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Foreword

Dear Readers of the Journal of Economics, Innovative Management, and Entrepreneurship,

It is with great pleasure that we introduce the first issue of the Journal of Economics, Innovative Management, and Entrepreneurship for the year 2024. As we embark on this journey of exploration at the intersection of economics, management, and entrepreneurship, we are delighted to present a diverse collection of articles that reflect the dynamism and ingenuity of these fields.

In an era defined by rapid globalization, technological advancement, and economic transformation, the role of economics, management, and entrepreneurship in shaping our societies and driving innovation has never been more significant. The JOURNAL offers a platform for scholars, practitioners, and policymakers to engage with the latest research, theories, and best practices in these areas, fostering dialogue and collaboration across disciplines and sectors.

Within these pages, you will find a wealth of insights and analyses on topics ranging from macroeconomic trends and policy implications to organizational strategies and entrepreneurial ventures. Each article contributes to our understanding of the complex dynamics that shape economies, businesses, and markets, offering valuable perspectives and practical implications for decision-makers and stakeholders.

As editors, we extend our sincere appreciation to the authors for their scholarly contributions and to the reviewers for their rigorous evaluation, which have ensured the quality and relevance of the published work.

To our esteemed readers, we invite you to delve into the articles in this issue with curiosity and an open mind. May the ideas and innovations presented here inspire new thinking, spark productive discussions, and ultimately contribute to the advancement of economics, management, and entrepreneurship as forces for positive change in our world.

Prof. Nataliya Bhinder
Editor-in-Chief
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Research Article

Rethinking Federal Airports Remodeling for Passenger Safety and Security in Achieving the Millennium Goals of the Industry

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Abstract: The 9/11 episode set the ball roiling for security in aviation industry in the world. The study looks at the remodeling of federal airports in Nigeria for passenger safety and security in achieving the millennium goal of the industry. Structural functionalism was adopted as the theoretical framework of the study. To carry out the task, the paper employed quantitative method of data analysis with the aid of questionnaire to elicit information. The study found that successive governments in Nigeria have made significant financial investments in the aviation industry in an effort to enhance travel conditions, passenger safety, employment opportunities, efficiency, and passenger confidence. However, the effectiveness of the remodeling task is been hinder by a number of factors amongst human capital deficiency, inappropriate funding, uncoordinated effort and infrastructural deficit. The paper concluded by suggesting the need for effective human capital development, provision of adequate and appropriate fund, unity of purpose among the airport staff and provision of modern and critical needed infrastructural facilities. Well-organized and efficient safety supervision process ensures both the immediate user advantages and the broader economic benefits of Air Transport International (ATI) investments.

Keywords: aviation; passenger; remodeling, safety; security

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1. Introduction

The economy all over the world depends to a large extent on transportation which reinforces the prosperity of cities by bridging the demand and supply. Beside telecommunications, air transport represents the sectors that epitomize globalization in an economy as well as in socio political worldwide. Hence, aviation becomes a potent vehicle for attracting and sustaining investment globally (Daramola, 2015). Since the liberalization of airline entrance into the business in 1985, when private airlines were allowed to enter and guarantee the creation of new nodes and routes, air traffic in Nigeria has increased dramatically (Daramola, 2015).

Nigeria, with over 78 countries under bilateral air services agreements, is currently the most populated country in Africa and a prominent destination for major international carriers. Safety oversight clearly stands out as the most critical Air Transport International component. Security and safety of passengers has therefore become sacrosanct in the industry, as Nigeria aviation industry is not an exception.

International Civil Aviation Organization (ICAO) has persistently given priority to safety and security (ICAO, 2015), as the major indicator for safety remains reduced accident rates. Effective safety oversight helps to identify safety threats in the industry and consequently advise on needed interventions. Specific areas in need of intense safety oversight in the Nigerian aviation industry include but not limited to enforcement of Standards and Recommended Practices (SARPS) for airline operators, Air Navigation Services, passenger security and passenger efficient movements at airports.

Objective of the Study

The general objective of the study is to provide empirical insight of the remodeling of Federal Airport of Nigeria with a view to understanding its linkages with safety and security of the passengers in an attempt to achieve the millennium goal of the industry.

Statement of the Hypothesis

1) Ho: A lack of professionalism at Federal Airport is not one of the major challenges of the industry.

Hi: A lack of professionalism at Federal Airport is one of the major challenges of the industry.

2) Ho: Effective safety oversight will not help to identify safety threats in Federal Airport.

Hi: Effective safety oversight will help to identify safety threats in Federal Airport.

1.1 Conceptual Clarification

The term aviation generally signifies operation of aircraft according to the Merriam-Webster's Collegiate Dictionary (2002). It talks about operation of aircraft, where air transport is being operated. The dictionary of aviation clearly brought out the different and the relationship between those related concepts, according to it, an airport is defined as a civil aerodrome intended for the takeoff and landing of general public passenger aircraft as well as freight aircraft (Crocker, 2007). Murtala Muhammed Airport in Lagos, Nigeria and London Heathrow Airport are good examples of airports in the world.

For the purpose of clarity, Airport authority according to Crocker (2007) "referred to the organization responsible for the running of an airport", as the staff responsible for managing the day to day running of the aviation industry. Aircraft is a unique word that has no plural form. It is a machine that is able to travel through the air (Crocker, 2007). It is the air transport equipment that is responsible for carrying of passengers and their belonging from one place to the other. It could be within state of nation (domestic) or from one country to another which is referred to as international. It is the major component of aviation industry. Examples of aircraft are airplanes, gliders, balloons, airships, helicopters, etc.

A sense of safety has always been the major preoccupation of homo-sapiens from the time immemorial (Omah, 2013). The nature of man has always been to put the concern for his safety above other issues. According to Naidu (2003), security is therefore a state in which something's existence has been safeguarded and maintained. It includes every aspect of human endeavour. It alludes to security, the absence of risk or danger, defense against sabotage, infiltration, espionage, and theft.

Security is a societal state in which people's well-being is essentially guaranteed. It's linked to sentiments of assurance, security, and confidence. It entails taking steps to protect people, things, and resources from threats, risks, and dangers of this kind (Ekanola, 2011 and Adebayo, 2011). According to Imobighe (2011), security is broadly defined as the absence of danger or threat to a nation's capacity to defend itself, advance its core values and legitimate interests, and improve the wellbeing of its citizens.

Airport security became a paramount issue after what is known as 9/11 disaster, and more importantly with the wave of increasing air terrorist activities that use various means to achieve their ulterior motive such as plane hijacking, bombing, cyber threat to mention a few. Airport safety and security entails using all available tools to prevent violence and the threat of violence in any form be it structural, psychological, or physical. The connection between airport security and passenger safety in general must be emphasized.

Everybody should feel comfortable at the airport. At a number of locations, including the staff entrance in the terminal, where you are searched for forbidden items, both passengers and employees are subject to checks. All individuals, regardless of age or gender, security personnel or pilots, are required to go through this screening. For safety reasons, any item passenger wants to bring, including hand luggage, and tools, is likewise inspected (Eindhoven Airport, 2010).

1.2 Theoretical Framework

The study's theoretical basis was derived from structural functionalism. In sociology and anthropology, structural functionalism is a comprehensive worldview that views society as a structure made up of interconnected pieces (Subedi, n.d.). Functionalism looks at the whole structure of society by analyzing how its institutions, norms, habits, and traditions work. By emphasizing the connections between many institutions that comprise a society, such as the government and its branches, organs, agencies, organizations, education, religion, ethnicity, etc. Structural functionalism also explains why the society functions as it does.

With its comprehensive grasp of society, structural functionalism proves that social structures are a group effort to meet societal needs. Moreover, it states that a variety of actions must be taken to guarantee that specific demands are satisfied in order for social life to endure and flourish in society. In line with the thought of Chukwuemeka (2004), the structural functionalist paradigm posits that individuals or groups of individuals provide essential services in diverse organizations that align with societal norms.

According to Omisore, Eri and Paul (2014), one of the main tenets of structural functionalism is that society is composed of institutions or groups that are compacted, share norms, and have their own unique cultures. According to structural functionalism, society cannot operate properly unless it is organized in the most natural and effective way possible. Being an offspring of Decree 9 of 1996, the Federal Airports Authority of Nigeria is an organized agency that was formally brought into existence by Act of the Nigerian National Assembly No. 52 of 1999 (as amended).

As the Federal Airports Authority of Nigeria is a public organization tasked with facilitating air transport services for all the institutions and groups that comprise the society known as Nigeria, hence the application of structural functionalism theory in this study is appropriate and suitable. The size need for any group to be included in a social institution is emphasized by structural functionalists, and the Federal Airports Authority of Nigeria is big enough to meet this requirement.

The Federal Airports Authority of Nigeria is portrayed in this study as a government institution tasked with specific mandates. Functionalism views society as a whole in terms of the roles played by each of its constituent parts. As such, FAAN, a part of the Federal Government of Nigeria, uses its established goals, visions, missions, and functions to accomplish its institutional aims

2. Materials and Methods

The paper adopted quantitative research approach. In view of this, the research design is the survey method. To carry the task, the work employed the use of questionnaire with a view to obtain adequate information from the respondents. Murtala Muhammed Airport, Lagos was selected as the population of the study been one of the central and leading Federal Airport in the country. Fifty (50) staff and fifty (50) passengers totaling one hundred (100) people making the sampling size, were randomly selected among the population for administration of questionnaires. The questionnaire was structured with guidelines to enable each respondent to tick appropriate option that portrays his/her opinion on each statement.

The Statistical Package for Social Sciences (SPSS) of Inferential Statistics version, which uses chi-square analysis to analyze data obtained from surveys, was the method used by the researcher to analyze the data. Chi-square is the statistical technique to be applied in order to evaluate the hypothesis, where:

$$X^2 = \frac{\sum (O-E)^2}{E}$$

X^2 – Chi-Square

$\sum$= Summation

O = Observed frequency

E = Expected frequency

The study's data, particularly the questionnaire responses, were gathered and shown in a table with absolute values and comparative percentages that could be further examined and explained. The proposed statements were also tested towards proving or disproving the hypothesis.

3. Literature Review

3.1 Safety Oversight in Nigerian Aviation

Safety oversight is the process by which states guarantee the efficient application of the safety-related Standards and Recommended Practices (SARPS) and related processes found in the Annexes to the convention on ICAO documents. It guarantees that the national aviation authority maintains a safety standard that is at least as high as that specified by the SARPS at the level of international regulation. Therefore, the cornerstone of secure international aviation operations is the individual state's obligation to oversee safety. However, the safety

of international civil aviation operation is automatically threatened when one contracting state lacks the necessary safety monitoring (ICAO, 2006).

Safety oversight clearly stands out as the most critical Air Transport International component given the fact that that it encompasses monitoring of all other ATI in addition to overseeing airlines who are the primary users of ATI. Effective safety oversight helps to identify safety threats in the industry and consequently advise on needed interventions. There is thus a crucial need to strengthen safety oversight in Nigerian aviation. Series of interventions were put in place to shore up safety performance in the industry following the deluge of air mishaps between the periods of 2004 and 2008 which witnessed nine accidents with 328 fatalities.

Despite the returned of a favorable verdict of category 1 status for Nigeria by International Aviation Safety Assessment (IASA) certification in 2010, the industry witnessed three more crashes involving a total of 180 fatalities precisely between years 2012 and 2013. Though category 1 status of IASA certification was retained in 2014. Hence, IASA certification is not enough, but the need to sustain interventions on safety performance and as well positioned the performance for constant refinement.

Ensuring safety operations represents a critical success factor in the aviation industry as corroborated by IASA assessment. Civil Aviation Authorities are in fact assessed based on their procedures for licensing carriers in the industry. A number of measures were implemented to improve industry safety performance in the wake of the plethora of aviation accidents following a model that will function as the foundation for standard operating procedures.

For the safety and security of federal airport to be all inclusive and workable, there must be a template that will serve as a basis for standard operating practices. For that reason, the Federal Airport Authority and the Washington State Department of Transportation (WSDOT) have established the following general safety guidelines according to WSDOT Manual (2009):

- It is necessary to restrict Airport runway closures.
- The control of aircraft use near construction sites to minimize disruptions to maintenance or construction operations is a must.
- The provision of appropriate safety training to airport personnel who access areas containing hazardous materials or activities are all important considerations.
- When the runway is closed or restricted, work should be done within a designated airport safety area, with approval from the airport manager beforehand.
- To guarantee safe operations at the airport, the Airport Manager is authorized to cease operations and relocate personnel, equipment, and materials when break the rule of the game.
- The decision to issue a Notice to Airmen (NOTAMs) shall rest with the Airport Manager.

3.2 Remodeling Federal Airport in Ensuring Airport Security

Part of the remodeling activities for the purpose of passengers' safety and security in the federal airport must encompass the following security activities that has been tested and certified to forestall the activities of notorious group in the airport:

3.2.1 Registered Traveler Program

The program's primary goal is to persuade frequent travelers to volunteer for a criminal background check in exchange for expedited airport screening. In order to verify identities, the program mandates that fingerprints and iris scans be obtained at the security stations. Upon identity verification, participants can proceed through security more quickly and with fewer inspections. According to Harrison (2004), this approach will essentially expedite airport traffic while allowing guards to screen passengers more thoroughly.

Developing safety and security capabilities by providing non-lethal equipment and training and helping security forces detailed in the airport to be more precise in their use of force. This could happen by welcoming expert in aviation discipline from countries like US, UK, Spain to train Nigeria airport security forces in special skills to combat anti-safety element in addition to direct involvement of the experts. They can as well help in financing the training.

Nigeria security forces detailed in airport need to cooperate with other regional and global forces in combating airport enemies. The monitoring and surveillance capabilities of federal airport need to be improved. In fact, the monitoring and surveillance units of other experienced countries may be particularly useful.

Additionally, high-quality intelligence is required to support counterterrorism efforts; security officers can only receive this kind of training by being trained in the science and techniques of intelligence. Gathering intelligence in Nigeria is deficient as observed by former Inspector General of Police Alhaji Ibrahim Coomassie in a July 2011 report (Soniyi, 2011). However, effort of Institute of Security, Nigeria in collaboration with Human Resource Development Centre, University of Lagos is commendable by running a specialist course on Intelligence and Security Investigation. It will be appropriate for Nigeria Government to embrace the effort of the institute by promoting it.

Another means of securing airport is penetration. Penetration is a clandestine activity involving the use of trained agent to infiltrate target establishments and installations for the purpose of obtaining information. Trained agent can be sent to the midst of any suspected notorious group by pretending to be a sympathizer to the terrorist group, and leaking their secret to the authority of the airport. This will help the security men to be at alert and repel their evil intention, or eventual arrest of such notorious group.

There is also need to employ and use of forensic science to investigate airport crime; this field of study interacts with the legal system. The use of forensic science in security operations, according to Ogundipe (2011), serves both offensive and defensive intelligence needs in areas including the detection of terrorist, economic sabotage, espionage, arsonist, and robbery activity. Holistically, development of the field of forensic science in our universities and research institutes through adequate and sustained finance will aid the investigation process of the suspected notorious in detection link anti-safety and anti-security issue in airport.

3.2.2 Unity of Command

For military and paramilitary forces to achieve unity of purpose, unity of command becomes the recommended doctrinal approach. The ultimate goal of these agreements is to provide the forces with a monopoly on the lawful use of force inside the airport while also establishing effective control. A structured command and control system should be used to provide one leader authority over all the forces involved in airport security.

Electronic Devices will also be an added advantage in monitoring and identification of any suspected notorious group within and around the airport. Mounting of Closed Circuit Television (CCTV) device in all the strategic locations in the airport and extension to the outside part of north, south, east and west of the airport. Adetona and Salawu (2006) define CCTV as a flexible surveillance system that restricts the receivers or monitors that can receive images to those that are directly connected to the point of origin via a coaxial cable, microwave link, or other transmission medium. It is believed that the wave of criminality will be reduced to barest minimum if the device is adopted in federal airport. Video tape, miracode and computer sketch are other modern technology that can aid checking of menace of criminality.

3.3 Related Benefits of Federal Airport Remodeling

The following are some of the few benefits derive from federal airports remodeling:

1) *Improved Travel Conditions:* Enhancing travel circumstances as a result of investing in airport infrastructure may have broader effects on the network by stimulating demand, influencing it, and raising the caliber and dependability of airport services.

2) *Passenger Safety:* Passenger safety is the most critical benefit of ATI investment and it is the core of this study.

3) *Socio-economic Spill-Overs Accessibility:* Enhancing an airport's accessibility is the aim of infrastructure investment in airports. One way to quantify accessibility is the number of social or economic events that are reachable through the transportation network. Hence, remodeling will grow the labour, tourism, and/or manufacturing markets, which will boost competition and/or centralization.

4) *Employment:* Established Jobs and jobs shifted are among the effects of airport infrastructure building, operation, and maintenance on employment. Techniques that enable the evaluation of the direct, indirect, and induced employment effects of airport infrastructure projects could be used to measure the effects of construction. Jobs connected to the upkeep and operation of airport infrastructure, both direct and indirect.

5) *Efficiency:* By increasing their production and distribution, productivity advantages could be realized through time and cost reductions, dependability and accessibility gains, and improvements in airport infrastructure. Therefore, it may be argued that airport infrastructure projects have an effect on labour productivity and private capital, and consequently on the nation's total economic growth.

6) *Efficient landside services* reduce passenger total journey time. The Common Use Self Service (CUSS) technology is used at some processing points. In many cases, check-in may be done online, thus reducing stop points for passengers at the airports. Self-bag drops and automated baggage handling equipment are making airports smarter and reducing passenger processing time globally. Passenger security checks have also become less intrusive with the use of semi-automatic thermo conductive scanners. These new technologies serve to improve travel conditions for passengers.

7) *Airside services, security and safety services* when properly designed and functional boost passenger confidence to embark on air travel and may improve patronage of air transport in an airport.

4. Results and Discussion

4.1 Analysis and Interpretation of the Data Gathered Through Survey Questionnaire

This section focuses on the presentation, analysis and interpretation of data collected through the use of questionnaires. The information was extracted from the selected sample of one hundred (100) respondents of Murtala Muhammed in Lagos Nigeria respondents (Table 1).

Table 1. Analysis of Questionnaire Administered

Variables	Frequency	Percentage
Returned	95	95
Unreturned	05	05
Total	**100**	**100**

Source: Author Field Survey, 2023

Ninety-five (95) copies out one hundred questionnaires distributed were returned while five (5) were not returned. Thus, the percentage was based on the ninety five (95) questionnaires returned.

4.1.1 Distribution of Responses According To Bio-Data Information

This subsection presents bio-data information of the respondents using six bio-data information, namely sex, age, marital status, academic qualification, occupational distribution and the relationship to the airport.

Table 2. Bio-Data Information of the Respondents

Sex	Frequency	Percentage
Male	55	57.9
Female	40	42.1
Total	**95**	**100**

Age Group	Frequency	Percentage
18-29	15	15.8
30-39	30	31.6
40-49	30	31.6
50 and above	20	21
Total	**95**	**100**

Marital Status	Frequency	Percentage
Single	35	36.8

Married	45	47.4
Divorced	10	10.5
Widow/Widower	05	5.3
Total	**95**	**100**

Academic Qualification	**Frequency**	**Percentage**
Secondary Education	30	31.6
Tertiary Education	40	42.1
Post Graduate Education	25	26.3
Total	**95**	**100**

Occupation Distribution	**Frequency**	**Percentage**
Civil/ Public Service	40	42.1
Student	20	21
Business	35	36.8
Total	**95**	**(99.9) 100**

Relationship to the Airport	**Frequency**	**Percentage**
Staff	48	50.5
Passenger	47	49.5
Total	**95**	**100**

Source: Author Field Survey, 2023

Table 2 showed that 57.9% of the respondents were male while 42.1% were female on gender distribution. On age difference of the respondents, it was observed that 15.8% were between age bracket 18-29, 31.6% falls within age bracket 30-39 and 40-49 respectively while 21% fall within age bracket 50 and above. The breakdown of marital status revealed that 36.8% were single, 47.4% were married and 10.5% were divorced while 5.3% were either widow or widower.

The table above showed that 57.9% of the respondents were male while 42.1% were female on gender distribution. On age difference of the respondents, it was observed that 15.8% were between age bracket 18-29, 31.6% falls within age bracket 30-39 and 40-49 respectively while 21% fall within age bracket 50 and above. The breakdown of marital status revealed that 36.8% were single, 47.4% were married and 10.5% were divorced while 5.3% were either widow or widower.

Further, as depicted above on academic qualification, 31.6% of the respondents had secondary education, 42.1% had tertiary education while 26.3% had post graduate education. On the occupational basis, 42.1% and 21% of the respondents were civil servants and students respectively, while 36.8% were in businesses related occupation. The table showed that 50.5% of the respondents were airport staff while 49.5% were passengers on the relationship of the respondents to the airport.

4.2 Presentation of Data According To Variables

This subsection presents the analysis of data according to the variables. It provides empirical insight of the remodeling of federal airport, which is the core of the paper. The study used a 5-Point Likert Scale to analyse table 3 and 4 below.

4.2.1 Related Challenges of Safety Oversight in Federal Airports

The result of related challenges of safety oversight in federal airports is presented in the table below.

