critical value (0.05)	P-value	Order of Integration	Remarks
HDI	-2.373676	-3.526609	0.3870	1(0)	not stationary
D(HDI)	-14.23392	-3.529758	0.000	1(1)	Stationary
BR	-4.995697	-1.949319	0.0000	1(0)	Stationary
D(BR)	0.196710	-1.949609	0.7380	1(1)	Not stationary
DR	-3.354219	-1.949319	0.0013	1(0)	Stationary
D(DR)	-1.062832	-1.949609	0.2551	1(1)	Not stationary
NM	-4.197218	-3.526609	0.0102	1(0)	Stationary
D(NM)	-4.142809	-3.529758	0.0119	1(1)	Stationary
SR	-1.641189	-3.526609	0.7583	1(0)	Not stationary
D(SR)	-4.598545	-3.529758	0.0037	1(1)	Stationary
INFLR	-3.044238	-3.526609	0.1335	1(0)	Not Stationary
D(INFLR)	11.98970	-3.529758	0.0000	1(1)	Stationary

Source: Authors computation 2022.

It is evident from the above result in table 4.3 that the HDI is stationary at the first difference, the BR and DR are motionless at the level as well, and the NM, SR, and INFLR are stationary at the first difference. It is evident from the above result in table 4.3 that none of the variable's probability values are more than the 5% level of significance. As a result,

we conclude that the variables under investigation are stationary at the 5% level of significance and reject the null hypothesis in every case. This suggests that the data is trustworthy enough for more examination. This suggests that the variable is likely to have a long-term association due to the stationary character of the data.

4.4 Lag Selection Criteria

The lag selection criteria is used to select the appropriate lag for the ARDL model estimation

Table 4.4 Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-192.6028	NA	0.022614	10.40015	10.61562	10.47681
1	-8.270240	310.4548	5.23e-06	2.014223	3.307054	2.474203
2	38.03334	65.79983*	1.83e-06*	0.892982*	3.263173*	1.736278*

From the table above, the LR, FPE,AIC,SC,HQ selected 2 lag. This research work adopted 2 lag selection from the AIC criteria.

4.5. Presentation of Results For : MODEL 1

Table 4.5. Estimated Short run coefficients using ARDL Approach

Variables	Coefficient	T-Statistic	Probability
Dr	-0.027943	-5.221684	0.0000
Br	-0.012633	-0.455338	0.6523
Nm	0.004295	0.697096	0.4913
Sr	-0.003768	-2.945911	0.0063
Inflr	-7.15e-05	-0.777008	0.4434
C	0.859336	5.252557	0.0000
R-Squared = 0.985007			
Adjusted R-Squared = 0.980354			
F- Statistics = 211.6942 (0.000000)			
Durbin- Watson Stat = 2.460881			

Source: Author Computation 2022.

The following result shows a significant positive link between the variables (HDI, BR, DR, NM, SR, and INFLR) with a high coefficient of determination (Adjusted R-squared = 0.98035). According to the R-squared value, birthrate (BR), deathrate (DR), net migration (NM), savings rate (SR), and inflation rate (INFLR) collectively account for almost 98% of the fluctuations in the Human Development Index (HDI). The model appears to be suitable for usage based on the values of the R-squared and the Adjusted R-squared.

The birthrate result showed that, when examining the t-statistics of -0.455338 (less than 2 in absolute term) and its related P-value of 0.6523 (which is more than 0.05), the coefficient of this variable (-0.012633) is negative and statistically insignificant. It suggests

that the birthrate and economic development in Nigeria are negatively correlated, meaning that a 1% rise in the birthrate would often result in a 1% decrease in economic growth. This is consistent with economic theories like the Malthusian hypothesis. The outcomes of Aidi, Emecheta, Ngwudiobu, and Ikenna (2016) are consistent with this conclusion.

For the duration of this analysis, there is a statistically significant negative correlation between DR and economic progress in Nigeria. This finding, however, is consistent with the research on Nigeria's death rate and economic growth conducted by Ishaku (2019). According to his research, Nigeria's economic progress has been significantly impacted by DR. According to economic theory, a higher mortality rate would result in a smaller labor force, which would lower productivity.

Furthermore, it was shown that net-migration is a statistically unimportant variable in the analysis of economic development based on the Net-migration coefficient, t-statistics, and P-value of 0.004295, 0.697096, and 0.4913, respectively. It is also crucial to remember that the variable's direct relationship to Nigeria's economic progress is explained by the positive coefficient, as shown. Thus, assuming all other factors remain constant, an average rise of 0.04% is predicted in economic development for every 1% change in net-migration. This stands in stark contrast to the findings of Aidi, Emecheta, Ngwudiobu, and Ikenna (2016) and apriori expectation. This might indicate that there is no economic benefit to the amount of people leaving the nation.

Additionally, as can be seen in the above table, the coefficient of savings is -0.003768; the corresponding t-statistics and P-value are 0.0063 and -2.945911, respectively. With all other variables held constant or unaltered, a percentage change in savings is predicted to reduce the dependent variable (HDI) by around 0.004 percent (on average) since this variable is statistically significant (based on both the t-statistics and P-value). This is consistent with Nwakeze and Omoju's (2011) findings.

It is discovered that the inflation rate has a negative correlation with the dependent variable (HDI) and is statistically significant. The values of the coefficient, t-statistics, and P-value are, respectively, -7.15E-05, -0.777008, and 0.4434. The outcome explains why an average increase in the inflation rate is predicted to decrease economic progress by around 7.15%. This is in line with economic theory as rising inflation rates should have a negative impact on the economy. It is also consistent with research done in 2015 by Osundina & Osundina on "capital accumulation, savings, and economic growth of a nation-evidence from Nigeria."

4.6. Estimated Long run coefficients using ARDL Approach

Table 4.6. Estimated Long run coefficients using ARDL Approach

Variables	Coefficient	T-Statistic	Probability
Dr	-0.020709	-5.419654	0.0000
Br	0.012681	3.031519	0.0051
Nm	-0.001750	-0.457783	0.6505
Sr	-0.002790	-3.135001	0.0039
Inflr	-2.48e-06	-0.040972	0.9676
C	0.243664	1.043769	0.3052

Source: Author Computation 2022.

The estimated ARDL model's Long-Run outcomes are shown in Table 4.6 above. Long-term economic progress in Nigeria is positively correlated with birthrate, despite the short-term results being unfavorable. This indicates that a 1% rise in the birthrate will result in 0.012% more economic development, or the same percentage as in the short term.

However, at a smaller proportion of 0.02%, the results indicate that the mortality rate has the same long-term negative and substantial link with economic progress.

Furthermore, there is a negligible long-term negative correlation between net migration and economic development, which is consistent with the economic theory that states that brain drain from net migration has a negative impact on economic development.

Likewise, there is a considerable negative correlation between the short-term savings rate and economic progress. Additionally, it has been demonstrated that the inflation rate and economic progress continue to have a negligible negative association.

4.7 F-Bounds Test Result

Table 4.7 F-Bounds Test Result

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	12.28005	10%	2.75	3.79
K	5	5%	3.12	4.25
		2.5%	3.49	4.67
		1%	3.93	5.23

Based on the bound test result, it is evident that there is a long-term link between the variables and HDI since the F-statistic (12.28) is bigger than the upper and lower bound test critical values (4.25 and 3.12, respectively).

4.8. Presentation of Results for Model 2:

Table 4.8.1 Estimated Short run coefficients using ARDL Approach

Variables	Coefficient	T-Statistic	Probability
Dr	3.933441	2.322691	0.0267
Br	1.648296	3.336712	0.0022
Nm	1.242312	1.548270	0.1314
C	-18.64224	-1.780768	0.0844
R-Squared = 0.936947			
Adjusted R-Squared = 0.925124			
F-Statistics =79.25128 (0.00000)			
Durbin –Watson Stat =2.178657			

Source: Author Computation 2022.

A significant positive link between the variables (BR, DR, NM, and SR) is shown by the high coefficient of determination (R-squared = 0.936947, Adjusted R-squared = 0.925124) in the given result. According to the R-squared value, net migration (NM), birthrate (BR), and deathrate (DR) collectively account for over 93% of the fluctuations in

savings rate (SR). The model appears to be suitable for usage based on the values of the R-squared and the Adjusted R-squared.

In the examination of savings rate, the birthrate is a positive and statistically significant proxy variable for population dynamics, as indicated by the birthrate coefficient, t-statistics, and P-value of 1.648296, 3.336712, and 0.0022, respectively. Nigeria. Therefore, an average rise in SR of 1.65% is predicted for every 1% increase in the birthrate.

The study of savings rate also demonstrated that deathrate is a statistically significant proxy variable for population dynamics, as indicated by the deathrate coefficient, t-statistics, and P-value of 3.933441, 2.322691, and 0.0267, respectively. It's also important to remember that the variable's direct relationship to Nigeria's savings rate is explained by the positive coefficient, as shown. Therefore, if all other factors remain constant, an average rise in SR of 3.93% is predicted for every 1% increase in the mortality rate.

In the examination of savings rate, net-migration is a statistically insignificant proxy variable for population dynamics, according to the Net-migration coefficient, t-statistics, and P-value of 1.242312, 1.548270, and 0.1314, respectively. It's also important to remember that the variable's direct relationship to Nigeria's savings rate is explained by the positive coefficient, as shown. Therefore, assuming that all other factors remain constant, an average rise of 1.24% in SR is anticipated for every 1% increase in net-migration. This is consistent with economic theory, which holds that migrants who leave their home country in quest of a better life contribute to their economic reserve through unilateral transfers.

Table 4.9. Estimated Long run coefficients using ARDL Approach

Variables	Coefficient	T-Statistic	Probability
Dr	-3.231741	-7.682828	0.0001
Br	2.015421	4.556188	0.0000
Nm	1.519013	1.711703	0.0966
C	-22.794440	-1.926829	0.0629

Source: Author Computation 2022.

The ARDL Model's long-term estimation is shown in Table 4.9.2 above. A key indicator of population dynamics that negatively affect SR is the deathrate.

In Nigeria, birthrate and net migration continue to have an influence on SR over time, with BR being substantial and NM being inconsequential at the 5% significance level.

4.10 F-Bounds Test Result

Table 4.10 F-Bounds Test Result

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.985971	10%	2.72	3.79
K	3	5%	3.23	4.25
		2.5%	3.49	4.67
		1%	3.93	5.23

According to the bound test result, there is a long-term association between the variables and SR since the F-statistic (6.985971), which is bigger than the upper and lower bound test critical values (4.25 and 3.23, respectively), indicates this.

4.11 Test of Hypothesis

Decision rule: In testing our hypothesis, we reject the null hypothesis if the probability value is less than the 5% level of significance otherwise; we fail to reject the null hypothesis.

Objective 1: Evaluate the effect of population dynamics on Economic development in Nigeria.

Null Hypothesis : Population dynamics has no significant effect on economic development.

Interpretation

We therefore accept the null hypothesis, which states that population dynamics has no significant effect on economic development in Nigeria at the 5% level of significance, based on the results in table 4.5.1 above, which show that the probability values of birthrate (0.6532) and net-migration (0.4913) are greater than the 5% level of significance.

Objective 2: Assess the impact of saving on economic development in Nigeria.

Null Hypothesis: Savings do not have significant impact on economic development in Nigeria

Interpretation

Based on the outcome presented in Table 4.5.1 above, the probability value of the savings rate (0.0063) is less significant at the 5% level. This suggests that we accept the alternative hypothesis and reject the null hypothesis, which claims that savings have no substantial effect on economic growth. As a result, we find that savings have a considerable impact on economic development in Nigeria.

4.12: Discussion Of Findings

The population dynamics, savings rates, and economic development of Nigeria are all empirically examined in this paper. The findings indicate a short- and long-term link between savings, economic development, and population dynamics.

Additionally, the study's findings indicate that, during the duration of the investigation, Nigeria's economic development is negatively impacted by population dynamics, both in the short and long terms. On the other hand, the adverse impact is negligible in the near term but substantial in the long term. This is consistent with proxies for population dynamics being shown to be negatively associated to economic growth in Aidi, Emecheta, Ngwudiobu, and Ikenna's (2016) study on population dynamics and economic growth. Furthermore, the demographic transition hypothesis demonstrates how a country's development is impacted by its population dynamics.

The study's conclusions also showed that, throughout the study period, Nigeria's savings rate had a considerable detrimental short- and long-term influence on the country's economic development. This likely demonstrates that a portion of the GDP saved in this economy is so low that it slows down the rate of economic development, which is

consistent with the finding of Igbatayo & Agbada (2012) that higher levels of national savings encourage higher levels of investment, which in turn boost output.

The findings also showed that, over the long and short terms, population dynamics and savings in Nigeria had a positive and substantial association. which has resulted in the null hypothesis—that there is no relationship between population dynamics and savings in Nigeria—being rejected. This is consistent with the lifecycle theory, which examines the relationship between population dynamism and savings rate, as well as the study by Leff (1969), which examined the effects of population growth and dependency ratio on savings and found that rising populations have an impact on savings.

5.1 Summary of Findings

The demographic dynamics and savings on Nigeria's economic development between 1980 and 2020 were examined in this study. ADF results indicate that the variables were not found to be stationary using ADF, which led to the use of the Phillip Perron test, where BR& DR became stationary at level. NM, INFLR, HDI, and SR were not stationary at level but stationary at first difference, and BR and DR were not stationary at level and first difference. The results of the Bound test showed that the variables had a long-term association.