Table 3. Related Challenges of Safety and Security Oversight in Federal Airports

SN	Related Challenges of Safety and Security Oversight in Federal Airports	SA	A	SD	D	U	Mean	Rank
1	A long-standing obstacle to Federal Airport Authority of Nigeria has been insufficient fund.	31.6	42.1	12.6	10.5	3.2	**2.88**	1
2	Famine of professionalism at Federal Airport Authority of Nigeria is one of the major challenges of the industry	42.1	21	15.8	10.5	10.5	**2.73**	2
3	The majority of Federal Airports' low passenger volume impedes the aviation industry's infrastructure growth.	21	47.4	15.8	10.5	5.3	**2.68**	3
4	In Nigeria, the single owner 'stand-alone' syndrome still permeates the provision of airline services.	26.3	36.8	14.7	16.8	5.3	**2.61**	4
	Grand Mean						**10.9**	
	Criterion Mean						**2.73**	

Source: Author Field Survey, 2023

Regarding associated safety and security challenges, the data revealed that 31.6% and 42.1% of respondents strongly agreed and agreed, respectively, that long-standing obstacle to Federal Airport Authority of Nigeria has been insufficient fund, while 12.6% strongly disagreed, 10.5% disagreed, and 3.2% were neutral. In a similar vein, it was found that 21% of respondents agreed, 15.8% disagreed, 10.5% strongly disagreed, and 10.5% were neutral, with 42.1% strongly agreed that famine of professionalism at Federal Airport Authority of Nigeria is one of the major challenges of the industry.

In addition, 21% strongly agreed, 47.4% agreed, 15.8% strongly disagreed, 10.5% disagreed, and 5.3% were neutral regarding the claim that the majority of Federal Airports' low passenger volume impedes the aviation industry's infrastructure growth. It further showed 26.3% of the respondents strongly agreed that the single owner 'stand-alone' syndrome still permeates the provision of airline services in Nigerian, 36.8% agreed while 14.7% and 16.8% strongly disagreed and disagreed respectively. However, 5.3% did not succumb to any option.

4.2.2 Policy Direction of Remodeling of Federal Airports

This segment concerns the policy direction of remodeling federal airports in achieving the goal of the industry. The table 4 quantitatively presents the analytical result.

Table 4. Policy Direction of Remodeling of Nigeria Airports

SN	Policy Direction of Remodeling of Nigeria Airports	SA	A	SD	D	U	Mean	Rank
5	It is imperative that governments and service providers acknowledge the significance of possessing a lucid comprehension of their respective obligations for safety and security compliance.	31.6	52.6	-	10.5	5.3	**2.95**	2
6	Strict adhering to the existing International Civil Aviation Organization provisions by Federal Airport Authority of Nigeria will overcome the obstacles related to safety and security in a dynamic environment.	28.4	43.2	12.6	9.5	6.3	**2.75**	3
7	Effective safety oversight will help to identify security threats in	47.4	42.1	-	10.5	-	**3.26**	1

	the aviation industry.							
8	There is need to strengthen safety oversight in federal aviation industry for safety and security purposes.	26.3	42.1	15.8	5.3	10.5	**2.68**	4
	Grand Mean						**11.64**	
	Criterion Mean						**2.91**	

Source: Author Field Survey, 2023

In line with policy direction of remodeling of federal airports, the table above revealed that 31.6% and 52.6% of the respondents strongly agreed and agreed respectively that governments and service providers acknowledge the significance of possessing a lucid comprehension of their respective obligations for safety and security compliance, 10.5% disagreed and 5.3% were entirely of no opinion to the statement. Also 28.4%, 43.2%, 12.6% and 9.5% of the respondents strongly agreed, agreed, strongly disagreed and disagreed respectively that strict adhering to the existing International Civil Aviation Organization provisions by Federal Airport Authority of Nigeria will overcome the obstacles related to safety and security in a dynamic environment, while 6.3% respondents were indifferent.

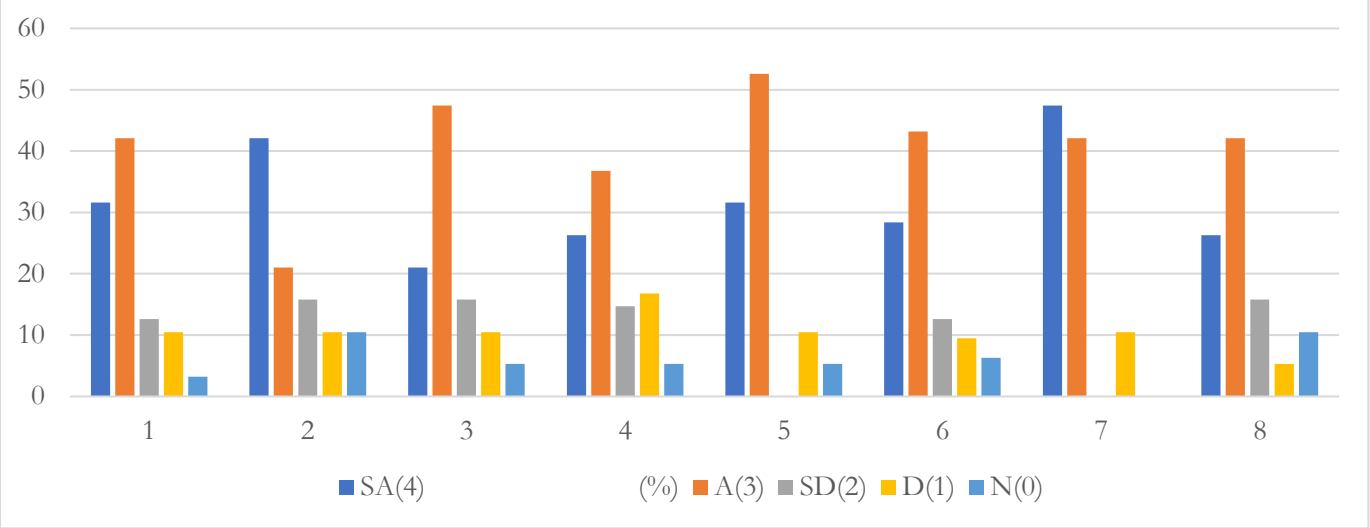
Similarly, above table indicated that 47.4% and 42.1% of the respondents strongly agreed and agreed respectively that effective safety oversight will help to identify security threats in the aviation industry while 10.5% disagreed to the claim. In addition, 26.3% of the respondents strongly agreed that there is need to strengthen safety and security oversight in Nigerian aviation industry for safety and security purposes. 42.1% respondents were in agreement, 15.8% strongly disagreed, 5.3% disagreed and 10.5% were aloof to the contested opinion (Table 5).

Table 5. Summary of the Result According to Tables 3 and 4 of Research Statements

Variables	SA(4)	A(3)	SD(2)	D(1)	N(0)	Mean	Rank
			(%)				
1	31.6	42.1	12.6	10.5	3.2	**2.88**	3
2	42.1	21	15.8	10.5	10.5	**2.73**	5
3	21	47.4	15.8	10.5	5.3	**2.68**	6
4	26.3	36.8	14.7	16.8	5.3	**2.61**	8
5	31.6	52.6	-	10.5	5.3	**2.95**	2
6	28.4	43.2	12.6	9.5	6.3	**2.75**	4
7	47.4	42.1	-	10.5	-	**3.26**	1
8	26.3	42.1	15.8	5.3	10.5	**2.68**	6
Ground Mean						**22.54**	
Criterion Mean						**2.82**	

Source: Author Field Survey, 2023

Figure 1 represents histogram of the summary of the result of research statements according in line to the table 5 above.



Source: Author Field Survey, 2023

4.3 Testing of the Hypotheses

The chi-square (X2) method is used in this section to examine the previously stated hypotheses. A frequency table is initially constructed in order to compute the expected frequency. Chi-square is the statistical technique that will be applied to test the hypothesis.

Where: $X^2 = \frac{\sum (O-E)^2}{E}$

Where X^2 – Chi-Square

$\sum$= Summation

O = Observed frequency

E = Expected frequency

Ho stands for the null hypothesis and Hi for the alternative hypothesis during the hypothesis proofing process. In line with the decision rule, "If the calculated X2 is less than the critical (X2 from the table)," the null hypothesis is accepted and the alternative hypothesis is rejected.

4.3.1 Hypothesis 1: Based on Statement 2

Ho: Famine of professionalism at Federal Airport Authority of Nigeria is not one of the major challenges of the industry.

Hi: Famine of professionalism at Federal Airport Authority of Nigeria is one of the major challenges of the industry.

Table 6: The table shows the analysis of the respondents on research hypothesis 1 of the study.

Table 6. Analysis of the Respondents on Research Hypothesis 1

Variable	**Frequency**	**Percentage**
Strongly Agree	40	42.1
Agree	20	21
Strongly Disagree	15	15.8
Disagree	10	10.5
Neutral	10	10.5
Total	**95**	**99.9 (100)**

Source: Author Field Survey, 2023

Expected frequency

= No of Observed Frequency

No of Variable

95

5 =19

Table 7 demonstrates the analysis of the Chi-square of the respondents on research hypothesis 1 of the study.

Table 7. Analysis of Chi-square (X^2)

Variables	O	E	O-E	$[O-E]^2$	$[O-E]^2$ /E
Strongly Agree	40	19	21	441	23.21
Agree	20	19	01	01	0.05
Strongly Disagree	15	19	-4	16	0.84
Disagree	10	19	-9	81	4.26
Neutral	10	19	-9	81	4.26
Total	**95**				**32.62**

Formula for degree of freedom = r-1
= 5 – 1 = 4:

Decision: Since chi-square calculated X2 is 32.62 which is greater than critical X2 of 9.448, we reject the null hypothesis (Ho) and accept the alternative hypothesis (Hi), which state that "famine of professionalism at Federal Airport Authority of Nigeria is one of the major challenges of the industry".

4.3.2 Hypothesis II: Based on Statement 7

Ho: Effective safety oversight will not help to identify security threats in Nigeria aviation industry.

Hi: Effective safety oversight will help to identify security threats in Nigeria aviation industry.

Table 8 presents the analysis of the respondents on research hypothesis II of the study.

Table 8. Analysis of Respondents on Research Hypothesis II

Variable	Frequency	Percentage
Strongly Agree	45	47.4
Agree	40	42.1
Strongly Disagree	-	-
Disagree	10	10.5
Neutral	-	-
Total	**95**	**100**

Source: Author Field Survey, 2023

Table 9: It shows the analysis of the Chi-square of the respondents on research hypothesis II of the study.

Table 9. Analysis of Chi-square (X^2)

Variables	O	E	O-E	$[O-E]^2$	$[O-E]^2$ /E
Strongly Agree	45	19	26	676	35.58
Agree	40	19	21	441	23.21
Strongly Disagree	-	19	-19	361	19
Disagree	10	19	-9	8	4.26
Neutral	-	19	-19	361	19
Total	**95**				**101.05**

Formula for degree of freedom = r-1
= 5 – 1 = 4:

Decision: Since the calculated value (101.05) is greater than table value (9.844), we reject the null hypothesis (Ho) and accept alternative hypothesis (Hi), which state that "Effective safety oversight will help to identify safety threats in Nigeria aviation industry".

Based on the statistical testing of stated hypotheses, it is however worthy to conclude that famine of professionalism at Federal Airport Authority of Nigeria is one of the major challenges of the industry. However, effective safety oversight will help to identify safety threats in Nigeria aviation industry.

5. Related Challenges of Federal Airport Remodeling

Federal Airport Authority of Nigeria (FAAN) is saddled with the responsibility of managing Nigeria airports. Having recognises the significances of aviation industry as a potential means for attracting and sustaining investment globally, the federal government embarked on the remodeling of federal airport for passenger safety and security. However, the effectiveness of the remodeling initiative is been hinder by a number of threats amongst:

1. Human Capital Deficiency: A major obstacle in federal airport inability to meet its safety oversight functions has been identified as the lack of requisite competent human capital (NASI, 2012). Moreover, accident occurrences in aviation have been linked significantly to Human errors (Li and Harris, 2006 and Daramola, 2014), and so the quality of human capital carrying out the oversight functions becomes critical.
2. Inappropriate Funding: Inadequate funding of the agency make it difficult for the establishment of comprehensive air navigation and safety agencies across federal airports in the country. Funding is clearly an issue, the lean financial capital available is a major challenge for the establishment, and hence it hinders the agency to properly fulfill her mandate. Until 2010, civil Aviation has not been receiving the attention which government gives to other ministries and agencies that are deemed more important.
3. Uncoordinated Effort: The inefficiencies in the oversight process due to lack of co-ordination is another bottleneck to the safety oversight function in Nigeria aviation. Most of the departments in airport seem lack unity of purpose, thereby promoting unilateralism against multilateralism which is the best doctrine of decision making in the management.
4. Lack of Adequate and Effective Enforcement: Compliance with international standards in the functioning and running of federal airport industry is another challenge facing aviation industry in Nigeria. Availability of law is not complete without adequate obedient and compliance, and enforcement when needed.
5. Infrastructural Deficit: This has also been tipped as one the major deficiency of aviation industry in Nigeria. This identified factor is a setback to passenger safety and security. Modern infrastructural facilities critically needed at different points in time are inadequate

6. Conclusions

The events of September 11, 2001 widely known as 9/11 have brought about issue regarding safety and security to society. The unexpected event has become the beginning of safety and security in the aviation industry. The number of damages done by aircraft crash in Nigeria aviation industry in the recent year cannot be quantified in terms of death recorded and properties destroyed which management lapses and nature of government bureaucratic were favour to responsible for.

The analysis reveals that the federal government of Nigeria, along with the airport authority, launched several national, regional, and international initiatives to tackle the issue. It was established that the transformation agenda of the administration of Goodluck Jonathan led the country aviation industry to be rated in group 1 in 2010 and 2014 respectively. Due to the fact that safety and security regulations and economic liberalization are intertwined of federal airport, safety and security of both the industry and the passengers must be prioritise among other things.

The complete overview of the study shows clearly that safety and security of aviation industry must be put into consideration above all other things for the industry to attract passengers. Involvement of expert in aviation industry from developed countries is sacrosanct as dedication and commitment of all stakeholders in Nigeria and in the industry in particular is highly needed.

7. Recommendations

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

1. There is need for effective human capital development in all federal aviation industry. The process of providing safety oversight is in fact hinged almost entirely on the quality of human capital in the industry. Sustained human capital development is essential to ensure cutting edge professionalism among the staff of aviation industries. Strengthen human capital at federal airport industry through training is key.
2. Provision of adequate and appropriate fund for the running of aviation industry by federal government. The government ought to support public-private partnerships (PPPs) in order to provide funding for the efficient operation of the sector. In allocating the available resources, priorities need to be well ordered.
3. Unity of purpose among the federal airport security architecture and other managerial staff is a necessity to forge ahead in achieving the desired remodeling. Unity of purpose will help the staff to establish effective control within the airport.
4. The authority must be positioned to ensure enforcement of and compliance with international standards in the functioning and running of airport industry.
5. Identification and addressing of infrastructure components with the most critical needs at different points in time.

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Research Article

The Influence of Exchange Rate Fluctuation on Foreign Direct Investment in Nigeria (1986-2022)

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Abstract: Using yearly data series spanning 36 years, from 1986 to 2021, the research empirically evaluates the influence of exchange rate fluctuation on foreign direct investment in Nigeria. The study's objectives were focus on examining the extent of exchange rate volatility in Nigeria and ways by which exchange rate volatility impact on foreign direct investment in Nigeria. Secondary source of data was employed from world development indicator (WDI) and central bank of Nigeria (CBN). Autoregressive Distributed Lag (ARDL) were employed and the GARCH (1, 1) model was used in investigating the model built and were analyzed using multicollinearity with the use of Augmented Dickey-Fuller (ADF) test to verify that the variables are stationary in order to make sure the estimated results are not erroneous. Findings from the study shows that real exchange rate volatility (REERVOL) has a long-term and short-term detrimental impact on FDI and negative long- and short-term interest rate coefficients demonstrate that an unfavorable interest rate exacerbates the already diminishing foreign direct investment (FDI) flows to Nigeria as a result of REERVOL. Policy was recommended for the improving FDI through effective exchange rate management.

Keywords: exchange rate; exchange rate volatility; foreign direct investment

1. Introduction

The amount of foreign direct investment (FDI) flows that have been recorded as well as the body of academic research that aims to explain these flows in the context of both source and host nations have increased dramatically in recent years. Firms in source countries make decisions about where to invest their funds, and a variety of factors can influence their choice and either encourage or discourage them from investing in a specific host country. These decisions are what make FDI flows so important and significant. As a result, FDI has drawn the interest of numerous researchers for a considerable amount of time and is now being discussed and studied in several nations. The Organization for Economic Co-operation and Development (OECD) reports that FDI inflows reached USD 1,286 billion in 2022, with enterprises in developing nations receiving more than half of these inflows (OECD, 2023). This demonstrates how nations are paying more and more attention to FDI flows and how they are putting up efforts to give incentives to international investors to boost FDI flows.

FDI is an investment made with the intention of allowing an expatriate entity with headquarters to control ownership of a business enterprise in another nation. It has been widely acknowledged that FDI has a significant role in boosting productivity in the receiving country and is one of the main sources of capital inflows to developing nations from resource-rich countries as well as within developing nations themselves (Onyele et al., 2023). Resource-scarce economies (like Nigeria) need FDI because it increases domestic investment. Nigeria have benefited greatly from these inflows in terms of enhanced managerial abilities, employment creation, and technical spillovers. In addition to other macroeconomic considerations, the political and legal climate of the host nation, inflationary pressure, domestic savings, physical and social infrastructure, fiscal and monetary policies, and indigenous technology all have an impact on the movement of capital, goods, and services into and out of that nation. In addition to the aforementioned, international investors consider one more crucial aspect before permitting the flow of their goods into any nation;

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the risks posed by exchange rate fluctuation (Ozigbo & Anuya, 2023; Aderemi, 2019.

The cost of one nation's currency in terms of another is known as the exchange rate. It is a crucial macroeconomic measure that is used to gauge how competitive a certain economy's currency is (Abbott et al., 2012). As one of the most significant prices in an open economy, exchange rate affects the flow of capital, products, and services across national borders and, as a result, exerts significant pressure on the macroeconomic variables of inflation, balance of payments, and other factors (Aidoo, 2017). Currency appreciation or depreciation may result from exchange rate fluctuations. An appreciation in exchange rates raises a nation's cost of manufacturing, which results in erratic and low FDI. The resultant massive imbalance in the local country's balance of trade and payments will be accompanied by poverty, high inequality, and underdevelopment.

Conversely, a decline in the value of the currency gives businesses a competitive edge in global trade. It raises the price of home goods, boosts demand for exports, and results in a rise in the demand for domestic goods abroad while lowering imports. This has a favorable effect on FDI into the home nation as foreign investors seeks to maximize returns. Decision-makers can be helped by an equilibrium foreign exchange to lessen the uncertainty that arises from exchange rate fluctuation and, consequently, promotes FDI inflows which is expected to foster economic growth and development. In light of this, stabilizing exchange rate is essential to any nation's economic management in this more interconnected globe if it hopes to deter risk-averse players from shifting their operations to other counties that have less risky markets. The stability of the exchange rate has a significant impact on why investors would choose to spend their resources in any given country. Effective foreign exchange rate management is critically needed for the Nigerian economy in order to promote FDI inflow and aid in economic diversification. But despite all of the government's efforts to stabilize the currency rate, there has not been much success in terms of FDI inflows. As a result, the goal of this research is to investigate the long- and short-term relationships between exchange rate volatility and FDIs into Nigeria. It also makes policy recommendations intended to manage the risk associated with unforeseen and unanticipated exchange rate volatility. The evidence offered has given the literature a new perspective and established a baseline against which subsequent research can be evaluated.

The results of this study have also added to the understanding of how much exchange-rate volatility influences FDI. This knowledge is crucial for designing FDI and exchange rate policy. The study's timeframe, which runs from 1986 to 2022, was selected based on the availability of data and the fact that Nigeria adopted the Structural Adjustment Programme (SAP) in 1986, which led to financial liberalization. The world's currencies were altered following the fall of the Bretton Woods Agreement, and the majority of nations implemented flexible exchange rate regimes, which led to exchange rate swings (Dal Bianco & To Loan, 2017). Foreign investors now face greater risk and uncertainty as a result of these movements. As a result, a lot of scholars started to pay attention to exchange rate volatility and look into how it impacts on FDI. Furthermore, researchers looked at a number of other factors in addition to the exchange rate to have a full picture of what draws more inward FDI to a nation because they were unable to determine how exchange rate volatility affected FDI.

2. Literature Review

2.1 Conceptual Framework

2.1.1 Exchange Rate

The nominal exchange rate, or the cost of one currency in terms of another, is a concept that most people are aware of. Typically, it is stated as the foreign currency's domestic price. What can be purchased with the foreign currency piques the curiosity of the investor or corporation purchasing it (IMF, 2014). The real exchange rate enters the picture at this point. It aims to determine how much a nation's goods are worth in relation to those of another nation, a group of nations, or the entire world, using the current nominal exchange rate (Itskhoki, 2020). Purchasing power parity (PPP), the concept that prices and exchange rates adjust to equalize the common-currency price of comparable bundles of products, is fundamental to international banking. In open economy macroeconomics, the real exchange rate is a crucial relative price that indicates how many bundles of domestic commodities must be sacrificed in order to acquire a single bundle of foreign goods. PPP can be defined as the situation in which one bundle of domestic goods is always exchanged for one bundle of foreign commodities. Put differently, PPP presupposes a steady real exchange rate (Gopinath, 2016).

The actual exchange rate fluctuates over time and is observed to have a significant impact on FDI to the degree that PPP fails to hold in the short run.

2.1.2 Foreign Direct Investment

The World Bank (2022) states that FDI occurs when capital flows into a company in an economy other than the investor's in order to obtain a long-term managerial stake (10% or more of voting shares). According to the balance of payments, it is the total of equity capital, profits reinvestment, other long-term capital, and short-term capital. The International Monetary Fund (2009) and the United Nations Conference on Trade and Development (UNCTAD, 2019) both agree that a foreign direct investor must have at least 10% ownership in a business in order to be deemed an investor with a significant say in its management. A kind of international investment known as "foreign direct investment" occurs when a person or group based in one country has a long-term stake in and exerts substantial control over a business based in another one. A person or corporation from another nation makes a direct investment in a country's production or business when they purchase a company there or increase the output of an existing business there (Babasanya & Olabisi, 2018). In this research, FDI is defined as the process by which a domestic firm gains majority ownership in a foreign company. But the other country's day-to-day activities are heavily influenced by international corporations. This implies they are bringing more than just financial resources; they are also bringing expertise, experience, and new technologies.

2.1.3 Exchange Rate and FDI in Nigeria: Stylized Facts

Nigeria has implemented a number of macroeconomic strategies over time to increase FDI (Onyele et al., 2023). Nonetheless, these measures had a minor effect on attaining sustainable growth in this particular area of capital flow. According to a survey study from the World Development Indicators (WDI) studies, net FDI inflows to Nigeria decreased in 2015 from $4.69 billion in 2014 to $3.06 billion. The United Nations Conference on Trade and Development (UNCTAD) global investment trend monitoring report also noted that Nigeria was severely impacted by the decline in its oil prices in 2015 (UNCTAD, 2016). In addition, net FDI inflows to Nigeria decreased more in 2017 as anticipated because of the world's economies' brittleness, exchange rate changes, low aggregate demand, and acceleration in a few major economies. According to the WDI, FDI to Nigeria decreased to $2.41 billion in 2017 and then to $0.78 billion in 2018. More recently, the WDI reported that net FDI inflows into Nigeria increased to $3.31 billion in 2021 from $2.31 billion in 2019, but then dropped to a negative $0.19 billion in 2022, suggesting that Nigeria had more outflows than inflows. The UNCTAD attributed the decline in investment into the nation to the economic recession, which had exposed the nation to a number of macroeconomic instability, most notably exchange rate volatility. The National Bureau of Statistics (NBS) reports that since 2008, when the world economy collapsed, Nigeria has mostly seen a steady decrease in FDI. But before to the financial crisis, the nation's FDI growth followed a mixed pattern. Figure 1 shows the trend of net inflows of FDI in Nigeria from 1986-2022.

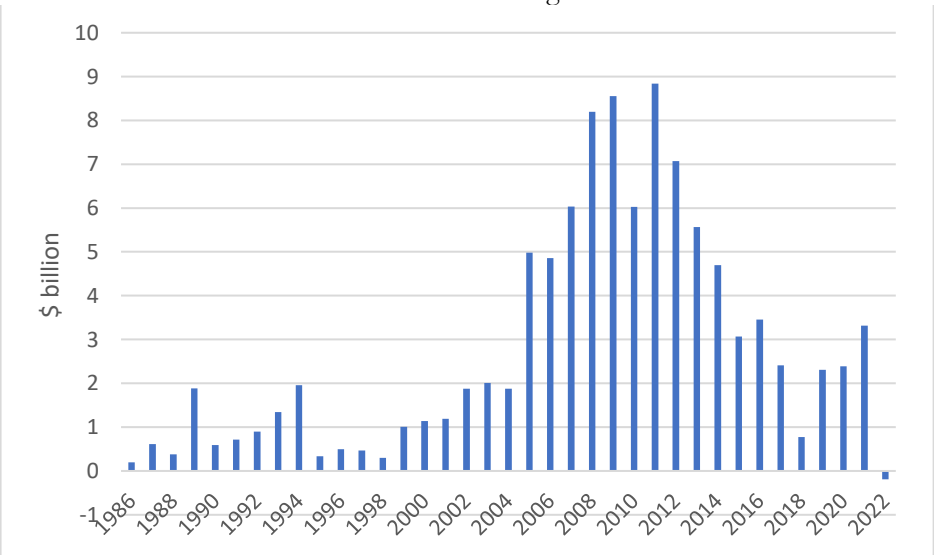

Figure 1. The trend of net inflows of FDI in Nigeria from 1986-2022.
Source: World development indicators (WDI)

The exchange rate is a crucial macroeconomic variable that is used to measure how

competitive a given economy's currency is. It continues to be one of the key determinants of a firm's decision to invest abroad and of a nation's effort to attract foreign direct investment. The movement of the exchange rate, as well as the kinds and amount of investment that a country attracts, are all influenced by the deliberate depreciation, appreciation, or manipulation of its currency in respect to another's. Exchange rate fluctuations can be linked to the various currency policies that the nation's central bank has implemented, claim Uzoma-Nwosu and Orekoya (2019). For example, the Structural Adjustment Programme (SAP) included a significant depreciation of the exchange rate, which was intended to dissuade imports and increase the return on investment for multinational corporations focused on exports. According to Obi (2017), SAP also noted significant fluctuations in currency rates when there was uncertainty about the inflation rate in the economy. A significant contributing element to the fluctuations in the exchange rate during this time period was external shocks brought on by the worldwide fluctuations in the pricing of oil and agricultural commodities, which are major sources of foreign exchange earnings and exports from Nigeria (Odionye et al., 2023). Nigeria is going through serious trade shocks in the current oil period due to the constant swings in the price of oil around the world. Figure 2 shows the real exchange rate of Nigeria from 1986-2022.

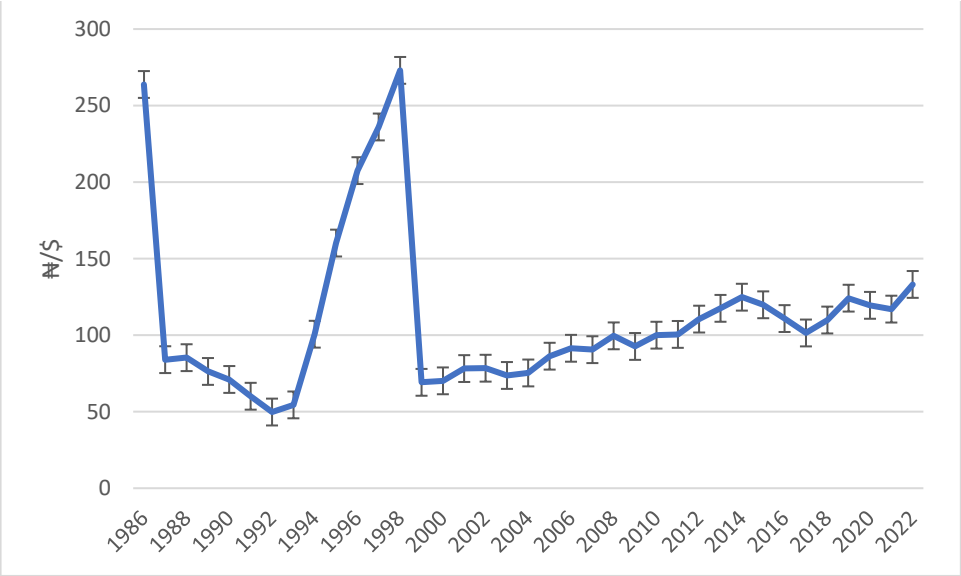

Figure 2. The real exchange rate of Nigeria from 1986-2022
Source: World development indicators (WDI)

Since SAP was introduced, the real effective exchange rate trajectory in Nigeria, as depicted in Figure 2, has continued to be a burden on the country's economy. In actuality, this scenario illustrates what is referred to as "exchange rate instability," which denotes a lack of knowledge regarding the exchange rate at any given moment. The real exchange rate depreciated steadily starting in 1986 and continued until 1992. However, as seen in the graph above, there was a brief period of relative appreciation of the naira compared to the US dollar from 1993 to 1998. This period was documented during Gen. Sani Abacha's stringent currency rate regime and has little bearing on the general trajectory of the exchange rate in this study. The real exchange rate has been fluctuating steadily since 1999. Ceteris paribus, the following situation makes it clear that investor trust cannot be guaranteed due to exchange rate volatility. Given the aforementioned issues, it is crucial to reevaluate how exchange rate volatility affects FDI in Nigeria and offer solutions as necessary.

2.2 Theoretical Framework

Arguments based on the "Mundell-Fleming model," "risk aversion," and "production flexibility" have all been used to support theoretical claims about how volatility affects FDI. Interestingly, there are differences in viewpoints and expectations regarding how exchange rate volatility affects foreign direct investment in each of these arguments.

2.2.1 Mundell-Fleming model

The theoretical framework of this study is based on the Mundell-Fleming model. The Mundell–Fleming model of economics was initially proposed (independently) by Robert Mundell and Marcus Fleming. The Mundell-Fleming Model (MFM) describes how a small

economy that is open to international commerce in goods and financial assets functions and provides a framework for assessing monetary and fiscal policy. Essentially, the model elucidates the causes of the short-term fluctuations in overall income in an open market. This study is based on the Mundell-Fleming model (MFM), developed by (Mundell, 1961; Fleming, 1962). The traditional IS-LM model characterizes an open economy, while the MFM model characterizes a closed economy, or autarky. It explains the relationship between output, interest rate, and real exchange rate in an open economy with international trade. This study employs the Mundell-Fleming model since it is thought that Nigeria's economy is open. Perfect capital mobility is assumed because Nigeria has little effect on interest rates or trade prices worldwide. Therefore, the MFM can be used as a framework to determine how the exchange rate affects FDI flows.

The fundamental presumptions of the model are as follows:

a) The domestic rate of interest (r) is equal to the world rate of interest (r*);
b) There is small open economy with perfect capital mobility;
c) It assumes fixed price level of domestic production.

The Mundell-Fleming model's principal prediction is that an economy's conduct is largely determined by the exchange rate system it chooses to use, whether it has a fixed or variable exchange rate system. The IS Curve for Open Economy: The following equation represents the goods and services market in the Mundell-Fleming model.

$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

When each term is used in its regular sense. The interest rate, r*, determines investment in this case since r = r*, and the exchange rate, e, determines net exports (NX), which is the cost of a foreign currency in terms of domestic currency.

2.2.2 Risk Aversion Theory

As per the risk aversion hypothesis, fluctuations in the currency rate might bring additional risk that can impact returns on investment. Consequently, investors may need to get compensation to mitigate the impact on their part. This is due to the fact that increased volatility in exchange rates reduces the degree of certainty associated with the predicted exchange rate. According to Goldberg and Kolstad (1995), a firm's expected profit function is influenced by the degree of certainty at which it makes investment decisions today with the hope of realizing returns in later periods. In this case, and in line with the risk aversion theory, foreign direct investment and returns are anticipated to decline in the event of a very volatile exchange rate. When the impact of short-term exchange rate volatility is taken into consideration, the risk aversion arguments become more compelling since firms are unlikely to modify the production components that are most likely to remain constant in the near future. The risk aversion theory was developed by Campa (1993) to account for risk-neutral enterprises and future expected returns. Campa (1993) contended that corporations would choose to postpone making investment decisions when exchange rate volatility rises because investors become more anxious about future expected returns. Given the high levels of exchange rate volatility, risk-neutral enterprises are projected to favor the local market over overseas ones in this scenario, which will result in a decline in foreign direct investment.

2.2.3 Production flexibility theory

The production flexibility theory runs counter to the risk aversion theory. This idea states that manufacturers must commit to investment capital and production costs to both the local and international capacity before making any judgments about foreign investments. Under this structure, capacity sunk costs, industry competitiveness, and total returns will now be the factors influencing the impact of exchange rate movement on foreign investment decisions. According to the production flexibility theory, enterprises may be able to modify how they use the factors of production, especially in the long run after profits are realised. As a result, increased exchange rate volatility is predicted to result in an increase in foreign direct investment in the ex-ante phase (Goldberg & Kolstad 1995). Conversely, as we approach the ex-post phase, the potential excess capacity and production increase with increasing volatility (Reinert et al., 2010; Chaudhary et al., 2012). Amidst the conflicting claims made by proponents of risk aversion and production flexibility, Goldberg and Kolstad (1995) contended that when making foreign investment decisions, one must distinguish between short-term exchange rate volatility and long-term misalignments of exchange rates. The production flexibility arguments seem more reasonable over the long term because enterprises can modify their usage of variable factors, even though risk aversion seems more acceptable in the near term because factors of production may be fixed.

2.3 Review of Empirical Literature

In addition to the theoretical justifications, a number of conflicting empirical studies make an effort – albeit without conclusive evidence – to explain how exchange rate volatility affects FDI.

In a recent study, Ozigbo and Anuya (2023) examined the real exchange rate volatility and FDI inflow into Nigeria from 1983 to 2022 in a recent study. The Error Correction Model (ECM) methodology and cointegration are compatible with the ordinary least squares (OLS) method that was applied. The cointegration test showed that the variables have an equilibrium connection over the long term. The study's findings demonstrated that there was a considerable real exchange rate fluctuation, which had an adverse effect on FDI inflows into Nigeria.

Similarly, Odionye et al. (2023) examined how changes in interest rates, exchange rate fluctuations, and political stability affected foreign capital inflows into Nigeria between 1981 and 2021. A discrete threshold regression model (DTRM) was employed in the investigation. An interest rate differential high and above the predetermined threshold encourages a favorable and significant inflow of foreign capital into the country, as demonstrated by the study's discovery of an interest rate differential threshold value of 3.68 percent. Exchange rate swings and political stability also had a detrimental impact on the nation's capital influx.

The relationship between FDI and the foreign currency rate in Nigeria was studied by Oladeji and Musa (2022) from 1986 to 2018. Within an ECM framework, the study employed a variety of quantitative analytical tools, such as regression analysis, Granger causality test, correlation matrix, and descriptive statistics. FDI and exchange rate did not exhibit a causal link over the research period, as per the estimations of the causality test. Second, there was a significant, long-term relationship between FDI and the exchange rate. The conclusion indicated above suggested that there was a short- and long-term relationship between FDI and the exchange rate in Nigeria. It also suggested that FDI was strongly depreciated as a result of the significant impact of capital inflows and the currency rate in particular.

In Zhejiang province, China, Tan, Xu, and Gashaw (2021) evaluated the mechanisms by which the exchange rate influences FDI inflows. They did this by using co-integration tests, vector error correction models, Granger causality tests, and impulse response tests. The exchange rate and FDI inflows have a long-term, stable, and unidirectional causal relationship, according to empirical findings. FDI inflow was deterred by the RMB's ongoing appreciation versus the USD. Rather than the cost or demand effects, the wealth effect was the mechanism responsible for the long-term association. However, in the near term, FDI inflows was not significantly impacted by the exchange rate or any of the three influencing mechanisms.

Using the data gathered for 42 source nations between 2005 and 2019, Nadine, Ashraf, and Nagia (2021) used both the enhanced and basic FDI gravity models in Egypt. This study examined the effects of several relative dimensions on inward FDI to Egypt from different source nations, as well as the influence of the real effective exchange rate on inbound FDI to Egypt, using a Generalised Method of Moments (GMM) estimating approach. The relative currency rate volatility was found to have a detrimental effect on foreign direct investment (FDI) into Egypt. Research has also shown that inward FDI was significantly positively impacted by the market sizes of both the host and home countries.

With time series data spanning from 1986 to 2017, Akinlo and Onatunji (2021) examined the relationship between exchange rate volatility and foreign direct investment (FDI) in a subset of ECOWAS nations. The impacts of exchange rate volatility on FDI and causal links were investigated using the Autoregressive Distributed Lag (ARDL) model and Toda-Yamamoto approach to causality. Only in Ghana, Sierra Leone, and Nigeria was the calculated coefficient of nominal exchange rate volatility significant, according to the empirical data, which were negative for all the nations chosen. In Nigeria, Togo, Sierra Leone, and Cote d'Ivore, on the other hand, the impact of actual exchange rate fluctuation was, as predicted, negatively substantial. Nonetheless, in Ghana and the Gambia, the effect was favourable but statistically negligible. Furthermore, in all of the countries that were chosen—aside from Ghana—the findings of the causality test demonstrated a unidirectional causal relationship between FDI and exchange rate volatility when the nominal exchange rate was used. However, only in Nigeria and Sierra Leone was there evidence of bidirectional causality between the two variables when real currency rate volatility was taken into account.

In a comparative study, Jannat (2020) evaluated how currency rate volatility affected FDI inflows into Bangladesh, India, Pakistan, Nepal, and Sri Lanka. Panel data from the developing South Asian nations indicated above, covering the years 1980–2017, were used in

the study. Since exchange rate volatility is not directly observable, data on volatility was produced using a GARCH (1,1) model. After that, the influence on FDI was examined using the exchange rate volatility variable in conjunction with additional control factors. The investigation continues by estimating fixed-effect models across the panel of nations. Findings indicated that fluctuations in currency rates significantly hampered FDI inflows into South Asian nations, which desperately needed more FDI to boost their economies.

Once more, using monthly time series data on exchange rate volatility, foreign direct investment, external reserves, domestic interest rate, RGDP growth rate, and trade openness for the years 1986–2016, Adokwe, Agu, and Maduka (2019) examined the impact of exchange rate volatility on FDI in Nigeria. Using the generalised autoregressive conditional heteroscedasticity (GARCH) method, the exchange rate volatility series was estimated. The study's model was estimated using the 2-Stage Least Squares approach following the results of a preliminary unit root test on the series. The study's conclusions showed that exchange rate volatility significantly and negatively impacted Nigeria's foreign direct investment.

Likewise, using data from 1999 to 2016, Uzoma-Nwosu and Orekoya (2019) examined the connection between exchange rate volatility and FDI in Nigeria. The GARCH(1,1) method was employed in the study to produce the volatility series, and the VECM methodology was employed for the estimate. The results demonstrated that FDI's reactions to fluctuations in exchange rates changed over time. For example, FDI reacted favourably to exchange rate fluctuation over the long term, but tended to react negatively in the short term.

Likewise, Ehikioya (2019) investigated how foreign direct investment (FDI) to Nigeria is impacted by exchange rate volatility. The study analysed time series data from 1970 to 2016 using the EC, GARCH, and ARCH models. The cointegration tests were performed and the stationarity of the data series was confirmed. The study's conclusion showed that exchange rate volatility tended to continue for the duration of the investigation.

In a different study, Jacob and Kattookaran (2019) ascertained how exchange rate fluctuations affected FDI inflows into India between April 1995 and March 2018.To calculate the effect of exchange rate volatility on FDI flows into India, the Autoregressive Distributed Lag (ARDL) model was utilised. Studies showed that exchange rate fluctuations significantly harmed FDI flow into India over the short and long terms. Short-term increases in FDI into the host nation are caused by the devaluation of its currency.

Likewise, Emmanuel, Ike, and Alhassan (2019) looked at how interest rates and currency rates affected FDI in Nigeria between 2006 and 2018. The study made use of secondary data that was taken from the Central Bank of Nigeria's 2000–2018 financial statements. Using the Augmented Dickey Fuller Test, the unit root property of the data was examined, and it was found that all of the variables were stationary at first difference. The cointegrating character of the data was further tested using the statistics from the Johansen co-integration test, and the error correction model was utilised to look at the long- and short-term relationships between the study's variables. The study's statistically significant conclusion showed a robust and positive association between FDI and exchange rates.

Similarly, the impact of exchange rate volatility on FDI and international trade in developing nations along the "One Belt and One Road" was examined by Latief & Lefen (2018). Seven developing nations—Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka—were chosen for this project between 1995 and 2016. The exchange rate volatility was measured using the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) (1,1) and Threshold-Generalized Autoregressive Conditional Heteroscedasticity (TGARCH) (1,1) models. In addition, the study used a fixed effect model to examine how exchange rate volatility affects FDI and trade. The study's findings, which support the economic theory contending that exchange rate volatility may harm FDI and international trade, showed that in OBOR-related nations, exchange rate volatility had a substantial but unfavorable impact on both.

2.3.1 Empirical Literature

Based on the empirical literature mentioned above, it can be said that a large number of academic scholars have been attempting to predict the impact of exchange rate volatility on FDI for a while now. To determine the impact of exchange rate volatility on FDI and the nature of the link between the two, they have conducted a number of empirical and descriptive studies. Using the methods and approaches at their disposal, they have come to differing results, which calls for additional research into the impact of currency rate volatility on FDI in Nigeria. The studies that were analyzed did not include the most recent dataset in terms of the time periods that these investigations covered. Hence, this study used annual

time series data spanning from 1986 to 2022 to cover current realities as it concerns the impact of exchange rate volatility on FDI in Nigeria.