The results showed that measures of population dynamics are negatively correlated with economic development; the amount of GDP saved in this economy has an adverse effect on economic development; and there is a substantial positive correlation, both in the short and long term, between population dynamics and savings.

5.2 Conclusion and Recommendations

The researcher in this study attempted to determine the relationship between population dynamics, savings, and economic development in Nigeria due to the government's inability to control the country's rapidly expanding population and enhance capital formation for economic development. These results suggest, among other things, that Nigeria has a low savings rate because the country has not been able to capitalize on its large population to increase productivity and the labor force. Based on the results, it is sufficient to draw the conclusion that the Nigerian government needs to make investments in the development of human capital, as this will inevitably increase capital formation and, eventually, lead to national development. In light of the study's conclusions, the following policies were recommended:

1. The Nigerian government ought to start sensitization campaigns to inform the people of Nigeria about the importance of monitoring the country's fertility rate.
2. The Nigerian government ought to make investments in human resource planning and manpower, as these are the primary sources of a country's wealth.
3. A renewed interest in mobilizing domestic resources to finance savings and economic development is necessary because capital accumulation is crucial for the growth and development of a nation. Particular attention should be paid to economic and socio-cultural shocks specifically, the investment climate in Nigeria so as to ensure macroeconomic stability and economic development.
4. The government should put in place more economically friendly policies to attract more of both domestic and foreign investors. This will go a long way in creating more

employment opportunities as well as stimulating productivity thereby boosting the part of GDP that is saved.

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FOREIGN DIRECT INVESTMENT, OIL SECTOR AND ECONOMIC GROWTH IN NIGERIA

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Abstract

The study examined the extent to which foreign direct investment in the oil sector influence economic growth in Nigeria. Although, it has been difficult to ascertain why foreign direct investment FDI in oil sector has not been able to measure up relative to other oil rich countries of the world. Nigeria has not been able to efficiently benefit adequately in this regards, it is on this premise that the work offers a practical means of addressing the phenomenon. The study covers the period 1970 -2022; the study is descriptive and quantitative in nature using statistical tools, trends, the Structural Vector Autoregression (SVAR), among other econometric models. The findings of the study showed a relationship among gross domestic Product, Foreign direct investment, oil exports, index of openness, employment and oil price. Finding showed that the lag value of gross domestic product has a positive but a statistically insignificant effect on economic growth in Nigeria. Oil exports have a positive and statistically significant impact on economic growth in Nigeria in the short-run. The analysis implies that a 1% increase in oil exports will lead to a 0.18% increase in economic growth in the economy. The paper concluded by recommended that Pragmatic mechanisms should be put in place to properly channel domestic technology ,improve on local technology and co-engage foreign and local technology for on the job training among others.

Key words: Oil export, Economic growth, foreign direct investment, exchange rate, inflation, employment.

Introduction

Foreign direct investment (FDI) is an important factor in the globalization process and in recent years has outpaced trade (Almsafir et al, 2011); It is also a vital component of the global economic system and a significant catalyst for the transfer of capital and human resources from one nation to another (OECD, 2017). Thus, foreign direct investment is a component of the economic system that promotes economic growth and infrastructural development. Developed and developing nations have in one way or the other provided incentives to encourage foreign direct investment in their economies (Melnyk, Kubatko, & Pysarenko, 2014); and many academics and policy makers report that foreign direct investment (FDI) can have significant favorable effects on the growth of a host economy along with doestic investment In addition to the funds it provides, foreign direct investment

can be a source of useful technology and technical know-how that can improve links with local businesses, which can support economic growth.

Furthermore, it has been observed that since the early 1980s a number of nations have implemented regulations meant to promote foreign direct investment and loosen financial flow restrictions and as a result foreign direct investment rose to prominence as one of the key sources of cash flow and a driving force behind economic growth by improving the balance of payments and increasing cash flows, which add more money to the current account and may be used to fund regional projects that are expected to have a favorable impact on the host country's economic performance. In same vein foreign direct investment is seen as a way to improve the peoples welfare through stimulating economic growth, extending employment possibilities, and increasing trade (Asiedu, 2018). According to Egolum (2011) He posts that in efforts to encourage the inflow of foreign direct investments (FDI), the Federal Government has adopted a variety of policies and measures which have allowed foreign investors to be almost treated in same vein as local investors with tax breaks and incentives. The National Investment Promotion Commission Act, 1995) was established with the purpose of promoting and facilitating investment in Nigeria with a one-stop investment center that brings together and streamlines administrative processes for new firms and investments; this center is supported by cooperation from 27 governmental and parastatal entities by promoting suitable investment climate; with the intention that incentive programs will encourage the inflow of foreign private investments and the government has demonstrated awareness of macro-policy and institutional framework particularly on macro-economic policies which are considered important in influencing investment decisions; eliminated restrictions and ceilings on FDI and permitted 100 percent foreign ownership in all sectors, with the exception of those that are illegal under local and international law (Emudainohwo, 2015). Economic potential is well recognized to be the biggest economy in the West African sub region given the country's considerable resource endowment and coastal location it is clear that it posses potential for strong growth, But yet Nigeria has realized very little because the previous efforts at planning and visioning were not sustained (Onyali & Okafor, 2014).

1.1 Back Ground to the Study

Economic openness is widely acknowledged to increase economic growth in both rich and developing countries. The oil and gas industry in Nigeria draws the greatest FDI inflows, according to a sector-by-sector examination of FDI inflows. \$20.83 million and \$203.9 million dollars in foreign capital were invested in the oil and gas industry during the first quarter of 2016, and the second quarter's respectively. A total of \$171.63 million and \$227.3 million were reported in the third and fourth quarters, respectively. In the first six months 2017, foreign investment inflows into Nigeria's oil and gas sector climbed to US\$291.47 million. Compared to the 21.21% inflows saw in the first half of 2016, inflows grew by 31.76%. (NBS, 2017) Beginning in 2020, Nigeria's primary trade partner for crude oil was Europe. In the fourth quarter of 2020, crude oil shipments to Europe were worth roughly N853 billion, which is about US\$2 billion. However, in the fourth quarter of 2020, exports from Nigeria exceeded N880 billion and reached over US\$2.2 billion, making Asia the top destination for Nigerian crude oil. A total, shipments of crude oil drastically declined in the second quarter of 2020. Nigeria's export value is mostly derived from crude