2.3.2 Research Design

This study examined currency rate volatility and its impact on foreign direct investment inflows into Nigeria using yearly data from the World Development Indicators (WDI) and the Central Bank of Nigeria (CBN). The World Bank's World Development Indicators database provided the data used to support the FDI figures. For the factors under consideration, sample data was available from 1986 to 2022. The study used data on exchange rates between US dollars and Nigerian naira to examine volatility across the research period. The study period is mostly determined by the accessibility of data for both SAP and pertinent variables. To improve data integration and analysis, time periods with full data availability should be taken into account. Nigeria underwent economic liberalization during the period under review, which paved the way for the implementation of a flexible/floating exchange rate system as the nation began to see consistent changes in the foreign exchange rate

3. Materials and Methods

3.1 Method of Data Analysis

3.1.1 Measurement of Exchange rate Volatility on FDI

The standard deviation of monthly exchange rate fluctuations has been used in previous research to gauge exchange rate volatility (Furceri & Borelli, 2008). Nevertheless, the time-varying and clustering characteristics of assets are not taken into account by the standard deviation as a method of calculating volatility. The full strength of volatility in a system cannot be taken into account by the standard deviation technique. Given this difficulty, the study decides to quantify exchange rate volatility using the Bollerslev (1986)-developed Generalized Autoregressive Conditional Heteroscedasticity (GARCH), which has been supported by a few recent studies (Bala & Asemota, 2013). The Autoregressive Conditional Heteroscedasticity (ARCH) model, which was introduced by Engle in 1982 and uses a time series' variance, was improved upon in the GARCH model. The GARCH model permits the error term's variance to have a time-varying variance that is dependent on the series' historical behaviour and hence reflects perceived actual volatilities. Furthermore, since a GARCH (1, 1) specification with its own lag effectively captures the issue of autocorrelation in time series data, it is important to generate exchange rate volatility. The following describes the GARCH (1, 1) model used in this investigation:

$$\sigma_t^2 = \alpha_0 + \omega_i \varepsilon_{t-1}^2 + \beta_j \sigma_{t-1}^2 \quad (1)$$

Equation (1) can be expressed further as:

$$\sigma_t^2 = \alpha_0 + \sum_{t=1}^{p} \omega_1 \varepsilon_{t-1}^2 + \sum_{i=1}^{q} \beta_j \sigma_{t-1}^2 \quad (2)$$

In the model, α_0 represents the mean, ε_{t-1}^2 is the ARCH term and σ_{t-1}^2 is the GARCH term. According to Bollerslev (1986), the necessary condition to ensure stationarity of the model is when $\sum_{t=1}^{p} \omega_1 + \sum_{i=1}^{q} \beta_j < 1$. In order to investigate the effect of real effective exchange rate volatility on FDIs to Nigeria, the study adapted the model by Ehikioya (2019) with the inclusion of interest rate, real GDP growth rate and population growth rate as moderating variables. The inclusion of these variables is expected to control for other macroeconomic variables that can affect or explain the FDIs to Nigeria.

3.1.2 Multicollinearity Test

Analysing the model's multicollinearity problems is the next stage. To attain the more effectively explainable independent variables for the model, tolerance measures and the Variance Inflation Factor (VIF) are utilized. The coefficient of determination (R2) is the foundation of the variance inflation factor (VIF), which measures the degree of multicollinearity between a single independent variable and the model. When the VIF of an independent variable rises beyond 10, it indicates that there are problems with multicollinearity in the model, since it indicates a strong correlation between the variable and

at least one of the explanatory factors.

3.1.3 Test for Stationarity

The research used the Augmented Dickey-Fuller (ADF) test to verify that the variables are stationary in order to make sure the estimated results are not erroneous. The ADF test's capacity to automatically control for higher order connections and modify the test approach gives it a significant edge over other series procedures for stationarity testing. However, because the Philips-Perron (PP) test can moderate error terms without adding lag difference terms, it was used in this investigation to corroborate the findings from the ADF test. To determine whether there is a long-term link between the variables, the study used the Johansen co-integration estimation technique. The study used the Akaike Information Criterion (AIC), as defined by Akaike (1974), to determine the ideal lag length.

3. 1.4 Autoregressive Distributed Lag (ARDL)

After explaining the stationarity tests, the ARDL model was chosen because it can conduct cointegration tests without requiring the same order of stationary variables. This implies that the model can be applied even if the variables are stationary in different orders (Pesaran, Shin & Smith, 2001). The behavior of the dependent variable in relation to the independent variables can be explained by the ARDL model using lag values. The ARDL model represents the cointegration of variables without requiring them to be all stationary in I (1), hence avoiding the issue of variables in stationarity tests having mixed outcomes in their ordering.

3.2 Model Specification

In general, the macroeconomic theory underlying the Mundell-Fleming framework maintains that interest rates and exchange rate volatility have an impact on capital inflows, such as foreign direct investments. This study used the Uzoma-Nwosu and Orekoya (2019) model for a longer time span (1986 to 2022) based on this theoretical perspective. Equation 3 illustrates the empirical function for this investigation as follows:

$$FDI = f(REERVOL, INTR, RGDP, POPU) \quad (3)$$

Following Pesaran et al. (2001), the ARDL bounds test for cointegration is expressed, thus:

$$\Delta FDI_t = \delta_0 + \sum_{i=1}^{p} \delta_1 \Delta FDI_{t-i} + \sum_{i=1}^{p} \delta_2 \Delta REERVOL_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta INTR_{t-i} + \sum_{i=0}^{p} \delta_4 \Delta RGDP_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta POPU_{t-i} + \beta_1 FDI_{t-1} + \beta_2 REERVOL_{t-1} + \beta_3 INTR_{t-1} + \beta_4 RGDP_{t-1} + \beta_5 POPU_{t-1} + \mu_t \quad (4)$$

Once cointegration is established, the long-run relationship was estimated using the conditional ARDL model as follows:

$$\Delta FDI_t = \delta_0 + \beta_1 FDI_{t-1} + \beta_2 REERVOL_{t-1} + \beta_3 INTR_{t-1} + \beta_4 RGDP_{t-1} + \beta_5 POPU_{t-1} + \mu_t \quad (5)$$

The short-run dynamic relationship is estimated using error correction mechanism (ECM) as specified in equation 6:

$$\Delta FDI_t = \delta_0 + \sum_{i=1}^{p} \delta_1 \Delta FDI_{t-i} + \sum_{i=0}^{p} \delta_2 \Delta REERVOL_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta INTR_{t-i} + \sum_{i=0}^{p} \delta_4 \Delta RGDP_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta POPU_{t-i} + \theta ecm_{t-i} \quad (6)$$

Where,

δ_0 = constant

δ_1 - δ_5 = short-run elasticities (coefficients of the first-differenced explanatory variables)

β_1 - β_5 = long-run elasticity (coefficients of the explanatory variables)

θ = speed of adjustment

ecm_{t-i} = error correction term lagged for one period

Δ = first difference operator

p = lag length

Where,

The dependent variable is FDI, which is measured as the total yearly FDI intake into Nigeria from all sources. It is the internal rate of inflation at current prices expressed as a percentage of GDP (GDP). One useful measure of an economy's relative appeal to foreign investment is the size of this variable. Additionally, it serves as a catalyst for developing nations' economies to expand.

The real effective exchange rate volatility is denoted by REERVOL. The GARCH approach is employed to construct this volatility variable. Two phases of estimation were completed. Initially, the pertinent lags of the relevant variables were used to estimate the GARCH model. The residuals were acquired, second. It is the residuals' variance that captures volatility. GARCH outperforms standard deviation measures because it can differentiate between predictable and unpredictable elements in the real exchange rate formation process. Standard deviation measures overlook the stochastic process of generating exchange rates, which leads to an underestimation of the impact of volatility on decision-making. FDI is anticipated to suffer as a result of REERVOL.

The interest rate is INTR. It gauges the nation's cost of capital as a draw for foreign direct investment (FDI) looking for resources. One anticipates a negatively signed INTR.

The size of the domestic economy is gauged by the growth rate of the GDP (RGDP), which is included to regulate the flow of foreign direct investment. It represents the purchasing power of individual consumers and is used as a gauge of a nation's productivity. Consistently growing markets also draw global profit-maximizing businesses. Long-term advantages are possible with FDI for both the home and host nations. Profit-maximizing businesses therefore want countries with sizable marketplaces that experience steady expansion over time. Annual RGDP growth expressed as a percentage is used to gauge this growth. The RGDP is expected to be positive a priori.

The population growth rate (POPU) gauges the size of the market and the potential of its population. A higher population is thought to pique the attention of foreign investors in that economy, which is predicted to have a beneficial impact on FDIs.

4. Analysis and Discussion of Results

4.1 Summary Statistic

The statistical characteristics of the variables, such as their measures of dispersion, such as the maximum, minimum, and standard deviation, and their measures of central tendency, such as the mean and median, are examined using descriptive statistics. In order to determine whether or not the variables were normally distributed, the descriptive statistics also show the pattern of distribution of the variables. Table 1 analyses descriptive statistic of variables.

Table 1. Descriptive statistic of variables

	FDI	REER	INTR	RGDP	POPU
Mean	1.582739	111.2637	18.16865	4.162427	2.597588
Median	1.380374	100.0000	17.59000	4.195924	2.586844
Maximum	5.790847	273.0092	29.80000	15.32916	2.764062
Minimum	-0.039128	49.77628	10.50000	-2.035119	2.380007
Std. Dev.	1.257269	53.30672	3.999617	3.854065	0.100791
Skewness	1.655711	1.801745	0.737173	0.515553	-0.184600
Kurtosis	5.799086	5.690173	4.173130	3.459191	2.206849
Jarque-Bera	28.98395	31.17584	5.472808	1.964139	1.179988
Probability	0.000001	0.000000	0.064803	0.374535	0.554331

Observations	37	37	37	37	37

Source: Author's computation using EViews Software, Version 10 (2023)

According to the given descriptive statistics, there are exactly 37 observations for each variable. The statistical characteristics of the variables, such as mean, median, maximum, minimum, etc., as well as the distribution pattern of the variables, are also indicated by the results. With reference to the Jarque-Bera estimates and probability value, it was possible to observe the distribution of the above descriptive statistic and determine that, while the variables (INTR, RGDP, and POPU) were normally distributed with probability values of 0.064803 > 0.05, 0.374535 > 0.05, and 0.554331 > 0.05, respectively, the other variables (FDI and REER) are not, as indicated by their probability values of the Jarque-Bera statistic given as 0.000001 < 0.05, 0.000000 < 0.05.

4.2 Generalized Autoregressive conditionally heteroscedastic (GARCH)

Using the GARCH model, the data analysis process starts with testing and extracting the real effective exchange rate volatility.

Table 2. GARCH(1,1) Estimates

Variable	Coefficient	Std. Error	z-Statistic	Prob.
REER(-1)	0.706734	0.076741	9.209352	0.0000
C	30.93342	6.772923	4.567219	0.0000
	Variance Equation			
C	57.83094	24.54210	2.356397	0.0185
RESID(-1)^2	6.788185	2.117631	3.205556	0.0013
GARCH(-1)	1.298591	0.266336	4.875762	0.0022
R-squared	0.705450	Mean dependent var		107.0269
Adjusted R-squared	0.682081	S.D. dependent var		47.32524
S.E. of regression	42.80041	Akaike info criterion		8.929942
Sum squared resid	62283.76	Schwarz criterion		9.149875
Log likelihood	-155.7389	Hannan-Quinn criterion		9.006704
Durbin-Watson stat	1.930986			

Source: Author's computation using EViews Software, Version 10 (2023)

Table 2 demonstrated the existence of the GARCH effect in the variance equation since all of the GARCH parameters are significant. Additionally, the GARCH parameter in the mean equation is significant, as indicated by the probability value of 0.0022, which is less than 0.01 (1% threshold of significance). This demonstrates that from 1986 to 2022, there was volatility in the real effective exchange rate (REER). Thus, from the variance equations, real effective exchange rate volatility (REERVOL) was obtained.

Research Question 1: What is the extent of exchange rate volatility in Nigeria?

From Table 2, the GARCH(1,1), it was concluded that the extent of exchange rate volatility in Nigeria was high and persistent over the period of study.

Hypothesis 1 (Ho1): The extent of exchange rate volatility in Nigeria is not significant.

The result as reported in Table 2 reveals that the parameters exchange rate volatility had probability values that were less than 0.05. The result suggests that the extent of volatility persistent was statistically significant.

4.3 Multicollinearity Test

The multicollinearity test using VIF was summarized in Table 3:

Table 3. Variance Inflation Factor (VIF)

Variable	Tolerance	VIF
REERVOL	0.652188	1.225684
INTR	0.002967	6.216312
RGDP	0.002977	2.434557
POPU	0.155154	2.624084

Source: Author's computation using EViews Software, Version 10 (2023)

Since none of the variables have multicollinearity problems and all have tolerances below 1 and VIFs between 1 and 10, it is possible to validate each variable using the multicollinearity tests as well. This is shown in Table 3. As a result, none of the variables need to be removed from the model.

4.4 Test for Stationarity

After determining the volatility of the real effective exchange rate, the following computation is needed to determine the stationarity features of the variables being studied (Table 4):

Table 4. Unit Root Test Results for Stationarity of Data

	ADF Test		PP Test	
Variable	**Level**	**First difference**	**Level**	**First difference**
FDI	-4.447770***	-	-4.336846***	-
REERVOL	-5.404684***	-	-5.396870***	-
INTR	-3.491707	-5.993907***	-5.724544***	-
RGDP	-3.986068**	-	-3.892720**	-
POPU	-1.130319	-4.231677**	-0.346986	-3.671069**

Source: Author's computation using EViews Software, Version 10 (2023)

Note: Lags were automatically selected by the Akaike Information Criterion (AIC). *** and ** denote statistical significance at 5% and 1% levels respectively

The variables (FDI, REERVOL, and RGDP) were stationary in their levels, according to the unit roots test result, indicating that they are order zero 1 (0). However, a second test of the variables in their first difference shows that they have stationarity at first difference I(1). In contrast, the variables (INTR and POPU) failed the stationarity test at levels. As a result, the null hypothesis is accepted for the variables (FDI, REERVOL, and RGDP), and it is possible to draw the conclusion that there is no unit root. It is necessary to draw the conclusion that the variables (INTR and POPU) do not have a unit root at first difference. Therefore, the study moved on to the next model in order to estimate the ARDL model, implying that the variables are integrated of both order zero I(0) and order one 1(1).

4.5 ARDL Estimation

4.5.1 VAR model, values of information criteria by lag

The optimal lag length used for the estimation was determined as follows:

Table 5. VAR Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1114.080	NA	3.79e+14	59.10949	59.49734	59.24749
1	-910.2011	300.4537	6.60e+11	52.64216	56.52066	54.02210
2	-780.1275	130.0736	1.08e+11	50.05934	57.42848	52.68122
3	-574.8164	108.0585*	2.65e+09*	43.51665*	54.37643*	47.38048*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

As demonstrated in Table 5 by the FPE and AIC criteria, the ARDL model requires three delays in order to be practical, as indicated by the VAR model. The software determines the ideal number of delays for each variable later in the short-term calculations, assuming a maximum of 3 (in accordance with the VAR model).

Although three lags on annual data, with a 38-year observation period and seven variables, are thought to be the maximum number of lags that can be used to estimate the ARDL model (more than three lags cannot be used to run the model in the software), this could be interpreted as overly pushing the lag length in the model. It should be noted, nevertheless, that in this study, with either one or two lags, cointegration between the variables would not occur, and autocorrelation between the variables would be detected in the diagnostic tests of the ARDL model.

4.5.3 Bound test

The long-run estimates are displayed in Table 7:

Table 7. Long-term estimations of FDI inflows

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Remark
REERVOL	-0.017655	0.003354	-5.263342	0.0001***	Significant
INTR	-0.148135	0.047735	-3.103293	0.0068***	Significant
RGDP	-0.201376	0.049020	-4.108061	0.0008***	Significant
POPU	6.514058	1.406800	4.630407	0.0003***	Significant

Source: Author's computation using EViews Software, Version 10 (2023)

Note: *** stands for significance at 1% level

With regard to the long-term estimates, Table 7 shows that the variables real effective exchange rate (REERVOL), interest rate (INTR), growth rate of real GDP (RGDP), and population growth (POPU) statistically significantly (at the 1% significance level) by rejecting the null hypothesis with p-values of 0.01.

The results indicate that, with the exception of POPU, all of the statistically significant variables have a negative impact on FDI inflows into Nigeria. REERVOL, INTR, and POPU all show the expected effect on FDI inflows into Nigeria, while RGDP does not show the expected signs.

Therefore, based on the coefficients, an increase of 1% in REERVOL, INTR, and RGDP, respectively, results in a long-term decline in FDI inflows into Nigeria of roughly 0.018%, 0.148%, and 0.201%. Given that Nigeria's economy has performed in an entirely unpredictable manner over the past 38 years, it is reasonable to draw conclusions about the detrimental effects these variables have on FDI inflows and to make the case that this unstable and irregular economy has changed some expected values, making them misleading over the long term. However, POPU showed a positive correlation, in keeping with a priori expectations. This indicates that a percentage rise in the population growth rate translated into a 6.514% increase in FDIs into Nigeria

4.5.4 Error correction mechanism (ECM) and short-term estimations of FDI inflows

The outcome of the ECM is contained in Table 8:

Table 8. ECM and short-term estimations of the FDI inflows

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Remark
C	-17.08662	2.520275	-6.779667	0.0000***	Significant
@TREND	-0.166808	0.027553	-6.054014	0.0000***	Significant
D(FDI(-1))	0.719498	0.204385	3.520313	0.0028***	Significant
D(FDI(-2))	0.304713	0.149548	2.037561	0.0585*	Non-significant

D(REERVOL)	-0.011630	0.003371	-3.450346	0.0033***	Significant
D(REERVOL(-1))	0.019240	0.004857	3.961021	0.0011***	Significant
D(REERVOL(-2))	0.016526	0.004479	3.689412	0.0020***	Significant
D(INTR)	-0.101662	0.045468	-2.235883	0.0400**	Significant
D(RGDP)	-0.164873	0.038943	-4.233699	0.0006***	Significant
D(RGDP(-1))	0.213406	0.059164	3.607044	0.0024***	Significant
D(RGDP(-2))	0.087749	0.042772	2.051538	0.0570*	Non-significant
D(POPU)	0.217109	0.052130	4.164729	0.0007***	Significant
D(POPU(-1))	-8.852606	5.804218	-1.525202	0.1467	Non-significant
ECM(-1)	-0.893263	0.206499	-4.325749	0.0003***	Significant
R-squared	0.870345				
Adjusted R-squared	0.786069				
F-statistic	10.32733				
Prob(F-statistic)	0.000003				
Durbin-Watson stat	2.226378				

Source: Author's computation using EViews Software, Version 10 (2023)

Note: ***, ** and * stands for significance at 1%, 5% and 10% level respectively

First, the coefficient of ECM provides validation for whether or not the model is viable in the short run, which is important for a deeper examination of the short-run estimations. This model is used in the short term because it calculates the efficiency in the brief moment when an independent variable varies and the dependent variable returns instantly to its initial equilibrium. For the entire sample, the estimated error term of the model's lag, or the coefficient of the error correction mechanism (ECM), is determined to be -0.893263, and at 1%, it is statistically significant. This finding implies the importance of endogenous variables in explaining foreign direct investment in Nigeria. Furthermore, it suggested that FDI and the endogenous variables influencing its short-term movements have a long-term link, suggesting that such disequilibrium can be corrected and repaired over time. This supports the preliminary analysis's findings on potential cointegration of the study's variables.

Regarding the short-term estimations denoted as D(REERVOL), D(INTR), D(RGDP) and D(POPU) in Table 8 is possible to observe that, the variables REERVOL, INTR, RGDP growth and POPU reject the null hypothesis through the p-values < 0.05, which means they are statistically significant. In relation to the sign that each statistical significant variable has, it is seen that D(REERVOL), D(INTR) and D(POPU) have the expected effect on FDI inflows into Nigeria, however, D(RGDP) did not have the expected sign, stating that RGDP have a positive influence on FDI inflows into Nigeria.

However, the variable of interest, REERVOL, is statistically significant in lags 1 and 2, indicating that, over a two-year timeframe, international investors are likely to pay attention and have REERVOL affect their investment decisions. Once more, the significance of INTR at its first difference suggests that foreign investors seem to be aware of the impact of interest rates, which can affect their investments in less than a year. Additionally, the RGDP growth rate is not statistically significant in one lag, indicating that foreign investors often pay attention to and are influenced by RGDP growth during a three-year timeframe when making investment decisions. The fact that POPU was insignificant in the beginning suggests that foreign investors are aware of the population growth rate and that it will have an impact on their investments in less than a year.

The explanatory factors may account for almost 87% of the variation in the explained variable, the FDI, according to the R-squared result (0.870345). Put otherwise, it denotes the portion of the FDI variance that can be explained by REERVOL, INTR, RGDP, and POPU taken as a whole. About 79% of the study model appears to be a good fit for explaining the

variability of the data from its mean location, according to the results of the Adjusted R-squared (0.786069). The study's variables show no signs of autocorrelation, as indicated by the Durbin-Watson statistic of 2.226378 over the sample period. In light of the three samples' F-statistic of 10.32733 and p-value of 0.000003, it is safe to draw conclusions about the model's overall relevance for this investigation. Additionally, this result suggests that FDIs to Nigeria are significantly impacted by all of the explanatory variables together.

Research Question 2: In what way does exchange rate volatility impact on foreign direct investment in Nigeria?

From Tables 7 and 8, it was found that real exchange rate volatility has a negative impact on FDI flows to Nigeria in the long-run and short-run, indicating that the higher the level of REERVOL, the lower the FDI flows to Nigeria.

Hypothesis 2 (Ho2): Exchange rate volatility does not have a significant impact on foreign direct investment in Nigeria.

The probability value of real exchange rate volatility (REERVOL) in the long-run (0.0001) and short-run (0.0033) was less than 0.01. This indicates the impact of REERVOL on FDI flows to Nigeria was statistically significant at 1% level. Therefore, hypothesis 1 (Ho1) is rejected as the study holds that exchange rate volatility has a significant impact on FDI flows to Nigeria.