oil exports. The Nigerian economy has been significantly impacted by the Covid-19 pandemic epidemic, Due to declining demand, crude oil prices fell precipitously, and the nation continuously reduced daily crude oil output. About 9% of Nigeria's GDP comes from the country's petroleum industry. However, due to the decreased in demand which was occasioned by the COVID-19 epidemic, Nigeria's oil output and exports decreased. The oil sector's share of this total real GDP in 2020 between October and December was roughly 5.9%, which is a decrease of about 3% from the prior quarter. Finally, the oil sector's share of the nation's GDP increased to 9.25% in the first quarter of 2021. The mineral fuels, petroleum, and distillate products industry contributed more than 80% of Nigeria's export value in 2019, totaling about \$45 billion (NBS, 2021). A downturn in FDI into Nigeria during the past years, coupled with a drop in oil prices on the global market, has slowed Nigeria's oil exports, which has had an adverse effect on economic growth. The government's pursuit of an expansive fiscal policy through public expenditure was simplified as a resultant effect. This decline in her FDI influx will have an impact on employment possibilities, consumption levels, investment levels, and employment growth. Given that global uncertainties decreased net FDI inflows from 1996 to 2019 and that oil exports were influenced by declining oil prices, the current epidemic on FDI is particularly concerning. Majority of the time, rising economies like Nigeria and those in the Asia-Pacific region experience severe shocks brought on by GDP uncertainty (Ho and Gan, 2021). Because of the loss in FDI coming in, host nations like Nigeria may see a drop in oil output and exports, which would cause the economy to contract. This has made it necessary to conduct a research of this kind, which look at how oil exports affect economic growth in Nigeria.

1.2 Statement of the Problem

Nigeria receives a higher proportion of FDI in the petroleum sector than in other industries, similar to other Sub-Saharan African countries. UNCTAD (2020) stated that FDI inflows to Nigeria surged by 71% from \$2 billion in 2018 to \$3.4 billion in 2019, led by resource-seeking inflows in the petroleum sector. Capital from Nigeria's petroleum sector accounted for the majority of a 17% increase in capital flows to around \$11 billion in West Africa. This demonstrates how cash flows to Nigeria's petroleum industry are distorted.

Nigeria's oil exports and FDI have a favorable correlation, according to empirical literature (see Adereni, Azeez, Elufisan and Awomailo 2019; Afolaya and Jimoh 2019; Hussain and Ahmed 2017; Makuchukwu, Salami; Fatimah, Gazi and Oke 2012). Despite an increase in oil exports fueled by FDI inflows, oil money in Nigeria has not had the desired effects, notably in the aspect of economic progress and development. There is no conclusive evidence that the increase in oil exports brought on by FDI inflows has had any direct or indirect effects on economic growth in Nigeria, unlike other oil-rich nations that have frequently exchanged their oil for fixed capital, leading to enormous capital formation and, consequently, economic growth and development. The development and expansion of Nigeria's economy are gravely threatened by this.

Although it is possible that the export of oil would have a direct impact on Nigeria's economic welfare, it is also very likely that this impact will only be indirect. With an increase in oil export profits, the government may decide to spend more or conserve more.

Increased government expenditure may be directed toward developing fixed capital or human capital, both of which support economic growth and development. Furthermore, increased government savings add to general savings, which when used can boost the economy. This study aims to conduct an empirical assessment of how foreign direct investment through oil exports affects Nigeria's economic prosperity.

1.3 Research Questions

This study seeks to solve the following puzzles

- i. What is the effect of FDI on Oil export in Nigeria?
- ii. How has FDI through oil Export impacted Economic growth in Nigeria?

1.3 Objectives of the Study

The objective of this study is to examine the relationship between FDI, Oil export, economic growth in Nigeria. The specific objectives are to:

- i. Examine how FDI impact on Oil export in Nigeria;
- ii. Ascertain the effect of FDI on economic growth through Oil export in Nigeria

1.5 Research Hypotheses

This study is guided by the following hypotheses:

H₀₁: there is no significant relationship between FDI and Oil export in Nigeria;

H₀₂: FDI through oil export has no significant impact on economic growth in Nigeria.

1.6 Significance of the Study

Oil export has unsurprisingly been extremely important to Nigeria's political economy. The transmission channels oil sales towards achieving economic growth in Nigeria have not been adequately subjected to any empirical details, despite the fact that these contributions to economic growth in Nigeria have been enormous and have each been the subject of empirical investigation separately. The relationship and nature of transmission between FDI, through oil export to economic growth in Nigeria have not been adequately documented in empirical literature.

Additionally, this research will serve as a resource for decision-makers and aspiring researchers on related subjects, which will incite profound and innovative thoughts that are practically applicable to help improve the management of oil export for the achievement of capital formation for the purpose of achieving real economic prosperity and development in Nigeria and other resource-rich countries.

2.0 Review of Related Literature

Despite several empirical works on oil export, there is little conceptual literature on oil exports. The entire amount of oil exported, including both crude oil and refined oil products, is measured in barrels per day (bb/day). According to Eche E. (2024) and Akighir and Kpoghul (2020), oil exports include semi-finished and unfinished petroleum products, liquid fuel, lubricating oils, solid and semi-solid goods made from distillate and cracking of crude petroleum, and solid and semi-solid products made from liquid fuel. Oil and gas extraction is a key source of export income and, to a lesser extent, source of employment in many developing economies. However, the most significant benefit that a nation may get from its growth is arguably the fiscal role that the oil and gas industry plays in

generating tax revenue and other government funds. To ensure that the state, as the owner of the resource, receives a fair share of the economic rent generated by oil and gas development, export strategies and the tax system must be properly established (Sunley, Baunsgaard and Simard, 2002).

2.1. Economic Growth

The expansion of a nation's capacity to produce goods and services from one period to the next is referred to as economic growth. It also refers to as the gradual rise in the quantity of goods and services an economy generates. Ogunleye (2014). The World Bank (2019) sees economic growth as an increase in the production of goods and services over a specific time period. For precision, the measurement of economic growth must take the effects of inflation into account. Business profits increase as a result of economic growth. The effect is a rise in stock prices. Businesses can invest and increase employee numbers as a result. As more employment opportunities are created, income rises. The consumers have sufficient funds to purchase extra goods and services. Purchases stimulate economic growth at a higher rate. This is why good economic growth is the goal of all nations. As a result, one of the important economic indicators is economic growth.

The most reliable growth metric is the Real Gross Domestic Product (RGDP). It eliminates the detrimental effects of inflation. The World Bank uses Gross National Income (GNI) as a growth indicator rather than GDP. It includes cash sent home by Americans working overseas. It is a key source of revenue for many developing countries like Nigeria. While growth rates are important, the World Bank (2019) Group emphasizes that growth patterns that prioritize increasing opportunities for the disadvantaged and excluded, especially women and youth, can result in more strong and sustainable growth.

Comparisons of GDP by nation will understate the full magnitude of these nations' economies. The GDP does not include unpaid services. This excludes daycare, unpaid volunteer labor, and illegal black market activities. Environmental expenditures are not included in. For instance, plastic is cheap since disposal fees are not included in. However, the impact of these costs on social wellbeing is not taken into consideration by GDP. A nation's level of living can be improved when environmental costs are considered. Only the values of a society are measured. The gross domestic product is the most reliable measure of economic growth (GDP). It takes into account the whole nation's economic output, which includes all goods and services produced for export by local businesses whether they are sold domestically or overseas. A measure of output is the GDP. The parts that are created to make a product are not included, though. Because they are made domestically, exports are taken into account. Imports are taken into consideration while adjusting economic growth.