4.5.5 Diagnostic tests

Table 9 shows Diagnostic Test for ARDL Estimate

Test	t-statistics	Prob.	Remark
Breusch-Godfrey Serial Correlation LM test:	1.879485	0.1892	No serial correlation
Heteroskedasticity test: Breusch-Pagan-Godfrey	1.090859	0.4330	No heteroskedasticity
Jarque-Bera	0.271646	0.8729	Normal distribution

Source: Author's computation using EViews Software, Version 10 (2023)

The four diagnostic tests for ARDL estimations are listed in Table 9. With a p-value of 0.1892-2.05 in F-statistics, the serial correlation test is unable to rule out the null hypothesis, indicating that there is no meaningful serial correlation between the variables and that the error terms of each independent variable are uncorrelated.

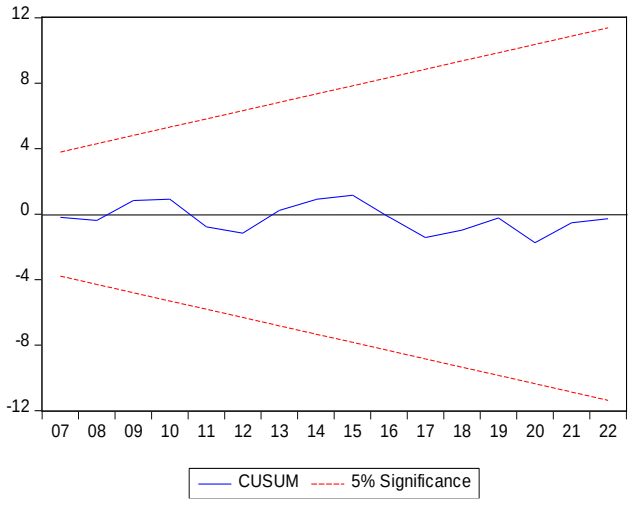

Figure 3. CUSUM

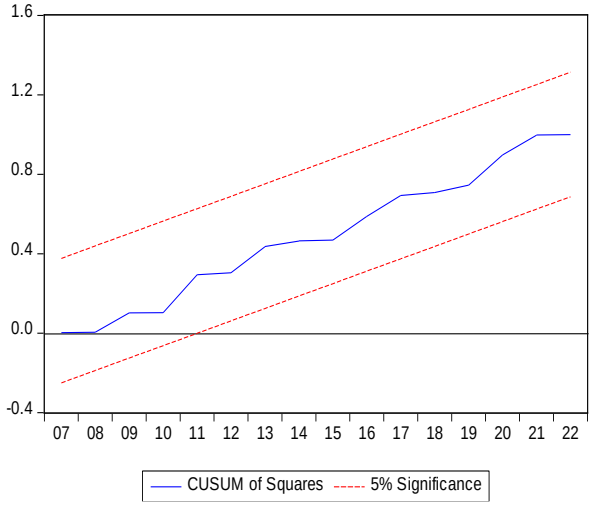

Figure 4. CUSUM

Regarding the normality tests, it is possible to determine from both test statistics that the null hypothesis, which states that the residuals are normally distributed, cannot be disproved. This model passes all diagnostic tests, making it possible to evaluate the effects of independent variables on the dependent variable over the long and short terms. In the final test, the heteroscedasticity test, both p-values are unable to reject the homocedasticity null hypothesis. Given that the F-statistics are the focus of this study, it can be said that the functional form is effectively used in this model.

As regards to the CUSUM and CUSUMQ tests, it is observable in their respective Figures 3 and 4, that there are no structural breaks and therefore, there is stability of the coefficients during the observation period, in the model. Thus, with all the tests complete, it

is confirmed that the model is feasible.

5. Discussion

The findings shown in Tables 7 and 8 demonstrate that real exchange rate volatility (REERVOL) has a long-term and short-term detrimental impact on FDI. Furthermore, the statistical significance of this REERVOL in the long-run estimations supports the idea that foreign investors are impacted by both short- and long-term fluctuations in REERVOL. This result is in direct accordance with earlier empirical research conducted by Adokwe et al. (2019), Odionye et al. (2023); and Akinlo and Onatunji (2021). This finding suggests that Nigeria's level of REERVOL deters FDI.

Additionally, the negative long- and short-term interest rate coefficients demonstrate that an unfavorable interest rate exacerbates the already diminishing foreign direct investment (FDI) flows to Nigeria as a result of REERVOL. Investors may be reluctant to directly fund local firms at a rate that is marginally below market value but higher than their parent company's borrowing rate if the interest rate is unfavorable. For local enterprises, on the other hand, who might not be able to borrow from the foreign lender at a rate that is less than the going rate, this situation might potentially cause still another set of issues. This is in consonance with the findings of Oladeji and Musa (2022) and Jennat (2020) who averred those changes in the interest rate aggravates the effect of exchange rate volatility on FDIs.

The study also looked at how the RGDP growth rate behaves in relation to FDI. The outcome demonstrates that FDI was negatively and statistically significantly impacted by the pace of RGDP growth both over the long and short terms. The findings imply that prospective investors in Nigeria would want to know or assess how the country's level of domestic productivity will affect the return on their capital. It implies that FDI is less during times of slower RGDP growth, which could potentially cause economic shocks. In this case, Nadine et al. (2021); Uzoma-Nwosu and Orekoya (2019) and Malot et al. (2017) lends credence to this study with the finding that low economic productivity could discourage FDIs during periods of extreme volatility in exchange rate.

The positive and statistically significant population growth rate (POPU) indicates that, even in the middle of REERVOL, Nigeria's expanding population may draw in foreign capital. Uzoma-Nwosu and Orekoya (2019), who presented the scenario to show that many foreign investors are drawn to nations with growing populations because of the availability of cheap labor and the potential population of the host economy's market size, backed this point of view.

6. Conclusions and Recommendations

6.1 Conclusion

This study looked at how exchange rate volatility affected foreign direct investments in Nigeria. Following a thorough examination of the literature, the study took into account a few FDI drivers that were found in the literature and included as control variables. According to the results of the ARDL estimation, real exchange rate volatility significantly and diminishingly affected net FDIs into Nigeria. The results from the long-run and short-run functions are consistent with this conclusion. The study recommended that policy makers take a more comprehensive approach to encouraging investment because there are other factors that influence FDI influx. Market players ought to consider reallocating resources and implementing additional macroeconomic factors that will stimulate FDI into the nation. To assess if Nigerian policies are acceptable, it is also critical to reexamine the currency rate to FDI transfer mechanism and vice versa. The analysis came to the conclusion that FDI flows to Nigeria are not influenced by either real exchange rate volatility.

6.2 Recommendations

In line with the findings from the data analysis, the following findings were made:

a) Policies that guarantee exchange rate stability should be developed and/or upheld in order to draw FDI into the economy. Based on the aforementioned research, it is recommended that these policies combine monetary and fiscal measures aimed at achieving exchange rate stability, interest rate declines, and lower inflationary pressure.

b) It is also suggested that when controlling FDIs, the monetary authorities should consider interest rate management in addition to exchange rate stabilization. The link between the exchange rate and foreign direct investment inflows into Nigeria appears to be

significantly moderated by interest rate control.

c) In order to achieve quick growth in the non-oil sector and increase domestic production, it is also advised that the economy be diversified. This will allow the country to export primary commodities, where it has a competitive advantage, and manage exchange rates more effectively.

d) Given that it has been shown to have a favorable effect on FDI in Nigeria over the study period, Nigeria's average population growth rate should be preserved. Therefore, it is crucial to direct the working population towards domestic production in order to create foreign exchange, which will aid in lowering the ongoing volatility of the exchange rate and promote FDI in Nigeria

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Research Article

Assessing Port Harcourt Superstores' Contributions to Sustainable Development Goals via Consumer Waste Management Behaviours

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Abstract: Waste management particularly in Port Harcourt, poses a significant challenge due to the generation of refuse from domestic, commercial, and industrial sources. Globally, superstores generate substantial amounts and diverse types of waste daily, necessitating environmentally friendly practices to align with sustainable development goals. Consumers' environmental consciousness significantly shapes their shopping and consumption habits. This study aims to evaluate consumer awareness of sustainable development goals (SDGs) related to waste management in Port Harcourt's superstores and assess consumer involvement in waste management practices during shopping. Employing a descriptive approach, quantitative data was collected through a random sampling method via questionnaires from 112 participants. The tools used were validated, with Statistical Package for Social Science version 26 employed for analysis, encompassing frequencies, percentages, chi-square, and Spearman correlation. The study rejected the null hypothesis, revealing a significant association between consumer awareness of SDGs in waste management and various socio-demographic factors, indicating that heightened awareness correlates with increased engagement. Notably, environmental consciousness drives participation in waste management activities. Importantly, the study underscores that consumer knowledge and awareness, particularly concerning plastic packaging waste, significantly influence waste reduction efforts, indicating the pivotal role of stakeholders, especially superstores, in communicating information and fostering consumer engagement for environmental sustainability.

Keywords: sustainable development goals; waste management; behaviours

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1. Introduction

Waste management is defined as the control of waste related activities, with the ultimate aim of resource conservation and protection of human health and the environment. Adegoke (2010) defined waste as substance and materials, which are disposed of, or required to be disposed of, according to the provision of national laws. In the same vein, waste can be generally described as any item or material that is generated and disposed of or intended to be disposed of by a person that has custody of it. However, in addition to considerations of legal nature and geographical location of generation, different definitions of waste exist based on conditions under which they occur (Williams et al., 2005). The importance of the adoption of effective waste management practices, by the retail sector and especially supermarkets, is further highlighted by facts regarding the annual quantity of food and packaging waste and the cost, related to this waste. Waste management has been identified as a challenge in many countries all over the world, much more so in developing countries, and a correlation has been identified between accelerated urbanization, population explosion, industrial development and rate of waste generation in cities found in such countries (Narayana, 2009).

According to the UN Environmental Programme (UNEP), every year, an estimated 1.3 billion tonnes of solid waste is collected worldwide. This figure is expected to increase to 2.2 billion tonnes by 2025, with almost all of the increase from developing countries. It has been recorded that Nigeria generates over 32 million tons of solid waste yearly, and only only 20–30% is collected (Bakare, 2020). Most of these wastes are generated by households and in

some cases, by local industries, artisans and traders who litter the immediate surroundings. Waste management is one of Nigeria's greatest challenges, in Port Harcourt, refuse is generated from domestic, commercial and industrial sources. The rate of generation has been steadily increasing and will likely continue to do so in future with the rapid increase of population in the city. Superstores across the globe generate and accumulate tons of solid waste per week, which may consist of the following: expired food products, meat and vegetable trimmings, cardboard boxes, empty wooden produce boxes, other types of secondary packaging. Plastic packaging will make up approximately two-thirds of the waste (Smith, 2022). Reckless disposal of waste has led to blockage of sewers and drainage networks, and choking of water bodies.

According to Jones et al. (2005), environmental issues are the earliest and most commonly reported corporate social responsibility agendas among top retailers. In this context, retailers, including super markets, incorporate the dimension of environmental responsibility, along with the dimensions of human and product responsibility, in the corporate social responsibility positioning (Anselmasson & Johansson, 2007). This means that they are perceived to trade environmental-friendly, ecological and non-harmful products and they apply environmental policies and use recyclable product packaging (Carrete et al., 2012). The importance of the adoption of effective waste management practices, by the retail sector and especially supermarkets, is further highlighted by facts regarding the annual quantity of food and packaging waste and the cost, related to this waste. Consumers' level of environmental awareness and understanding influences how they shop and consume, which in aggregate influences the direction of demand and supply, as consumers' decisions are influenced by their level of environmental knowledge and concern. Identifying gaps in consumers' knowledge, attitude and behaviour would support policy developments targeting Sustainable Development Goals (SDGs) (Pearson et al., 2013). Environmentally sound and integrated solid waste management programs and plans affect the achievement and improvement of many indicators of SDGs, whether that effect is directly or indirectly (Jurgilevich et al., 2016).

The individual consumer behavior is one of the factors affecting the quality of the environment. Consumers know that their consumption behavior has an impact on sustainability (Guercini & Runfola, 2009). Consumer behaviour represents acts or decisions that influence the direction of production and consumption activities, which are, in turn, driven by household and, ultimately, economic activities. Many of the leading retailers report on their corporate commitment to SDGs and sustainable consumption, but there is, at best, limited evidence of this commitment at store level (Abdulredha et al., 2020). Here, the retailers might be seen to be transferring the responsibility for adopting more sustainable approaches to consumption to customers without providing them with any information to guide their choice at the point of sale. In particular, the statements relating to goal number 12- Ensure sustainable consumption and production patterns and goal number 11 - Sustainable cities and communities that underlines the need to substantially reduce waste generation through prevention, reduction, recycling and reuse (Parfitt et al., 2010).

As plastic remains as the most prevalent packaging and product material, it is difficult for consumers to avoid it. Consumers might also be reluctant to take the sole responsibility for reducing plastic consumption as convenience is often governed by the prices and availability of sustainable alternatives (Heidbreder et al., 2020). Hence, with supermarkets as one of the world's leading retailers, consumers will need to shape the change necessary in those places that can actively make an impact in production, in consumption and in the recycling of products in as much as they should be thoughtful about what to buy and choose a sustainable option whenever possible (Song et al., 2016).

1.1 Justification of the study

Plastic wastes are hardly recycled in Nigeria with less than 12% being recycled and about 80% of these wastes end up in landfills and dump sites. A comparative analysis of municipal solid waste (MSW) composition in three local government areas (LGAs) in Rivers State revealed that waste generation rate was 0.45, 0.98 and 1.16 kg/capita/day for Emouha, Obio/Akpor and Port Harcourt, respectively (Bakare, 2020). The most prominent categories identified were organic waste, paper and nylon. Mean percentage composition was 59, 65.5 ,65 for organic waste, 6, 11 and 13% for paper and 14, 16 and 12% for nylon in Emougha, Obio/Akpor and Port Harcourt LGAs, respectively. However, recognizing trash as a problem does not prevent littering or other negative behaviors concerning waste management (Knickmeyer, 2019). This attitude-behavior gap often emerges and can be further affected by

a variety of reasons including convenience, social norms, lack of public participation, and lack of education and awareness of effective waste management techniques (Heidbreder et al., 2020).

In Nigeria, the commonly practiced waste management option basically involves the collection of mixed waste materials and subsequent dumping at designated dumpsites. It is not a practice to separate waste materials at source or any point during its management (Lawrence et al., 2020). Indiscriminate dumping of waste in urban areas is common, creating increased risk of disease, flooding and environmental pollution. Recycling and treatment infrastructure is typically inadequate to safely deal with these waste streams resulting in direct impacts to human health and the environment (Lazzarini et al., 2018). Nigeria generates an estimated 32 million tonnes of solid waste yearly; one of the highest in Africa, from that figure, plastic constitutes 2.5 million tonnes. According to the reports presented during the World Economic Forum in 2016, the largest application of plastic is packaging, representing 26% of the total volume of plastic used, 95% of material value of which are lost to the economy after a first use. It is estimated that 40% of plastic packaging is landfilled and 32% leaks out of the collection system.

Public awareness and participation are remedies to the problems of waste management in Nigeria. Amalu and Ajake (2014) pointed to the need for community education programs to adequately educate the people on environmental issues. Sound waste management contributes to sustainability: consumers deserve to know more about how they can unlock hidden value for themselves, and for the good of the environment.

Since consumers increasingly buy manufactured, packaged products (Boesen et al., 2019; Monnot et al., 2019), packaging of fast-moving consumer goods (FMCG) and packaging waste are important in their own right in the transition to a circular economy (Testa et al., 2020). Due to the size of its contribution to the waste stream and litter, the EU waste directive (EU, 2018) demands that member states drastically reduce packaging waste and increase its recycling. The goal is that 70% of packaging waste is recycled in 2035. Consequently, actions on reducing plastic packaging and plastic packaging waste (PPW), as the main contributors to plastic waste in general, are a high priority in the European Union's New Circular Economy Plan (EU, 2020). Packaging accounts for 40% of global plastic consumption, which makes it by far the largest user of plastic (Testa et al., 2020).

Research Objectives

The broad objective of this paper is to assess Port Harcourt Superstores' contributions to SDGs via consumer waste management behaviours. However, the specific objectives are:

1. To assess consumer awareness of SDGs related to waste management within Port Harcourt Superstores.
2. To assess the level of consumer engagement in waste management practices while shopping at Port Harcourt Superstores.

Research Questions

The research questions are as follows:

1. Are consumers aware of the SDGs related to waste management?
2. To what extent do consumers actively engage in waste management practices while shopping at Port Harcourt Superstores?

Research Hypothesis

The research hypotheses are as follows:

H01: There is no statistically significant association between consumer awareness of SDGs in waste management and the socio demographic factors in the study.

H02: Consumer awareness of SDGs related to waste management does not significantly influence consumer engagement in waste management practices during shopping at Port Harcourt superstores.

2. Literature Review

2.1 Sustainable Development Goals (SDGs)

Sustainable development depends on the interrelationship between economic progress, environmental management and individual well-being. Sustainability initiatives involve substantial interaction among stakeholders and concerted involvement of participatory agencies (Andersen & Ratiu, 2019; Fiorini & Hoekman, 2018). In September 2015, over 150 world leaders decided to adopt the agenda for sustainable development in the form of SDGs.

The SDGs consist of 17 specific goals and 169 targets embedded within these goals, which could help nations and stakeholders worldwide align their actions with the urgent need for improving the condition of society, environment and the economy.

SDGs is the global plan of the United Nations Members established in 2015. Belonging to the 2030 Agenda for Sustainable Development, SDGs provide a shared framework for prosperity and peace for humanity and the planet and encompass prosperity, peace, and partnership. However, there is scope for competition among these goals whereby the achievement of some goals can be at cross purposes with the achievement of some others (Campagnolo & Davide, 2019).

SDGs which can be useful to policy makers in setting policies which could affect a larger number of stakeholders (Biggeri et al., 2019). Entrepreneurs and public-private partnerships have the capacity to drive the push towards sustainability using SDGs (Majukwa et al., 2020; Andersen & Ratiu, 2019). Advances in organization and management research on waste management would contribute to the achievement of several SDGs (Jurgilevich et al., 2016). Waste management businesses have the inherent advantage of helping to improve the environment, create employment opportunities and create profits for the entrepreneurs. Identification of sustainable alternative materials to plastics, and innovative packaging and recycling technologies such as the 2020 National Policy on Plastic Waste Management which is aimed at ensuring that all plastic packaging in the market are recyclable or biodegradable or compostable and reusable by 2025, ensure that all plastic packaging in the market meet at least two criterion of being recyclable or biodegradable or compostable or reusable by 2030 and phase out single-use plastic bags and Styrofoam, effective December 2028 mostly packaging used for shopping in supermarket.

For this study, as earlier stated SDGs 11 and 12 will be considered as important aspects regarding sustainable and resilient societies including affordability, access to services, employment and education, a clean and healthy environment, adequate social infrastructure, gender equality and respect for human rights.

2.1.1 SDG 11- Sustainable cities and communities

This goal encompasses improvement in several factors to ensure sustainability in habitations. All the targets as listed below are to improve basic services, transportation, living environment, green spaces, pollution levels and links between urban and rural areas.

11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.

11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

The pledge of Goal 11 to make cities and human settlements inclusive, safe, resilient and sustainable provides an unparalleled opportunity for the attainment of collective and inclusive progress, and for the achievement of sustainable development in the world.

Managing solid waste remains a major environmental challenge in cities in several regions. The safe collection, removal, treatment and disposal of solid waste are among the most critical services in the urban environment. As urban populations grow, income levels rise and economies become more consumer oriented, the volume of solid waste generated will only get larger. Data from 214 cities or municipalities in 103 countries show that about three quarters of municipal solid waste generated is collected. In sub-Saharan Africa, less than half of all municipal solid waste generated is collected, with adverse effects on the health of residents. Moreover, even when waste is collected, it is often not treated and disposed of in a

sustainable and environmentally sound manner. Managing such waste continues to be a major challenge facing urban areas in several regions

2.1.2 SDG 12 - Ensure sustainable consumption and production patterns

Achieving SDG 12 through environmentally sound management of plastic products and waste through their life cycle would reduce the amount of plastic litter ending up in the ocean and would help countries implement the 2030 Agenda.

12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries.

12.2 By 2030, achieve the sustainable management and efficient use of natural resources.

12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities.

12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production.

12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products.

12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

Waste management and resource recovery is an ongoing challenge, particularly with the large number of relevant supply chains and the complexity of national and state regulatory frameworks. Reducing waste and improving our use of waste will achieve broader environmental, economic and social benefits and will become increasingly important as the population continues to grow. Waste generation is projected to increase from 1.3 billion tons per year to 2.2 billion tons per year by 2025, with high increases in middle-income developing countries.

Environmental awareness is also identified as the driver of waste management participation in developed countries (Kokkinos et al., 2019; Elkiran et al., 2018). When evaluating determinant factors of waste management behaviour conducted in Rayong Province, Thailand in 2016, Janmaimool & Denpaiboon (2016) found that environmental awareness was mediated by environmental efficacy to affect their decision to participate in the waste management process. The individual should realize their capability to contribute to environmental improvement to some extent (Janmaimool & Denpaiboon, 2016). The study in Kerbala City, Iran in 2016 (Abdulredha et al., 2020), two Slums, Central Uganda (Mukama et al., 2016), and Macau residents in 2011 (Song et al., 2016), proved that improving people's awareness toward proper waste management process influenced the effectiveness of waste management system. Lack of environmental awareness was a barrier to waste recycling practice in two districts in Palestine (Kattoua et al., 2019). A study conducted by Heidari et al. (2018) toward students at Ferdowsi University, Iran, in 2016 showed that awareness affected waste separation intention toward attitude and personal moral norms. This finding is agreed by Zhang et al. (2018), who investigated the waste separation behaviour of households in China. Zhang et al. (2020) showed that awareness would influence intention through personal attitude and personal moral norms. In this study, attitude is considered as the personal moral norms itself. In relation to participation, Trihadiningrum et al. (2017) found that 40% of residents involved in their study in Surabaya City, Indonesia stated that

their reason to be involved in the waste separation activities was their awareness of the environment. Environmental awareness was also proven to affect residents' waste separation behaviour in China (Choon et al., 2017; Fan et al., 2019) and Vietnam (Nguyen & Watanabe, 2019). On the other hand, low environmental awareness was to be the main reason for the absence of participation in waste separation in Macau residents (Song et al., 2016).