Since 2015, the pace of economic growth has been moderate. After averaging 1.9% in 2018, growth was constant at 2% in the first six months of 2019. Internal demand is still hedged as a result of low private spending and high inflationary episodes (11% in the first six months of 2019). From the perspective of output, the services sector, particularly the telecoms, was the primary engine of development in 2019. The North-East insurgency and ongoing farmer-herdsmen disputes are to blame for the continued underperformance of the agriculture sector. Industry performance is inconsistent due to a worse power sector performance in 2019, manufacturing production is slowing down, while GDP growth is

steady. It was predicted that output of food and beverages would rise in response to import restrictions. The construction sector, on the other hand, is still performing well as a result of continuing megaprojects, increased public spending in the first half of the year, and import restrictions. The growth rate is too slow to eradicate poverty among the poorest 50 percent of the population. The agriculture sector's failure harms the chances of poor rural inhabitants, while excessive food inflation has a detrimental effect on the poor in urban regions. Oil production is slowing in 2019 as a result of a poorer power sector performance, GDP growth is constant. In reaction to import limitations, an increase in food and beverage production was anticipated.

On the other hand, the construction industry is still doing well thanks to ongoing megaprojects, increased public expenditure in the first half of the year, and import restrictions. The growth rate is too slow to eradicate poverty among the poorest 50 percent of the population. The agriculture sector's failure harms the chances of poor rural inhabitants, while excessive food inflation has a detrimental effect on the poor in urban regions. Despite growth in some industries, employment growth is still slow and insufficient to keep up with the labor force's rapid expansion, leading to a high unemployment rate (23% in 2018) and 20% of the work force being underemployed. The high rate of poverty in the country's North-East area was also a result of the instability in the Northern region and the resulting population relocation.

Nigeria's medium-term growth is forecast to stay constant at roughly 2% in the absence of major fundamental policy adjustments. As a result, it is anticipated that the economy would expand more slowly than the population and that living standards will decline. Growth is also constrained by a weak macroeconomic environment, high persistent inflation, several exchange rate windows, restrictions on foreign exchange, distorting actions of the central bank, and a lack of revenue-driven fiscal consolidation outcomes. The increase of private sector credit is constrained by increasing public debt as well as more complex central bank policy measures. Nigeria's economy is vulnerable to external risks because fiscal buffers have been exhausted and external balances are unstable due to hot money flows. The opportunity exists for the incoming administration to quicken the pace of structural changes in order to create an institutional and regulatory framework capable of controlling the volatility of the oil industry and fostering long-term expansion of the non-oil economy. The abolition of trade and forex restrictions, the elimination of subsidies, enhanced domestic tax mobilization, and more openness and predictability of monetary policy are all bold measures that might have a substantial influence on the economy's trajectory. While raising spending on much needed public services, such measures would help enhance the standard of life for low-income populations. After much consideration, the signing of the Africa Continental Trade Agreement may also provide the economy a boost in the medium run. Economic indicators from the World Bank

3.0 Data Presentation and Analysis of Results

3.1 Method of the Study.

Data was analyzed using descriptive statistics and econometric analytical tools, the unit root test, ADF, KPSS, the SVAR and Variance decomposition tests were carried out. The IRF was also used to track the responsiveness of the regressands in the SVAR to the shocks

in the other variables. The variance decomposition explained the extent of movement in the dependent variables explained by their own shocks vis-avis shocks from other factors.

3.2 Model specification and Discussion

In tracing the indirect effect of foreign direct investment on the economy, the employment channel will be used as specified. Foreign direct investment inflows create employment avenues in an economy and thus affect economic growth positively. Thus, the transmission which is the pass-through effect of foreign direct investment to economic growth via employment is given as follows:

$$FDI \longrightarrow EMP \longrightarrow GDP \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad -$$

1

Where FDI is foreign direct investment inflows, EMP is employment, and GDP is economic growth (proxy by gross domestic product).

Transposing the transmission yields,

$$GDP_t = f(GDP_{t-1}, EMP_{t-1}, FDI_{t-1}, EMP_t, FDI_t) \quad - \quad - \quad - \quad - \quad (2)$$

$$EMP_t = f(GDP_{t-1}, EMP_{t-1}, FDI_{t-1}, GDP_t, FDI_t) \quad - \quad - \quad - \quad - \quad (3)$$

$$FDI_t = f(GDP_{t-1}, EMP_{t-1}, FDI_{t-1}, GDP_t, EMP_t) \quad - \quad - \quad - \quad - \quad (4)$$

Therefore, the exposition of the normalized SVAR (4.7) system of equation yields the following,

$$GDP_t = \alpha_{11}^1 GDP_{t-1} + \alpha_{12}^1 EMP_{t-1} + \alpha_{13}^1 FDI_{t-1} + \alpha_{12}^0 EMP_t + \alpha_{13}^0 FDI_t + \varepsilon_{1t} \quad - \quad - \quad (5)$$

$$EMP_t = \alpha_{21}^1 GDP_{t-1} + \alpha_{22}^1 EMP_{t-1} + \alpha_{23}^1 FDI_{t-1} + \alpha_{21}^0 EMP_t + \alpha_{23}^0 FDI_t + \varepsilon_{2t} \quad - \quad - \quad (6)$$

$$FDI_t = \alpha_{31}^1 GDP_{t-1} + \alpha_{32}^1 EMP_{t-1} + \alpha_{33}^1 FDI_{t-1} + \alpha_{31}^0 GDP_t + \alpha_{32}^0 EMP_t + \varepsilon_{3t} \quad - \quad - \quad (7)$$

Collecting the contemporaneous effects to the Left Hand Side (LHS) turns,

$$GDP_t - \alpha_{12}^0 EMP_t - \alpha_{13}^0 FDI_t = \alpha_{11}^1 GDP_{t-1} + \alpha_{12}^1 EMP_{t-1} + \alpha_{13}^1 FDI_{t-1} + \varepsilon_{1t} \quad - \quad (8)$$

$$-\alpha_{21}^0 GDP_t + EMP_t - \alpha_{23}^0 FDI_t = \alpha_{21}^1 GDP_{t-1} + \alpha_{22}^1 EMP_{t-1} + \alpha_{23}^1 FDI_{t-1} + \varepsilon_{2t} \quad - \quad (9)$$

$$-\alpha_{31}^0 GDP_t - \alpha_{32}^0 EMP_t + FDI_t = \alpha_{31}^1 GDP_{t-1} + \alpha_{32}^1 EMP_{t-1} + \alpha_{33}^1 FDI_{t-1} + \varepsilon_{3t} \quad - \quad (10)$$

In order to estimate the appropriate model, the minimum Schwarz criterion was estimated to select the optimal model as shown in Figure

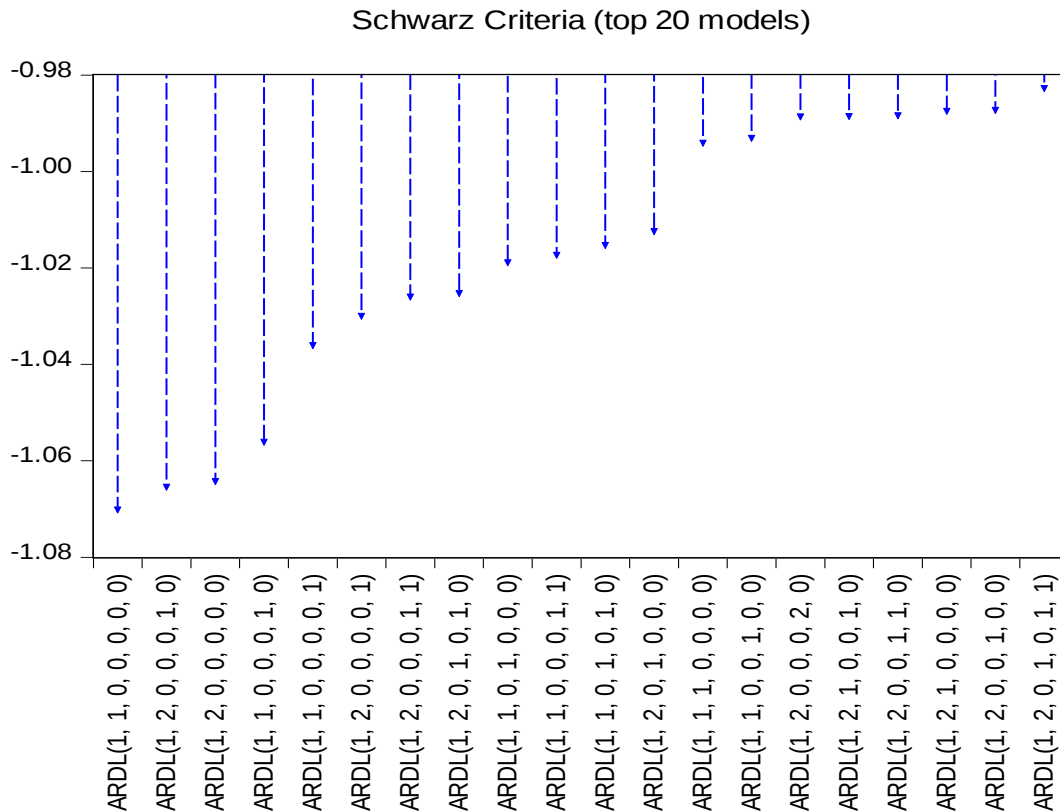


Figure 1.0: Schwarz Criteria

Source: Author's Estimation Using E-views 10

Figure 1.0 indicates that ARDL (1,1,0,0,0,0,0) is the optimal ARDL model to be estimated among the top 20 ARDL models.

In order to determine the long-run relationship among the variables of interest, Autoregressive Distributed Lag (ARDL) bounds test was estimated and is presented in Table 1.0

Table 1.0: Autoregressive Distributed Lag Bounds Test

Test Statistic	Value	Sign.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	4.602159	10%	1.99	2.94
K	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99

Source: Author's Estimation Using E-views 10

Table 1.0 indicates that the F-statistics value of 4.60 is higher than the upper bound value of 3.28 at a 5% level of significance. This implies that there is a linear long-run relationship

among the variables in the model. Thus the short-run and the long-run estimates were estimated as shown in Tables 1.2 and 1.3.

Table 1.2: Short-Run Estimate of the ARDL (1,1,0,0,0,0) Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.703868	1.489319	0.472611	0.6389
GDP(-1)*	0.245443	0.098059	2.503004	0.0162
FDI(-1)	0.133153	0.031899	4.174206	0.0001
INFL**	0.000261	0.001654	0.157763	0.8754
EXR**	-0.002209	0.000454	-4.865638	0.0000
EMP**	0.009120	0.027763	0.328513	0.7441
OPN**	-0.000901	0.002135	-0.422076	0.6751
INTR**	-0.007390	0.004772	-1.548557	0.1288
D(FDI)	0.172684	0.046452	3.717430	0.0006
ECM(-1)	-0.245443	0.063577	-3.860545	0.0004
Adjusted R-squared	0.821392			
F-statistic	30.31777			
Prob(F-statistic)	0.000000			
Durbin-Watson stat	1.068381			

Source: Author's Estimation Using E-views 10.

Table 1.2 indicates the short-run relationship among gross domestic Product, foreign direct investment, inflation, exchange rate, employment, index of openness, and interest rate. From the table, the lag value of gross domestic product has a positive and statistically significant effect on economic growth in Nigeria. The lag and the current values of foreign direct investment indicate positive and statistically significant impact on economic growth in Nigeria in the short-run. This suggests that a 1% increase in foreign direct investment will lead to a 0.13% and 0.17% increase in economic growth respectively in the economy. Inflation has a positive but statistically insignificant impact on economic growth in Nigeria in the short-run. Exchange rate has a negative and statistically significant impact on economic growth in the short-run in Nigeria. This implies that a 1% increase in exchange rate will lead to a reduction by 0.002% in economic growth in Nigeria in the short-run. Employment indicates a positive but statistically insignificant impact on economic growth in Nigeria in the short-run. The index of openness has a negative and statistically insignificant impact on economic growth in the short-run in Nigeria. Similarly, interest rate has a negative and statistically insignificant effect on economic growth in Nigeria in the short-run.

The speed of adjustment [ECM(-1)] which explains the speed of adjustment of variables to equilibrium in the long-run is negative (-0.245443) and statistically significant. Meaning that disequilibrium among gross domestic product, foreign direct investment,

inflation, exchange rate, employment, index of openness, and interest rate will readjust to equilibrium in the long-run.

The Adjusted R-squared value of 0.82% suggests that, foreign direct investment, inflation, exchange rate, employment, index of openness, and interest rate have explained short-run variation in economic growth by 82% in Nigeria. Also, the F-statistic value of 30.31777 is statistically significant, implying that, the explanatory variables have a strong joint effect on economic growth in Nigeria. Finally, the Durbin-Watson statistic value of 1.068381 shows the absence of autocorrelation in the model.

Furthermore, the long-run estimates for the model were estimated and presented in Table 5.17.

Table 1.3: Long-Run Estimates of the ARDL (1,0,0,0,0,0) Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	0.135072	0.053265	2.535849	0.0231
INFL	0.001063	0.006717	0.158274	0.8750
EXR	-0.080850	0.032046	-2.522935	0.0298
EMP	0.037159	0.109038	0.340788	0.7349
OPN	-0.003672	0.009418	-0.389837	0.6986
INTR	-0.030110	0.014641	-2.056488	0.0458
C	2.867744	6.191154	0.463200	0.6456

Source: Author's Estimation Using E-views 10.