2.2 Engagement in Waste Management

Waste management behaviour refers to all actions where residents must be involved in the waste management process, including waste separation, waste reduction, waste recycling, waste reuse, and waste disposal behaviour (Sukholthaman et al., 2017). The behaviours required in 3R are waste reduction behaviour, waste separation behaviour, waste recycling behaviour, and the combination of those behaviours. These green behaviours in consumers have been defined as being more adaptive to environmentally friendly or sustainable product choices.

Irresponsible shopping behavior and the lack of shopping lists create the optimal conditions for the food waste phenomenon within households by over-provisioning and high sensitivity to marketing offers and campaigns (Pearson et al., 2013). Thus, good household management is essential (Stancu et al., 2016). Planning routines represent an important factor of waste prevention and reduction throughout the use of shopping lists (Bogevska et al., 2021).

Four exogenous factors were identified as driving factors for sustainable consumption and waste behaviour, namely (i) environmental concern, (ii) environmental knowledge, (iii) opinion/belief, and (iv)concern for local businesses. Previous study reported that one of the food waste the antecedents in the household is buying too many foods (Porpino, 2016). Understanding how food shopping behavior is developed may lead to solving the main problem. Food waste could be prevented by efficient food shopping behavior. This is shown from the condition if the consumer does not buy more food than the amount of their needs, then the possibility to discard leftovers or excess food supplies will be reduced. And examining the understanding of food shopping behavior is needed to be able to develop good communication strategies in reducing food waste campaigns. Therefore, environmental effects are part of consumer behavior analyses including food wastage (Bogevska et al., 2021).

According to UN Environment on African Waste Management Outlook Changing consumer behavior has resulted in increasing plastic consumption in Africa, which combined with weak waste collection systems, places Africa at risk of increasing marine plastic litter. If Africa does not put measures in place to mitigate the flow of plastic (and other waste) into the ocean, increasing pollution is likely to negatively impact coastal economies.

Several studies have focused on how the context facilitates or impedes consumer activities for avoiding plastic packaging waste (Bartolotta & Hardy, 2018). For instance, Heidbreder et al. (2020) found that perceived difficulty was the strongest predictor of willingness to reduce single-use plastic. Many studies in this category investigated the impact of policy interventions aiming at reducing single-use plastics, such as shopping bags (Luis et al., 2020; Martinho et al., 2017) and water bottles (Bartolotta & Hardy, 2018). However, when consumers were required to separate their plastic waste at the same time, it appears that they prefer to recycle rather than buying refill packaging. Heidbreder et al. (2020) found that a plastic free week campaign led to a small, but significant, reduction in single-use plastics consumption, particularly among consumers with low pro-environmental identity. Overall, research suggests that consumers' plastic packaging and plastic packaging waste avoidance depends on motivational as well as opportunity and ability factors.

2.3 Theoretical framework

This work is anchored on Cradle-to-Cradle theory developed by William McDonough (2002). It is designed to stop the cycle of use-waste-pollute, which suggests that certain products could be reused endlessly to make similar products (cradle-to-cradle), rather than recycled into lower-grade products until the last stop is a landfill (cradle-to-grave). This means that products can be used, recycled, and used again without losing any material quality-in cradle-to-cradle cycles. Therefore, it could be a good way for reducing the waste from the raw materials of the products instead of using more and more virgin materials. Besides, considering the waste hierarchy, it also increases the proportion of waste reuse. Hence, when we face the problems of municipal solid waste, this theory can bring us the possibility for the breakthrough. All in all, "cradle-to-cradle" plays an important role in developing China's waste treatment hierarchy and implementing China's waste management system.

2.4 Empirical Framework

A number of related research has been conducted along these lines.

Jones et al. (2011) conducted a study aimed at providing a general review of the reporting process adopted by some of the world's leading retailers along with the sustainability agendas, which they have publicly reported. They, also, tried to provide a wider exploration of the ways these retailers are currently addressing and pursuing sustainability agendas. In order to achieve this, they reviewed the most recent sustainability reports as well as information, which have been posted on the webpages of the eight out of ten retailers. Their findings suggested that the structure of the sustainability reports vary considerably among the retailers, while three broad sets of schemes can be identified, the environmental, the social and the economical. In general, the authors argue that the world's leading retailers are, at best, adopting weak models of sustainability. In addition, they point out that during the pursuing of consumption and continuing growth, retailers are ignoring the fact that the present patterns of consumption are unsustainable in the long term. In their own research, Cacho-Elizondo & Loussaief (2010) explored the perceptions of young consumers about the sustainable development initiatives of French food retailers and evaluated their impact on the brand image of retailers and their relationships with their consumers. Their methodology included the review of the corporate websites of the retailers and a press review as well as eight in-depth interviews and one face-to-face survey. Their results suggested that young consumers seem to relate sustainable development more to ecology and less to social and economic issues. In addition, they report the five dimensions that seem to best describe brand image in relation to sustainable development, which include sympathy, innovativeness, human touch, responsibility and opportunistic behavior.

Finally, Guercini & Runfola (2009) focused their research on the concept of traceability, by offering some evidence of the adoption of different traceability approaches by actors along the supply chain and by illustrating the relevance of the traceability issue and how it can be exploited. Authors describe two different approaches to traceability. According to the first, a company uses traceability as a tool for strengthening organizational control and is not willing to share information with its customers. In the second approach, traceability is used as a market tool, which helps customers to acquire knowledge about the origin of the products and the conditions of their manufacturing. Authors also explain that the traceability process has intra-organizational consequences in terms of contents, technologies and the parties involved in its implementation. Waste management, along with energy consumption, land use, transportation etc., constitutes one of the main environmental issues in the retail sector. Consequently, it has been heavily researched by various authors so far.

3. Materials and Methods

3.1 Study Area

The study focuses on Port Harcourt, the capital city of Rivers State, Nigeria. Situated in the Niger Delta region, Port Harcourt is renowned for its vibrant economic activities, particularly in the oil and gas sector. Established in 1967, Rivers State comprises 23 Local Government Areas, each characterized by unique socio-economic and environmental dynamics. Across the various Local Government Areas are supermarkets of different sizes and capacities, patronized by urban and rural dwellers in the state. Port Harcourt boasts several superstores offering a diverse range of products. Examples include Spar Nigeria, known for groceries, household items, electronics, and clothing; Shoprite, offering groceries, fresh food, household items, and electronics; Next Cash and Carry, providing wholesale options for groceries, household goods, and electronics; Everyday Emporium, popular for competitive prices on groceries, household items, electronics, and clothing; and Park 'n Shop, known for groceries, fresh produce, household goods, and electronics. These superstores cater to various needs, providing a convenient one-stop shopping experience for residents and visitors in Port Harcourt.

3.2 Research Design

Employing a descriptive research design, this study aims to provide a comprehensive understanding of the variables related to waste management in superstores across Port Harcourt. Descriptive research design is a type of research methodology used to describe characteristics or behaviors of a population or phenomenon. It focuses on observing and documenting the existing state of affairs without attempting to manipulate or control variables. Descriptive research is chosen for its ability to elucidate consumer awareness and

engagement in waste management practices without manipulating variables, thereby allowing for an in-depth exploration of complex societal phenomena.

3.3 Study Population

The population of the study refers to the entire group or set of individuals, items, or phenomena that the researcher is interested in examining or drawing conclusions about. The study targets customers of superstores in Port Harcourt, encompassing a diverse demographic. A random sampling approach was employed to ensure the representation of various consumer profiles and preferences. In total, 112 customers participated in the study, providing a robust sample size for thorough analysis and meaningful insights. This population was made up of both male and female genders, with ages ranging from 18 years and above, and included married and single respondents of diverse occupations, different levels of education, and frequencies of shopping at superstores.

3.4 Study Instrument

Data collection involved a combination of primary and secondary sources. Primary data were gathered through structured questionnaires and interviews administered to the selected sample (Appendix A). The questionnaire, designed with a summative rating scale ranging from 1 to 5 in Likert scale format, facilitated nuanced responses. The Likert scale is a commonly used psychometric scale for gauging attitudes or opinions of respondents in surveys or questionnaires. It typically consists of several statements or items to which respondents indicate their level of agreement or disagreement on a scale, often ranging from "Strongly Disagree" to "Strongly Agree." Section A of the questionnaire collected demographic information, while Section B addressed specific research inquiries. Secondary data sources, including libraries, journals, articles, textbooks, and online databases, contributed to the literature review and contextual understanding of waste management issues.

The instruments used in data collection for this study are structured questionnaires. The questionnaire was designed in Likert scale (5 points) format. It was divided into two parts: Section A deals with the personal information about the respondents, while Section B addresses the research questions. The questionnaire was distributed to customers of superstores.

3.5 Data Analysis

The data analysis process involved several steps to extract comprehensive insights. Data was organized into tables and percentages to present key findings clearly. Statistical techniques like Chi-square and correlation analysis were used to test hypotheses and explore relationships between variables. Advanced statistical analyses, including standard deviation and correlation coefficient calculations, were conducted using SPSS version 26. This software facilitated thorough examination of the data, providing deeper understanding of variability and relationships within the dataset. The combination of structured data organization, hypothesis testing, and advanced statistical analyses ensured robust interpretation of results, leading to valuable insights and informed conclusions.

3.6 Validity and Reliability of Instrument

Ensuring the validity and reliability of the research instrument was paramount. To validate the questionnaire, it underwent rigorous evaluation by the institutional ethical committee to ensure it effectively covered the study variables. Additionally, reliability assessment was conducted using Cronbach's alpha, a measure of internal consistency, to confirm the reliability and consistency of the questionnaire responses. These measures contribute to the credibility and trustworthiness of the study findings.

4. Results

The data obtained was analyzed as follows:

Table 1 below describes frequency tables of the distribution of respondents based on gender, age, and marital status.

The Gender table indicates that out of the 112 respondents, 58 identified as male (51.8%), and 54 identified as female (48.2%). The percentages represent the proportion of each gender category relative to the total number of respondents.

Age table provides information on the distribution of respondents across different age groups. The majority of 67 respondents (59.8%) within the 18-33 age range, followed by 36

respondents within 34-49 (32.1%), 8 respondents within age 50-65 (7.1%), and a single respondent in the 82 and above age category (0.9%).

The Marital Status table indicates that 33.0% of respondents are married (37 individuals), while 67.0% are single (75 individuals).

Table 1. Frequency distribution table of gender, age, and marital status

Gender	**Frequency**	**Percentage (%)**
Male	58	51.8
Female	54	48.2
Total	112	100.0
Age	**Frequency**	**Percentage**
18-33	67	59.8
34-49	36	32.1
50-65	8	7.1
82& above	1	0.9
Total	112	100.0
Marital Status	**Frequency**	**Percentage**
Married	37	33.0
Single	75	67.0
Total	112	100.0

Table 2 shows frequency and percentage distribution for level of education, occupation and frequency of shopping with total subjects of 112.

The Level of Education table shows that the majority of subjects (98.2%) have a tertiary level of education (110 individuals), while only a small percentage (1.8%) have a secondary level of education (2 individuals).

The Occupation table provides information on the occupational distribution of subjects. The majority are employed 61 (54.5%), followed by students 30 (26.8%), self-employed individuals 14 (12.5%), unemployed individuals 6 (5.4%). Retired subject is 1 (0.9%).

The Frequency of Shopping table indicates the shopping habits of subjects. The most common frequency is once a week 23 (38.4%), followed by 2-3 times a month 27 (24.1%), once a month 23 (20.5%), and 19 subjects rarely shop (17.0%)

Table 2. Frequency distribution table of level of education, occupation, and frequency of shopping

Level of Education	**Frequency**	**Percentage**
Tertiary	110	98.2
Secondary	2	1.8
Total	112	100.0
Occupation	**Frequency**	**Percentage**
Employed	61	54.5
Unemployed	6	5.4
Self employed	14	12.5
Retired	1	0.9
Students	30	26.8
Total	112	100.0
Frequency of shopping	**Frequency**	**Percentage**
Once a week	43	38.4
2-3 times a month	27	24.1

Once a month	23	20.5
Rarely	19	17.0
Total	112	100.0

Table 3 provides insights into the levels of awareness among male and female consumers regarding various aspects of sustainable development goals related to waste management. The mean scores indicate patterns and differences in awareness across different questions asked.

The mean score for item 1 is 2.45±1.54 for males and 2.19±1.67 for females. Males have a higher awareness level than females regarding superstores being aware of the need to reduce, reuse, and recycle. Item 2 measures awareness of the connection between sustainable development, lifestyles, and nature. Both male and female have mean and standard deviation of 2.34±1.48, 2.46±1.26 respectively, females have a higher awareness level compared to males. Also, for item 6 males and females have similar awareness levels (means of 2.48±1.49 and 2.44±1.44, respectively) Furthermore, male and females have low awareness levels for item 1, 2 and 6 respectively.

Additionally, item 3, 4 and 5 have mean scores of (3.10±1.64, 2.78±1.28), (2.55±1.49, 2.24±1.29) and (3.22±1.58, 3.41±1.58) respectively for both male and female indicating that they do not have high awareness level except for item 4 that shows that the female respondents are aware that achieving sustainable development goal would phase out single-use plastic bags for shopping.

Table 3. Level of awareness of SDGs related to waste management

S/N	Description	Male Mean ± SD	Female Mean ± SD	Aggregate Mean ± SD
1	I know superstores are aware of the need to reduce, reuse and recycle	2.45±1.54	2.19±1.167	2.32±1.37
2	I am aware that sustainable development and lifestyles harmonizes with nature	2.34±1.481	2.46±1.255	2.40±1.37
3	I am not aware that good waste management can contribute to the achievement of sustainable cities and communities	3.1±1.64	2.78±1.284	2.95±1.48
4	Achieving sustainable development goal would not phase out single-use plastic bags for shopping	2.55±1.489	2.24±1.288	2.40±1.39
5	Sustainable consumption and production cannot be achieved through waste management	3.22±1.579	3.41±1.584	3.31±1.57
6	I am aware that sustainable development goals targeted to improve living environment	2.48±1.49	2.44±1.436	2.46±1.46
	Mean of Awareness	2.69±1.05	2.59±0.70	2.64±0.89
	Total	16.16±6.29	15.52±4.22	18.48±9.53

Table 4 represents the chi-square table of association between awareness and social demographics.

The chi-square test for gender and awareness yields a chi-square statistic of 37.082 with 19 degrees of freedom. The p-value is 0.08 which indicates that there is no statistically significant association between gender and awareness at 0.05 levels. The chi-square test for marital Status and awareness value is 35.079 with 19 degrees of freedom. The p-value is 0.04, representing a significant association between Marital Status and Awareness.

The chi-square test for level of education, occupation, age and frequency of shopping with awareness shows a chi-square statistic value of 54.98, 250.99, 198.43 and 110.79 respectively. Also, their degree of freedom is 19, 76, 57 and 157 respectively. Additionally, the p-value for the 4 variables is 0.00. There is statistically significant association between level of

education, occupation, age and frequency of shopping with the awareness of sustainable development goals related to waste management.

Table 4. Chi-square table of association between consumer awareness of SDGs in waste management and the socio demographic factors

Awareness	X^2	Df	p-value	Remarks
Gender	37.082	19	0.08	N/Sig
Level of Education	54.982	19	0.00	Sig
Marital Status	35.079	19	0.04	Sig
Occupation	250.993	76	0.00	Sig
Age	198.43	57	0.00	Sig
Frequency of Shopping	110.787	157	0.00	Sig

H01: There is no statistically significant association between consumer awareness of SDGs in waste management and the socio demographic factors in the study.

The null hypothesis is rejected.

Table 5 provides insights into the extent of customer's engagement in waste management practices.

The mean scores and standard deviation for items 1, 2, 3, 4 and 5 measuring participation in waste reduction and recycling practices while shopping, separation of waste when shopping at Superstores, making conscious choices that align with proper waste disposal while shopping, seeking information and resources related to waste management and advocating for waste reduction at the superstores among friends and family are 2.29±1.38, 2.04±1.23, 2.17±1.29, 2.19±1.35, 2.31±1.29 and 2.68±1.39 respectively. It was revealed that the respondents had a low level of engagement in waste management patterns across the questions asked.

Although, the mean score and standard deviation of item 6 measuring providing feedback or suggestions to Superstores regarding their waste management is 2.68±1.39 reveals that the respondents have an average level of engagement in waste management practices

Table 5. Descriptive statistics of customer's engagement in waste management practices

S/N	Description	Mean±SD
1	I participate in waste reduction and recycling practices while shopping	2.29±1.38
2	I do not separate waste when shopping at Superstores	2.04±1.23
3	I make conscious choices that align with proper waste disposal while shopping	2.17±1.29
4	I seek information and resources related to waste management.	2.19±1.35
5	I advocate for waste reduction at the superstores among friends and family.	2.31±1.29
6	I provide feedback or suggestions to Superstores regarding their waste management.	2.68±1.39
	Mean of engagement	2.28±0.85
	Total	15.96±6.13
	Aggregate mean±SD	2.28±0.87

Table 6 shows that there is a statistically significant relationship between consumer's awareness and consumer's engagement (r= 0.45, p= 0.00, N=112). The correlation coefficient (r) indicates a positive moderate relationship between "awareness" and "engagement" suggesting that higher level of awareness is associated with higher level of engagement.

Table 6. Correlation table showing the association between consumer awareness and consumer engagement

Variable	N	R	Interpretation	p-value	Remarks
Awareness VS Engagement			Moderately positive		

	112	0.45	0.00	Sig.

r = Correlation coefficient

The null hypothesis is rejected.

5. Discussion

The results of this study from the first objective suggest that the male and female respondents have differing average levels of awareness on the SDGs related to waste management. Awareness becomes pivotal because it is the primary step to change personal behaviour by influencing its attitude, leading to a willingness to change. For example, the findings from the studies about waste management behaviour of households conducted in Sharjah City, UAE (Hammami et al., 2017), Padang city, Indonesia (Ulhasanah & Goto, 2018) and in Macau, China (Song et al., 2016) which showed the vital role of awareness. Hence, recycling packaging waste is easier when the consumer has acquired a habit of recycling, and correctly sorting of packaging waste material requires knowledge of how to do that (Thøgersen, 1994). Limited knowledge about the problem and how to solve it is a general psychological barrier to engage in sustainable consumer behaviour (Gifford, 2011). Consumers are more likely to engage in a particular behaviour if they believe it will make a difference and contribute to environmental sustainability (Antonetti & Maklan, 2014; Leary et al., 2014). Also, the hypothesis of association between consumer awareness of SDGs in waste management and the socio demographic factors where the p-value for gender indicated not significant that is based on the observed data, there isn't strong evidence to suggest that a relationship exists between customer awareness and sex (gender). This implies that gender might not play a substantial role in determining or influencing customer awareness.

Although, the p-value of level of education, marital status, occupation, age and frequency of shopping indicated a significant association with consumer awareness of SDGs in waste management. This implies that level of education, marital status, occupation, age and frequency of shopping play a substantial role in determining or influencing customer awareness. In line with the findings of the study above, earlier revealed younger generations often have higher levels of environmental awareness, exhibit 'green behaviours' and are more active than older generations on environmental issues (Deliana & Rum 2019). Likewise education that becomes the platform to share facts, information, and values for the targeted community to change behaviour through intrinsic factors in the personal domain (Stern, 1999) as insufficient understanding of the impact of human activities toward their environment might be the cause, as indicated by the studies conducted in China in 2011 (Song et al., 2016), Shanghai in 2014 (Fan et al., 2019), Thailand in 2016 (Janmaimool & Denpaiboon, 2016), and Iran in 2016 (Heidari et al., 2018). Further, the study conducted by Gyimah et al. in 2019, which aimed at examining waste separation practice of Cape Coast Metropolis households in Ghana in 2016, indicated that attitude was also affected by knowledge toward health impacts, perception of time availability, facilities, and technical knowledge toward waste separation. Consequently, a strong and intensive educational program is required to improve both knowledge and attitude (Padilla & Trujillo, 2018).

Further, the results of this study reveals that the respondents have a limited level of engagement in waste management practices judging from their responses. Although, consumers are more likely to engage in a particular behaviour if they believe it will make a difference and contribute to environmental sustainability (Antonetti & Maklan, 2014; Leary et al., 2014). Opportunity is the objective conditions for performing the behaviour (Olander & Thøgersen, 1995). This often relates to convenience in the form of place and time utility. By optimising these conditions, consumers' likelihood of engaging in a given sustainable behaviour becomes higher (Thøgersen, 2005). Also, Consumers face various structural barriers to engage in sustainable behaviour (Verplanken, 2018) and their engagements depend on the actual context. Considering the second hypothesis guiding the study it was evident the higher the level of awareness of the customers on SDGs related to waste management the more their level of engagement in waste management practices. Hence, education is the best intervention to change people's awareness of waste management and encourage them to be involved (Chow et al., 2019).