Table 1.3 shows the long-run relationship among the variables in the model. Foreign direct investment has a positive and statistical significant impact on economic growth Nigeria. This implies that a 1% increase in foreign direct investment inflow in the long-run will lead to a 0.14% increase in economic growth in the country. Inflation has a positive but a statistically insignificant impact on economic growth in Nigeria in the long-run. Exchange rate has a negative but statistically significant impact on economic growth in the economy. This suggests that a 1% increase in exchange rate in Nigeria will lead to a reduction in economic growth by 0.08% in the long-run. Employment has a positive but statistically insignificant impact on economic growth in Nigeria in the long-run. The index of openness has a negative and statistically insignificant impact on economic growth in the long-run in Nigeria. Interest rate has a negative but statistically significant impact on economic growth in Nigeria. This suggests that a 1% reduction in interest rate will lead to increase in economic growth in Nigeria by 0.03% in the long-run.

1.4 Diagnostic Tests

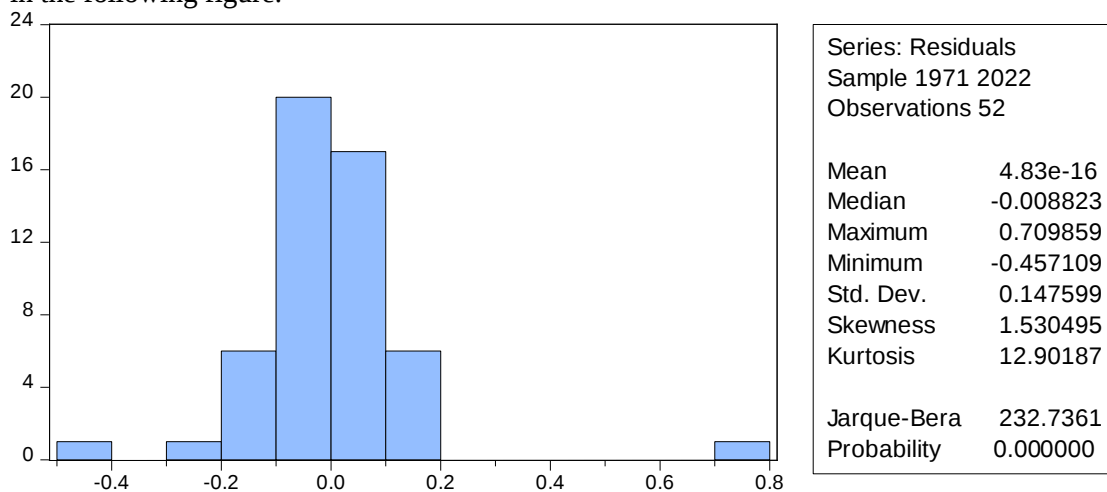
In order to ensure the validity of the results, diagnostic tests were estimated and presented in the following tables.

Table 1.4: Results of Ramsey Reset Test

	Value	df	Probability
t-statistic	0.742171	42	0.4621
F-statistic	0.550818	(1, 42)	0.4621

Source: Author's Estimation Using E-views 10

The t-statistic and F-statistic of the Ramsey Reset tests are both statistically insignificant. This means that, the model is correctly specified in terms of its functional form and inclusion of relevant explanatory variables. Furthermore, the normality test of the residuals was estimated and the results are presented in the following figure.

**Figure 1.1: Normality Test**

Source: Author's Estimation Using E-Views 10

The normality histogram and the Jarque-Bera statistics have both shown that, the residuals of the model are not normally distributed. However, the violation of the assumption of normality in a distributed lag model does not have serious consequences on the validity of the estimates.

Also, the serial correlation test was estimated using the Breusch-Godfrey Serial Correlation LM Test and the result is presented in the following table.

Table 1.5: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.811038	Prob. F(2,41)	0.2303
Obs*R-squared	1.951605	Prob. Chi-Square(2)	0.3170

Source: Author's Estimation Using E-views 10

The result of both F-statistics and Chi-Square (2) are statistically insignificant indicating the absence of serial correlation among the residuals of the model.

Also, the Heteroskedasticity test was estimated using the Breusch-Pagan-Godfrey and the results are presented in Table 1.60.

Table 1.60: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.647437	Prob. F(8,43)	0.1397
Obs*R-squared	12.19900	Prob. Chi-Square(8)	0.1425

Source: Author's Estimation Using E-views 10

Both the F-statistics and Chi-Square (2) are statistically insignificant indicating that the residuals are homoscedastic.

Finally, stability test were conducted and the results are presented in the following figures.