6. Recommendations

Following the findings of the study the under listed recommendations were considered appropriate:

Waste Management Education: Through the superstore's education efforts and outreach, waste generators and production units are made more aware of the need to reduce, reuse and recycle and integrate sustainable practices into their operations. Effective education is often considered as a robust solution to nurture intrinsic factors effectively to improve waste management behaviour (Idamah, 2015; Nnaji, 2015; Oduro-Kwarteng et al., 2016; Choon et al., 2017; Padilla & Trujillo 2018; Kattoua et al., 2019; Lawrence et al., 2020; Nmere et al., 2020). Even though extrinsic factors are available such as infrastructure, there is no assurance that the residents want to participate if they have no proper environmental awareness and technical knowledge toward the activity (Kattoua et al., 2019). The educational system is supposed not only applied to the formal system (such as school-based or college-based education), which is commonly intended for youth (Singer & Song, 2019). The local government should provide an educational system specifically designed for adults as well in the concept of resident-based education. The waste management education will improve specific residents' knowledge to nurture various intrinsic factors needed to improve participation. The educational setting might allow intensive interaction such as face-to-face interaction for better knowledge internalization (Knickmeyer, 2019), involving internet (Padilla & Trujillo, 2018) and learning-by-doing to encourage changing behaviour and improve waste management performance.

Some of the possible ways of reducing the quantity of waste generated include buying products that involve less packaging or buying products in bulk so as to reduce the quantity of materials used for the packaging; making use of reusable items rather than the disposable ones, for instance, the use of handkerchiefs rather than tissue papers, rechargeable batteries, refillable ink pens, etc.; making use of reuseable/cotton/textile bags for shopping rather than plastic bags; maintaining/repairing of damaged products like clothes, leathers, furniture, etc.

A survey of grocery stores in Quebec, Canada revealed that materials such as fruits, baked products, seafood, packaging materials and other frozen products make up a large amount of waste from grocery stores. These wastes are in the form of polymers and plastics which research has shown that they are difficult to manage. Over the last fifty years, plastic has become the packaging material of choice for many of the goods we consume.

Avoiding plastic packaging can be achieved, for instance, by buying packaging free/reduced products (Louis et al., 2021) or products with bio-based or other alternative plastic packaging solutions. Another important strategy of achieving waste reduction is the separation at source (Ugwu et al., 2020). This is achieved by providing separate bins/containers, which are clearly labeled, at designated places of collection or generation points like households, industries, workplaces, commercial areas, offices, etc.

To promote the practice of recycling, regulations in several developed economies mandate retail stores to operate a free 'take back' scheme that allows customers to return to the items they no longer find useful (Modak, 2010). These could include household electrical and electronic appliances, batteries, cell phones, among others. Businesses are expected to take these wastes to designated recycling centres or recycle the items themselves (Wagner, 2007). In some countries, retail stores have also been mandated to display visible posters and banners in their outlets, websites and products packages informing customers of this free waste 'take back'

7. Conclusions

This study focuses on the fact that in a city like Port Harcourt, with several tens of thousands of supermarkets, there is a need to critically examine the waste emanating from the sector to identify the best waste management method. This research assessed Port Harcourt Superstores' contributions to SDGs via consumer waste management behaviors, considering factors such as consumer awareness of SDGs related to waste management and the level of consumer engagement in waste management practices while shopping. It was evident that poor waste management can lead to significant environmental and health hazards. Considering the low level of environmental management awareness in Nigeria, knowledge of environmental management techniques becomes crucial for life sustainability. Through descriptive and quantitative analysis, the research identifies a significant association between consumer awareness of SDGs related to waste management and various socio-demographic factors, indicating that heightened awareness correlates with increased engagement. Specifically, SDG 12: Ensure sustainable consumption and production patterns, and SDG 11:

Make cities and human settlements inclusive, safe, resilient, and sustainable, were emphasized. Waste management is a crucial component of achieving these goals. The research highlights the critical challenge of waste management in Port Harcourt, particularly the generation of refuse across domestic, commercial, and industrial sectors. Superstores, as major contributors to waste, need to adopt environmentally friendly practices to align with sustainable development goals. The study underscores the pivotal role of consumer awareness in shaping shopping and consumption behaviors, especially concerning waste management practices. Environmental consciousness emerges as a driving force behind consumer participation in waste management activities. The findings emphasize the importance of consumer knowledge, particularly regarding plastic packaging waste, in influencing waste reduction efforts. Overall, the study emphasizes the necessity for stakeholders, particularly superstores, to play a proactive role in communicating information and fostering consumer engagement for environmental sustainability in waste management practices. This includes initiatives such as implementing efficient waste collection systems, promoting recycling through a return of PET bottles policy and composting programs, reducing litter and pollution, and investing in waste-to-energy technologies. Ultimately, integrating waste management into urban planning and development is essential for creating sustainable and resilient cities that can support the well-being of present and future generations. Conclusively, the study reveals that the ability to avoid plastic packaging waste particularly depends on the consumer's knowledge and awareness of plastic packaging waste and its consequences, influenced by information communicated from different stakeholders, as residents must understand the benefits of waste management activity for the environment and their role and moral obligation to keep the environment.

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Appendix A

Assessing Port Harcourt superstores' contributions to SDGs via consumer waste management behaviours

Dear Respondent,

This questionnaire is aimed at collecting information that will ensure the publication of "Assessing Port Harcourt Superstores' contributions to SDGs via consumer waste management behaviours". Answers will be treated with utmost confidentiality and used for academic and research purposes only. Thank you very much for your profound contribution towards this study.

Esther Joseph Azubuike (Researcher)

Do you wish to participate in this study?

Yes
No

Socio-demographics

Gender
Male
Female

Age Group
18- 33
34-49
50-65
66-81
82 and above

Marital status
Married
Single
Widow/Widower
Divorced/Separated

Level of Education
No Formal Education
Primary
Secondary
Tertiary

Occupation
Employed
Unemployed
Self-Employed
Retired
Student

Frequency of shopping at superstores
Once a week
2-3 times a month
Once a month
Rarely

Awareness Level of SDGs Related to Waste Management

I know superstores are aware of the need to reduce, reuse and recycle
Strongly disagree
Disagree

Strongly agree
Agree
Neutral

I am aware that sustainable development and lifestyles harmonizes with nature
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

I am not aware that good waste management can contribute to the achievement of sustainable cities and communities
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

Achieving SDG would not phase out single-use plastic bags for shopping
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

Sustainable consumption and production cannot be achieved through waste management
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

I am aware that SDGs targeted to improve living environment
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

Consumer engagement in waste management practices

I participate in waste reduction and recycling practices while shopping
Strongly disagree
Disagree

Strongly agree
Agree
Neutral

I do not separate waste when shopping at superstores
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

I make conscious choices that align with proper waste disposal while shopping
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

I seek information and resources related to waste management
Strongly disagree
Disagree
Strongly Agree
Agree
Neutral

I advocate for waste reduction at the superstores among friends and family
Strongly disagree
Disagree
Strongly agree
Agree
Neutral

I provide feedback or suggestions to Superstores regarding their waste management
Strongly disagree
Disagree
Strongly Agree
Agree
Neutral

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Research Article

Power Supply and the Performance of Small and Medium Scale Enterprises in Rivers State, Nigeria

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Abstract: This research looks at power supply small and medium scale enterprises in Rivers State, Nigeria. Primary and secondary source of data were the source of data for the study, the study aims at examining the effect of power (electricity) on SMEs, the impact of power supply on the profitability of SMEs and the effect of power (electricity) on the sales and income of SMEs in the state of Rivers. Survey method was employed in this study and Cochran's sample size formula was used as the sampling strategy since the study's population size was limitless thereby leading to a sample size of 384. Power supply indicators are used as explanatory factors in the models, whereas performance indices are used as dependent variables. Questionnaires were developed by the researchers to get the necessary information from the respondents and the data was analysed using the discrete response approach and the logistic model. The findings of the study showed that SMEs' storage of goods, productivity, and revenue were all negatively impacted by the short duration of public power supply and it serve as a bottle neck that limit the profit, sales and revenue generation of SMEs in Rivers State, Nigeria. Therefore, in order to boost productivity, profitability, and job creation in the state of Rivers, the research suggests that more electric power should be directed to the industrial region of Port Harcourt particularly during the day, money collected from SMEs in form of tax should be wisely put to use for the benefit of the general public.

Keywords: power; electricity supply; small and medium scale enterprises (SMEs); revenue; profitability

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1. Introduction

In order to achieve productivity, steady development, and an improvement in people's quality of life, the economy—a complex dynamic—needs more study and better management. There has been an emphasis on small and medium scale enterprises (SMEs) as a growth engine for economies and industrial sectors in especially since the 17th century, when attempts to boost economic growth first gained traction (Adeyemi, 2011). SMEs play an increasingly important role in Nigeria's economy. This is because SMEs are the primary vehicles for the creation of the resources necessary for industrialization and consumer spending, both of which contribute to a nation's overall prosperity. Aderemi et al. (2020). Due to their diverse customer base and rapid impact on achieving macroeconomic goals (e.g., equal income distribution, full employment, etc.), SMEs play an essential role in Nigeria's economic growth. In any economy, small and medium-sized businesses have great potential for growth, both in terms of creating jobs and money. In many states, small and medium-sized businesses have provided job opportunities and improved per unit of invested capital more than larger corporations. This explains why, beginning in the 1970s, developing countries have taken such an active interest in fostering SMEs growth.

Additionally, there are a number of obstacles that have prevented SMEs in Nigeria from reaching their full potential in terms of contributing to the country's economic growth and development. These include a lack of access to long-term capital, insufficient funding, a lack of information available to potential investors, incompetent management, a lack of entrepreneurial skill, an overly burdensome regulatory and operational environment, unfavourable tariff policies, and infrastructure deficiencies like an unreliable power supply. Particularly for Nigerian SMEs these limitations reduce their performance. Despite the

common belief that access to capital is the single most important factor affecting the success of SMEs, research has shown that many of these businesses fail due to issues unrelated to money, such as poor infrastructure, lack of reliable electricity is one of the infrastructure facilities that hinders the efficiency of SMEs businesses throughout the nation. In spite of their limited financial resources, almost all SME participants now have backup power sources to keep their operations running smoothly. According to Soludo (2005) the high cost of manufacturing was a direct outcome of this circumstance. Consequently, a reliable supply of power is crucial for SMEs to make cost-effective investments.

Since Rivers State is second only to Lagos in terms of commercial activity in Nigeria, it is necessary to objectively evaluate the effect of power (electricity) supply on the efficiency of small and medium-sized businesses operating there. There are several challenges faced by the small and medium-sized businesses in Rivers State and Nigeria's industrial growth, notwithstanding the importance of these businesses. Inadequate capital and unfavourable tariff policy are two of the many variables impacting the success of the SMEs subsector. While many things work against the success of small and medium-sized businesses in Nigeria, a major one is the country's inadequate electricity infrastructure. The whole country is still plagued by power shortages and blackouts, even though the previous administration invested much in the power industry to address the dire electricity situation. Despite efforts to privatise the power industry and make the country's electricity infrastructure more reliable, the national power grid's capacity fell from 4,100 MW in 1999 to 1,300 MW in 2014 (Amadi, 2014). Power plays a very important part in the development and improvement of Nigeria's economy. Reducing SMEs' alternative cost is dependent on their access to a steady supply of power (Ofosu-Ahenkorah, 2008). Reason being, almost every industry in Nigeria need access to power. Actually, the majority of small enterprises rely on electricity as a primary resource (Watson et al., 2002). But most sectors have found that the very high incidence of power instability in Nigeria throughout the years is a real problem. Many small and medium-sized businesses have to buy costly standby generators because of the unreliable power supply, although they are still more expensive than grid energy. Along with a steady supply of fuel and replacement components, operating a generator also requires a certain level of technical knowledge.

Despite this, there has been an uptick in the amount of electricity that businesses generate on their own in recent years, particularly in sub-Saharan Africa. Businesses who have looked into alternate power sources have found that running on a steady generator power supply is costly and, in most instances, capital heavy. As an aside, customers in Nigeria essentially have no option but to pay for the critical service of electricity, which is protected from competition (Chau, 2009; Watson et al., 2002). From an economic perspective, this means that any disruptions in the electrical supply chain could potentially dampen the nation's economic growth and development, and secondly, that the general public's interests, particularly those of individuals who depend heavily on electricity, could be jeopardised due to price increases and the "degradation of quality of supply and customer service" (Chau, 2009). The above points to the need of researching how electricity supply affects the efficiency of SMEs before taking any kind of policy decision in this area. Reliability issues with the electricity supply have persisted, leading to more frequent power outages, load shedding, and rationing.

Many companies have resorted to buying expensive private generators due to the unpredictable and intermittent power supply. According to Adeyemo (2001), the private generating facilities have a capacity of more than 250 mm, which is about half of the available capacity of the Power Holding Company of Nigeria (PHCN). The capacity of a country to generate competitive businesses is directly related to the reliability and availability of its electrical supply, as this factor has a significant impact on the success of small and medium-sized businesses worldwide. Thus, the purpose of this research is to assess how the availability of electricity affects the productivity and financial health of SMEs in Rivers state, Nigeria, as well as how this factor affects the revenue and sales generated by these businesses.

Research Questions:

In an effort to find out how the availability of power (electricity) affects the efficiency of SMEs in Nigeria, this study aims to address the following research questions:

1) How does the availability of power (electricity) affect the efficiency of SMEs in the state of Rivers?

2) How much of an impact has the availability of power (electricity) had on the bottom lines of SMEs in Rivers state?

3) How does the availability of power (electricity) affect the sales and income of SMEs

in the state of Rivers?

Research Hypotheses:

The following hypotheses were made for the study:

Ho1: There is no significant relationship between power (electricity) supply and productivity of SMEs in Rivers state.

Relationship between power (electricity) supply and profitability of SMEs

Ho2: There is no significant relationship between power (electricity) supply and profitability of SMEs in Rivers state.

Relationship between power (electricity) supply and revenue /sales of SMEs

Ho3: There is no significant relationship between power (electricity) supply and revenue /sales of SMEs in Rivers state.

2. Conceptual Literature Review

2.1 Electricity Supply

James Watt (1736) defined electricity supply as the amount of electrical energy given to residential, commercial, and industrial customers. The installation of Nigeria's first producing power plant in the city of Lagos in 1898 marked the beginning of the country's electrical history (Modi & Adamu, 2016). Between then and 1950, the distribution pattern of electrical power was dispersed throughout the communities. The public works department of the federal government oversaw most of the few projects, with some being carried out by local and others by indigenous communities. Currently, out of the Power Holding Company Nigeria Entitles, which are known as Local Distribution Companies in different areas, the National Privatisation Council has reserved bidders for five producing companies and eleven distribution companies. The following distribution companies were operational in April 2014: Abuja, Benin, Eko, Enugu, Ibadan, Ikeja, Jos, Kaduna, Kano, Port Harcourt, and Yola. All other system operations rely heavily on electricity, which is a fundamental physical facility that is part of the infrastructure (Adeyemo, 1979). Development as a crucial stimulant to development, economists stress the importance of increasing power production. It is well acknowledged that studying economic growth always includes an examination of electricity (Ukpong, 1976). The movement of a charge or electrical power is known as electricity. It is obtained via the process of converting other energy sources, known as primary sources, such as coal, natural gas, oil, nuclear power, and other natural resources. As a result, it is considered a secondary energy source. Although renewable and non-renewable energy sources may provide electricity, the energy itself is neither. We rely on electricity, which is both a natural phenomenon and a major energy source for our daily lives.

2.1.2 Small and Medium Scale Enterprise

There is no agreed-upon definition of SME in Nigeria, according to an analysis of historical descriptions of the term. In particular, CBN defined a small or medium firm (SME) as any business with an asset base of up to 200 million naira (not including land and working capital) and no minimum or maximum number of employees in its 2005 guideline on the Small and Medium firm Investment Scheme (SMEIS). According to the European Union, when a company has fewer than 250 people and a final maximum of EUR 50 million, it is considered a medium size corporation. On the other hand, a small firm is defined as one with less than 50 employees and a financial ceiling of EUR 10 million (European-Union, 2022). Companies in the US with 500 or less workers are considered SMEs. Manufacturing, wholesale, and retail SMEs were the three categories used by Japan. Businesses in the following categories: manufacturing, wholesale trade, and retail and service trades with capital amounts below ¥300 million (US$3.6 million), ¥100 million (US$1.2 million), and ¥50 million (US$600,000), appropriately. According to the federal government's 1990 budget for commercial bank loans, SMEs were defined as those with a yearly turnover below 500,000 naira and, in the case of merchant bank loans, a capital expenditure of no more than 2 million naira (excluding land costs) /a maximum of 5 million naira. SMEs were recently classified by the Financial System Strategy as businesses with fewer than 300 workers or a yearly revenue of less than 100 million naira (Banji, 2020).

2.2 Theoretical Literature

The following theories are theories that helped the study:

2.2.1 Energy Rebound Theory

One argument that opponents of energy efficiency initiatives seldom use is the energy

rebound notion. There is a tendency for energy efficiency policies to increase energy consumption, which in turn leads to economic growth and development and more CO_2 emissions. This is because efficiency policies reduce energy use and emissions, which is less than expected due to the induced behaviour adjustment of relevant economic agents (Lu, 2017). When energy production and consumption are more efficient, the economy grows and develops. Ekpo (2008) observed that the most critical aspect of infrastructure to investment is power (electricity) supply which unfortunately had been on the low side in Nigeria and statistics from state owned electricity utility firm (PHCN) showed that electricity supply is about 3400 megawatts in a country of over 200million people. He went further to conclude that fixing power (electricity) will spur economic growth and make our industries more competitive. However, when this leads to more emissions and greater environmental damage, the gains in efficiency are offset.

2.2.2 Keynesian theory

This research also considers Keynesian theory to be relevant. When it comes to regulating the supply of power to SMEs, this theory provides helpful insight into the effects of government action. This theory's strength lies in the fact that it highlights the significance of government intervention in economic affairs. According to Keynesians, private sector actions may have inefficient effects on the economy as a whole, hence they propose a mixed economy where the private sector is dominant but the public sector and government also play significant roles. Lack of government involvement in economic activities will always be a barrier to the establishment of SMEs, even in countries like Nigeria where the public and private sectors are strongly complementary. Consequently, the expansion of SMEs is highly dependent on government involvement. When seen through the lens of this research, this becomes a very significant matter.

2.3 Empirical Literature Review

The impact of power distribution on the efficiency of SMEs in southern Taraba State is studied by Arumdeben et al.(2023). The research's stated goals are to (1) determine the impact of power supply stability on the performance of SMEs in the study region and (2) determine the cost-effect of power supply on SMEs' performance. Primary data was collected by open-ended questionnaires and used in the research. Fourteen hundred and eleven managers from SMEs in the Southern Zone (IBI, Wukari, Donga, Takum, and Ussa) were interviewed using a simple random selection method. Out of the total number of questionnaires distributed, only 105 (or 92.12%) were complete and usable for the research. Ordinary least squares and descriptive statistics were used in it. Power supply reliability and cost had a favourable and statistically significant influence on the performance of SMEs in the research area. Researchers in Southern Taraba state came to the conclusion that SMEs benefit from increased power distribution. Consequently, it was suggested that in order to boost the profitability of SMEs in Nigeria, the government should provide a consistent and reliable supply of power and lower energy rates for SMEs.

In their study, Adanlawo and Vezi-Magigaba, (2021) looked at how power interruptions affected the work and economic contributions of SMEs in Nigeria. Therefore, the consequences of power supply on the expansion of SMEs in Nigeria were assessed in the research. The report looked at the potential problems that a lack of power may cause for SMEs. One hundred and ten SME operators from the Lagos state, Nigeria, LGAs of Mainland, Shomolu, and Agege were surveyed using a standardised questionnaire. To examine the data that was obtained, descriptive statistics were used. The hypothesis that was formed was tested using a chi-square approach. Electricity disruptions significantly impact SMEs in Nigeria, according to the findings.

In a study spanning 1986–2010, Nkoro and Okeke (2019) examine the relationship between Nigeria's small and medium-scale companies' power supply and their performance. Secondary data was gathered and empirical analysis was performed in order to accomplish these goals in this research. The data was anglicised using multiple regression. The researcher employed an econometric model to assess and test two hypotheses on the significance of power supply changes in Nigeria. The researcher validates that power supply variations negatively affect Nigerians and uses Ordering Least Square (OLS) to display the model's outcome. That the Nigerian GDP and balance of payment are positively affected by a one-unit adjustment in electricity supply. The report's conclusions informed a number of policy suggestions, one of which was that the government step up its fight against corruption and fraud.

Electricity supply and its effect on the efficiency of Mubi's small and medium-sized businesses was the subject of a research by Modi and Adamu (2016). The data were derived via questionnaires, which were considered primary sources. Data utilised in the coding process comes from surveys that asked about several SME-related topics in Mubi, such as their monthly turnover, the number of workers, tax information, earnings and salaries, years in operation, and spending on alternative power sources. A measure of performance was the monthly turnover, whereas a measure of power supply was kilovolt. Descriptive statistics, correlation analysis, and regression analysis were all used in the research. An inverse relationship between power supply and the efficiency of SMEs was found by the research. Regression analysis, however, revealed that electrical supply positively affects the performance of Mubi's small and medium-sized businesses. Providing a consistent source of energy was one of the study's main recommendations for helping new companies get off the ground and running.