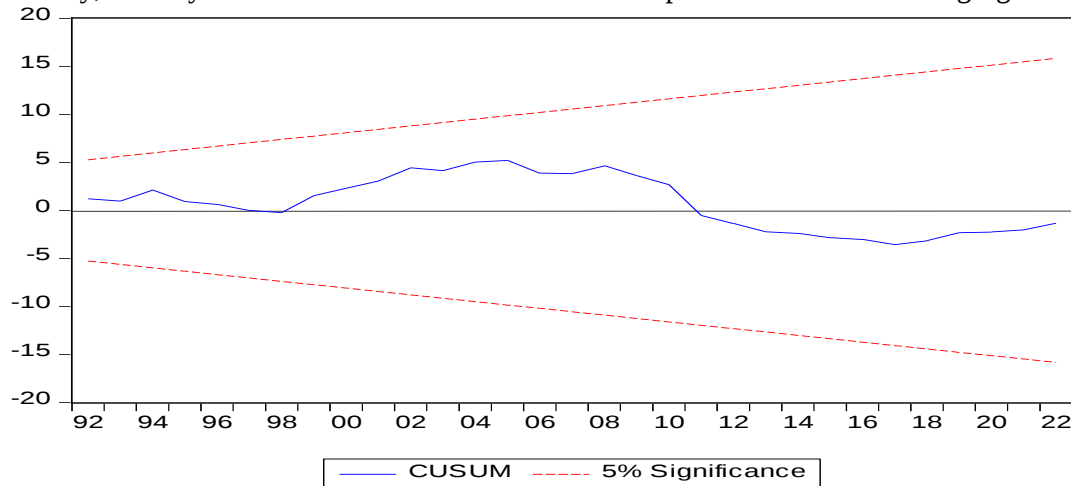


Figure: 1.3: The CUSUM Test for Stability

Source: Author's Estimation Using E-Views 10

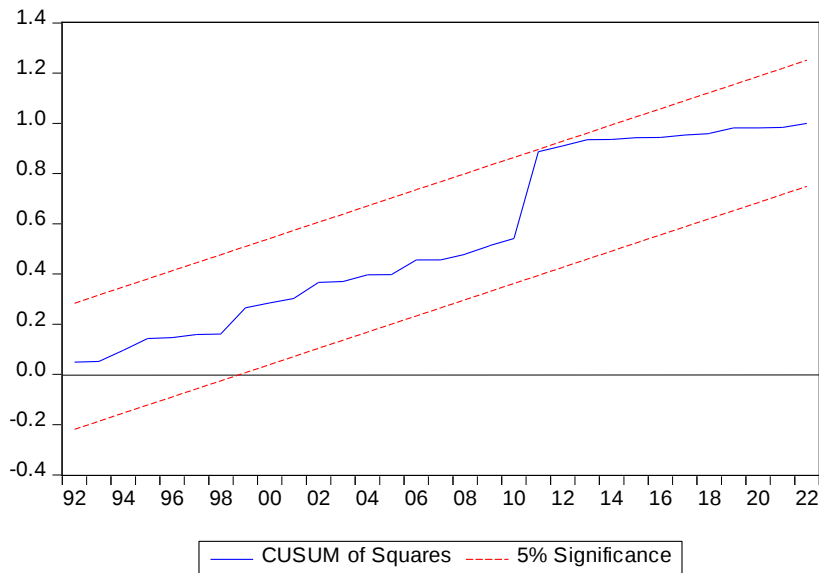


Figure 1.4: The CUSUM of Squares Test for Stability

Source: Author's Estimation Using E-Views 10

Both the CUSUM and CUSUM of Square tests have shown the presence of stable estimates, since all the graphs are within the 5% significance critical bounds.

4.0 Discussion of Findings

The study found long-run relationship among oil exports, foreign direct investment, and index of openness, exchange rate, oil prices, OPEC quota, and foreign demand. Specifically, the study found that FDI oil and gas had positive and statistically significant impact on oil export both in the short- and long-run. This finding is in line with Eche, E. (2024) who found that FDI had positive impact on oil exports. This means that increase in the inflow of foreign investment in the oil and gas will exert positive impact on the volume of oil exports in the country. This could be through huge capital investment, innovations and efficient production techniques in the oil and gas sector.

Also, the study found that oil export had positive and statistically significant impact on economic growth in both the short and long-run in Nigeria. This finding is in tandem with Ugwu et al. (2019); Sultan and Haque (2018) who found positive impact of oil exports on economic growth. This suggests that the export of oil provides revenue for the funding of the economy in diverse ways such as critical infrastructures, welfare services and direct investments in the economy which has a multifaceted impact on the aggregate economy.

Furthermore, the study found that foreign direct investment in the oil and gas sector had positive and statistically significant impact on economic growth in both the short and long-run in Nigeria. This finding collaborate Idris and Usman (2022); Udi et al. (2021); Obinne et al. (2020); Alabi (2019); Okey and Amba (2018); and Akinyemi et al. (2018) who found that foreign direct investment positively impact on economic growth. This suggests that the inflow of foreign direct investment in the oil and gas sector affect oil production, exports and revenue which has multiplier effect on the Nigeria economy.

5.0 Summary

The study investigated the nexus among foreign direct investment, oil export and economic growth in Nigeria from 1970 to 2021. Specifically, the study examined the pass-through effects of foreign direct investment to economic growth via oil exports. The study utilized the Autoregressive Distributive Lag (ARDL) model and the Structural Vector Autoregressive (SVAR) model in the investigation.

Findings of the study revealed that, first, foreign direct investment in oil and gas industry has positive and statistically significant relationship with oil exports both in the short and long-run in Nigeria. Second, the study found that oil exports have positive and statistically significant impact on economic growth in Nigeria. Third, findings indicated that, there is positive and statistically significant relationship between foreign direct investment in oil and gas sector and economic growth of the Nigeria both in the short and long-run.

6.1 Conclusion

On the basis of the findings of this study, it is concluded that, directly, foreign direct investment in oil and gas exerts strong positive impact on oil exports. Also, oil exports impacts positively on economic growth in Nigeria. Again, foreign direct investment in oil and gas exerts strong positive impact on economic growth in Nigeria. Indirectly, foreign direct investment in oil and gas through employment, foreign reserves and exchange rate channels transmits weak spillover effects to economic growth; but through oil exports, there is a strong pass-through effect to economic growth in Nigeria.

6.2 Recommendations

On the basis of the findings and conclusion the study recommends the followings:

1. The Government through the Ministry of Industry, trade and investment in collaboration with the ministry of petroleum and gas should make concerted efforts in attracting and retaining foreign direct investment in the oil and gas sector. This can be done by improving on the investment climate in the country through control of rising insecurity and economic policies that can ensure economic stability..
2. Pragmatic mechanisms should be put in place by the Ministry of Defense and Interior to forestall oil theft and bunkering. Also, efforts should be made to forestall pipeline leakages. These efforts will go a long way in increasing the volume of oil exports that will guarantee sustained economic growth.
3. To improve on the positive potentiality of employment transmission effect as a spillover of foreign direct investment in the oil and gas industry, there should be adaptation of indigenous technology and indigenous manpower engagement to acquire skills from the expatriate's on the job.
4. To improve on the positive potentiality of the foreign reserves channel as a spillover of foreign direct investment in the oil and gas industry to the economy, the Central Bank of Nigeria and the Ministry of Finance should develop effective mechanisms that will track the receipts of foreign exchange from multinational's and ensure the remittance of same to the Federal government.
5. To ensure exchange rate reduction potentiality as a spillover of foreign direct investment in the oil and gas industry to the economy, the Central Bank of Nigeria

should potentially manage foreign exchange supply from foreign direct investment by prudent utilization in terms of allocation to critical sectors of the economy that can in turn attract further inflows of foreign direct investment in to the economy.

6.3 Contribution to Knowledge

This study has contributed to knowledge by its novelty in literature. First, it considered the direct impact of foreign direct investment on oil exports and oil exports on economic growth and foreign direct investment on economic growth within a single framework. Second, it unearths the indirect effects of foreign direct investment on economic growth in two folds. First, it unraveled three transmissions channels: namely the employment, foreign reserves and exchange rate channels as spillover effects of foreign direct investment on economic growth in Nigeria. Secondly, it examined the pass-through effect of foreign direct investment in oil and gas industry to economic growth via oil exports in Nigeria.

6.4 Limitations of the Study

The major limitation of this study was the inability to get available data that will allow for disaggregation of inflows of foreign direct investment separately in oil and gas. However, the challenge was circumvented by using aggregate data on foreign direct investment in to the oil and gas sector that guarantee the internal and external validity of the results.

6.5 Suggestion for further Studies

Further studies should explore other spillover channels of foreign direct investment in the oil and gas sector such as technological diffusion and human capacity development. Also, further studies may consider the possibility of disaggregating foreign direct investment in the oil and gas sector.

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