Using data collected from 1993 to 2011, Eze and Okpala (2015) analyse how SMEs affected the rate of economic development in Nigeria. Multiple regression based on the ordinary least squares methodology was the econometric strategy used for the investigation. Nevertheless, the results of the ADF test showed that the variables are integrated of order two, 1(2), which should be sufficient to prevent erroneous estimates. It was found using the Johansen test that there is a long-term equilibrium link between growth in the economy and small and medium size businesses. The output of SMEs in Nigeria, however, is not currently contributing much to the country's economic development. The research found that bribery and corruption, a lack of entrepreneurial development centres, bad infrastructure, and ineffective tariff and incentive policies all work against SMEs in Nigeria. The research concluded that governments should work towards the following goals: microfinance institutions to help SMEs get loans easily; financial literacy programmes in schools; entrepreneurial development centres to help SMEs build their skills; adequate infrastructure, particularly in the areas of power and roads; and lastly, agencies to combat corruption and bribery.

From the above empirical literature review above, it has been seen that none of the study talks about the impact of power supply on SMSEs revenue and sales in Rivers, based on this the purpose of this research is to assess how the availability of electricity affects the productivity and financial health of SMEs in Rivers state, Nigeria, as well as how this factor affects the revenue and sales generated by these businesses.

3. Materials and Methods

The researcher used survey research design in the study. More specifically, cross sectional survey was adopted because it determines the impact of inadequate power supply on SMEs in Rivers State. According to Gaumnitz and Lere (2002), a survey undertakes the study of a large population by describing it through a close study of a representative sample that has been selected from the target population. They also stated that cross-sectional survey is concerned with what is happening at the moment and recognize the fact that a particular condition may change with the passage of time. Gaumnitz and Lere (2002) observed that for an effective conduct of cross-sectional survey, research questionnaire was required for data collection. Since there is no accurate data on the numbers of SMEs in Rivers state, Cochran's sample size formula was used as the sampling strategy since the study's population size was limitless which brings about a sampling size of 384 SMEs, three local government areas were randomly chosen from each of the three senatorial districts in Rivers state making it a total of nine LGA's. Primary and secondary data were both used and data was collected using the questionnaire which the researchers will administer face to face to the respondent. The researchers made use of primary data which enabled the researcher to personally visit the field to collect the necessary data from the respondents, and this will contribute to the results and findings of the study. Data for the study will be collected through administration of questionnaires titled the effects of power supply on medium and small businesses evaluation survey to selected SMEs in the selected LGA's of Rivers state and be retrieved at the spot. The researchers drafted samples of the questionnaire and send to some lecturers in economics department of Ignatius Ajuru university of Education who are expert and also to a lecturer in measurement and evaluation department who examined each item in terms of relevant clarity and appropriateness of language. Their comment incorporates in the correction and modification of the instrument. The measuring instrument was constructed in a way that the questionnaire item was used to measure a particular hypothesis and relevant variable that leads

the respondent to answer the question. 5likert scale with a mean criterion of 3.0 were used and Logit models were employed, while the hypothesis was tested with the use of Likelihood Ratio (LR) test, Hosmer and Lemeshow's (HL) test and pseudo R-squared to check the goodness of-fit of the model.

Here is the statement of the Cochran's sample size technique:

$$n = \frac{Z^2.Pq}{\varepsilon^2} - (1)$$

Where

n = Sample Size

z= 95% confidence level = 1.96

ε = Sampling Error at 5% =0.05

p = maximum variability of the population at 50%, that is (0.5)

q = 1 – p = 0.5

Given the values of the parameters then,

$$n = \frac{Z^2.Pq}{\varepsilon^2} = 384$$

Based on the result the researcher distributed 384 questionnaires to the staffs and owner of the selected SMEs in the three senatorial regions of Rivers State. Table 1 shows sectorial distributions of the questionnaires.

Table 1. Sectorial Distributions of the Questionnaires

Senatorial District	**No. of L.G.A**	**Names of L.G.A**	**No. of L.G.A**	**Names of Selected L.G.A**
Central Senatorial District	8	Emohua Ikwerre Etche Omuma Port Harcourt Obio/Akpor Ogu/Bolo Okirika	3	Port Harcourt Obio/Akpor Emohua
West Senatorial District	8	Bonny Degema Asari-Toru Akuku Toro Ogba/Egbema/Nd oni Ahoada East Ahoada West Abua/Odual	3	Bonny Ogba/Egbema/Ndoni Ahoada West
South East Senatorial District	7	Andoni	3	Eleme

	Opobo/Nkoro	Khana
	Gokana	Oyigbo
	Khana	
	Eleme	
	Oyigbo	
	Tai	

Source: Authors Computation, 2023.

4. Results

4.1 The Model

$$\Pr\left(Y = \middle| X\right) = k(\alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \cdots + \alpha_n X_n) - - - - - - - (1)$$

The equation above defines the conditional probabilities of Y=1 (i.e. Y occurring) given X.

Y = the dependent variables which measure performance of SMEs, includes revenue/storage, productivity and profits

X = Explanatory Variables (hours of power supply and cost of power (electricity tariff)).

HRS = Hours of Power Supply

PRF = Profitability of SMSEs

REVS = Revenue/Storage

PCOST = Cost of Public Power Supply

COSTP = Cost of Private Power Supply

$$\alpha_0, \alpha_1, \alpha_2, , , , , \beta_n, are\ the\ paremeter\ estimated\ in\ the\ models$$

For a more compact representation:

$$\Pr\left(Y = \middle| X\right) = g(X\alpha) - - - - - - - - - - (2)$$

In the Logit model, $\wedge(X\alpha)$ can be expressed as:

$$\wedge(X\alpha) = \frac{exp(X\alpha)}{1 + exp(X\alpha)} \quad - - - - - - - - - - - - - - (3)$$

The equation above is the cumulative (logistic) distribution function (cdf) and it ranges between zero and one for all values of$(X\alpha)$.

$\wedge$ is a non-linear function of$(X\alpha)$ and hence, we cannot use OLS.

The errors follow standard logistic distribution leading to the use of the Maximum Likelihood estimator in Qualitative Response Models.

We estimated for the following parameters:

Odd Ratios, Marginal Effects & Conditional Probability in our models

Odds Ratio: It is the ratio of probability of

Y=1 to the probability that Y=0.

• This is given as:

$$Odd\ Ratios = exp(X\alpha) - - - - - - - - - - - - (4)$$

$$L = \alpha_0 + \alpha_0 * \ddot{X}_1 + \alpha_2 * \ddot{X}_2 + \alpha_3 * \ddot{X}_3 + \alpha_n * \ddot{X}_n - - - - - - - (5)$$

4.2 Data Presentations

In line with the study's aims, data were analysed. The data was analysed at three different levels: primary, secondary, and tertiary. Participants were characterised by certain demographic variables in primary analyses. All demographic factors, such as age, gender, marital status, duration of service, etc., were summarised using percentages. Means, standard deviations, and logistic regression were used for descriptive statistics in the secondary analyses. Table 2 demonstrated distribution and retrieval of questionnaires.

Table 2. Distribution and Retrieval of Questionnaires

S/N Regions/LGAs	Questionnaire Distributed	Questionnaire Retrieved	Questionnaire Not Retrieved	Percentage of Retrievals
Central Senatorial district				
Port Harcourt	43	42	1	97.67
Obio/Akpor	43	43	0	100.00
Emohua	42	39	3	92.85
Sub-Total	128	124	4	96.87
West Senatorial district				
Bonny	43	40	3	93.02
Ogba/Egbema/Ndoni	43	37	6	86.05
Ahoada West	42	34	8	80.95
Sub-Total	128	111	17	86.72
South/East Senatorial district				
Eleme	43	42	1	97.67
Khana	42	36	6	85.71
Oyigbo	43	43	0	100.00
Sub-Total	128	121	7	94.53
TOTAL	384	356	28	92.71

Source: Authors Computation, 2023.

Each of Rivers State's three senatorial districts has three LGAs that received the survey. The senatorial district's commercial cities were the sites of questionnaire distribution throughout the chosen LGAs. Out of 384 questionnaires that were given, 356 were collected and filled out in full, accounting for 92.71% of the total.

According to Table 1 and figures 1–4, a total of 43 questionnaires were delivered to each of the three local government areas, with the exception of the Emouaha, Ahoada, and Khana LGA, which received 42 surveys. With 124 fully completed and returned surveys, the central senatorial district had the highest response rate of 96.87%. Among the senatorial districts in Rivers Central, the response rate was 100% in Obio/Akpo and 80.95% in Oyigbo; in contrast, Ahoada had the lowest percentage of response.

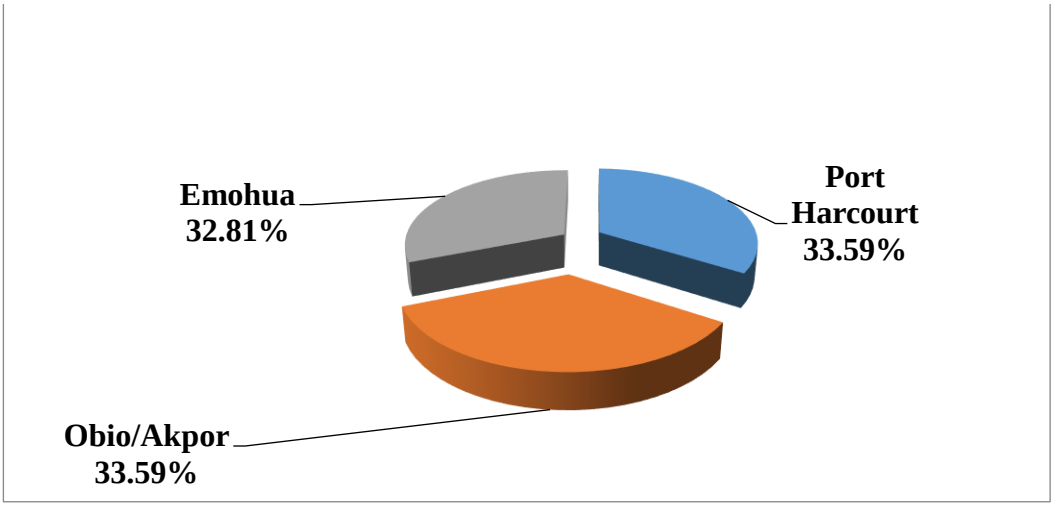

Figure 1. Percentage Distribution of Questionnaires in the LGAs in Central Senatorial District

Out of 129 questionnaires sent, about 111 individuals in the Rivers West Senatorial district filled out the survey in its entirety, yielding an overall response rate of 86.05%. Similarly, the centre senatorial district and the West Region also had the lowest response rates. With a rate of 93.12%, Bonny Local Government had the best response rate in the Rivers West Senatorial district, while Ahoada West Local Government Area had the worst, at about 70.07%.

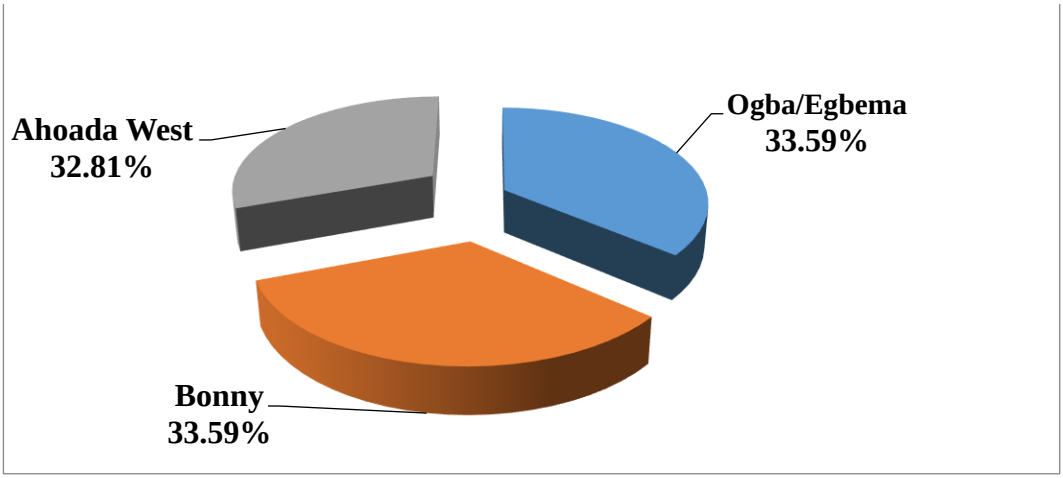

Figure 2. Percentage Distribution of Questionnaires in the LGAs in West Senatorial District

After the Central senatorial district, the Rivers South/East senatorial district performed well. Out of 129 questionnaires, 121 were recovered, representing about 93.80% of the total in the Rivers South/East senatorial constituency. Oyigbo had the best response rate in the area, with all of the given questionnaires returned in full, while Khana local government area had the lowest participation percentage at 83.21%.

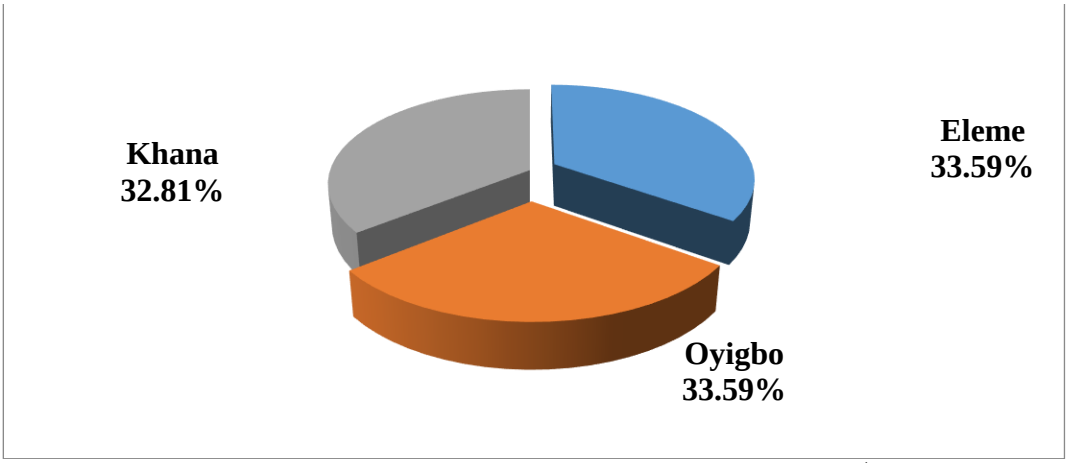

Figure 3. Percentage Distribution of Questionnaires in the LGAs in South/East Senatorial District

Obi/Akpor and Oyigbo were the only local governments to receive all of the surveys, according to the distribution summary, while Ahoada West had the lowest response percentage, at about 79.07%.

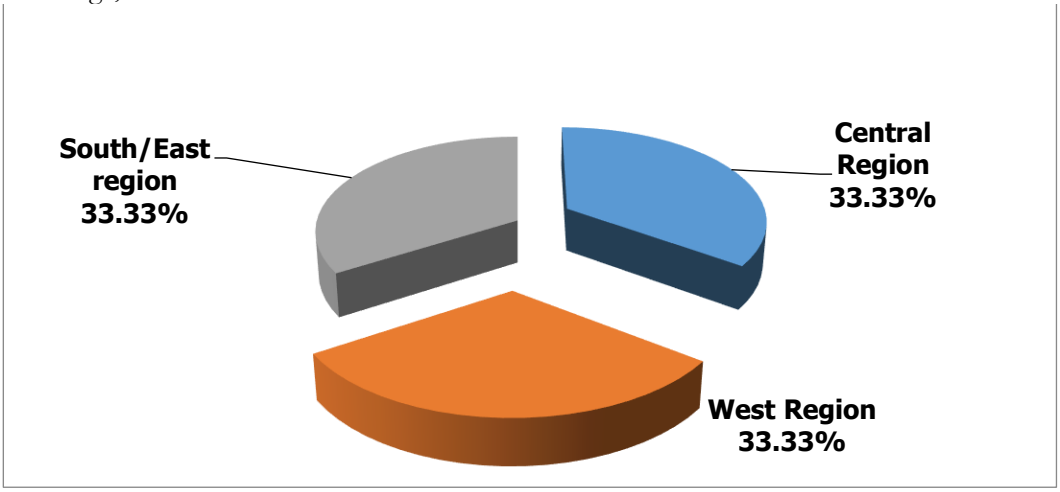

Figure 4. Percentage Distribution of Questionnaires in the LGAs in Three Senatorial Districts

Table 3. Demographic Characteristics

Details	Classifications	Frequency	Percent	Cumulative Percent
Gender	Males	238	66.85	66.85
	Females	118	33.15	100

Source: Authors Computation, 2023.

Table 3a. Demographic Characteristics

Details	Classifications	Frequency	Percent	Cumulative Percent
Age	20-29 yrs	51	14.33	14.33
	30-39 yrs	140	39.33	53.66
	40-49 yrs	165	46.34	100

Source: Authors Computation, 2023.

Table 3b. Demographic Characteristics

Details	Classifications	Frequency	Percent	Cumulative Percent
	Married	211	59.27	59.27

Marital Status	Single	145	40.73	100

Table 3c. Demographic Characteristics

Qualifications	B.SC/HND	169	47.47	47.47
	M.SC/Phd	43	12.08	59.55
	Other Degrees	144	40.45	100

Source: Authors Computation, 2023.

Table 3d. Demographic Characteristics

Details	**Classifications**	**Frequency**	**Percent**	**Cumulative Percent**
Length of Years in Business	1-5 yrs	56	15.73	15.73
	6-10 yrs	79	22.19	37.92
	11-15 yrs	87	24.43	62.35
	16-20 yrs	40	11.23	73.58
	Above 20 yrs	94	26.42	100

Source: Authors Computation, 2023.

Table 3 displays the responder demographics from each of the nine LGAs. There were 66.85 percent male responders and 33.15 percent female respondents. Only one-third of women in the Rivers States are business owners, according to the data, suggesting that men and women contribute equally to the growth of the economy there. A large portion of the participants were in the age group of 40 and above; specifically, 165 people (or 46.34 percent of the total) fell into this category, while 51 people (or 14.33 percent) were in the 20-to-29 age range. Overall, young people made just under half of the responses. This suggests that American young are not engaged in the pursuit of entrepreneurship but are instead looking for white-collar professions, or they are just sitting about and trying to find political role models. Among the respondents, 211 (or 59.27%) are married men and women from the same household, whereas 145 (or 40.73 percent) are unmarried women and men. Marriage is not considered a top priority for the majority of the state's inhabitants, according to the data. The majority of the single residents in the Rivers Senatorial district may be found in the Port Harcourt and Obio/Akpor Local Government Areas. With a bachelor's degree in law (LLB), a bachelor's degree in education (B.Ed., B., or Eng.), a higher national diploma (HND), or some combination of these, 169 people (or 47.47%) have completed their undergraduate studies. 12.08% of the participants have Master's degrees or Doctor of Philosophy degrees, which is higher than a Bachelor of Science, Bachelor of Education, Bachelor of Engineering, LLB, or Higher National Diploma. 144 people, or 40.45% of the total, hold degrees lower than a Bachelor of Science or Higher National Diploma. They have a variety of credentials, like SSCE, OND, Vocational Skills, or Known, but they also possess abilities for which certifications were not awarded. Among the businesses that were part of the study, 26.42% have been around for 20 years or more, 24.43% for 11–15 years, 22.19% for 6–10 years, 15.73% for 1–5 years, and 11.23 for 16–20 years. According to the data, 84.27 percent of the businesses that were looked at had been around for over five years.

Table 4. Respondents by Business Types

Types of Business	Frequency	Percentage
Boutiques	27	7.58
Recording Studios	5	1.40
Manufacturing firms	53	12.64
Cold Room	25	7.02
Restaurant	21	5.90
Night & Drinking Bars	30	8.43

Tailoring Shop	29	8.15
Timber	15	4.21
Hair Dressing	25	7.02
Phone Technicians	20	5.62
Furniture	19	5.34
Painting Firm	13	3.65
Poultry/Fish Farm	49	10.95
Pharmacy/Super Store	53	12.08
TOTAL	384	100.00

Source: Authors Computation, 2023.

Table 4 provides a concise overview of the types of enterprises that SMEs are involved in. The study found that the most common types of enterprises are poultry and fish farms, manufacturing organisations, and pharmacy and superstores, with respective shares of 10.95%, 12.64%, and 12.08%.

4.3 Data Analysis

Data from table 5-7 analyse the impact of power (electricity) supply on productivity, profitability, revenue/sales of SMEs in Rivers state. The data were analysed using 5likert scale with a mean criterion of 3.0 where SA – strongly agreed, A – Agreed, UD – Undecided, D – Disagree and SD – Strongly Disagreed. A mean criterion below 3.0 indicate that the respondents anonymously disagree in their collective response to the item in that particular question while a mean criterion of 3.0 and above indicate that the respondents agreed anonymously.

Table 5. Responses to the Questionnaires on the impact of power (electricity) supply on productivity of SMEs

ITEMS/SENATORIAL DISTRICT	SA	A	UD	D	SD	TOTAL	MEAN	DICISION
Central Senatorial district								
The erratic power supply has led to a decrease in our profit margin.	32	67	12	10	3	124	3.90	AGREED
We will produce/sell more goods and services if we had regular power supply	11	73	22	14	4	124	3.54	AGREED
Our business will make more profit if we had regular & reliable power supply.	30	71	14	6	3	124	3.93	AGREED
We would have made more profit if we had not been spending much on alternative power supply.	40	68	10	4	2	125	4.20	AGREED
West Senatorial district								
The erratic power supply has led to a decrease in our profit margin.	16	58	28	8	1	111	3.72	AGREED
We will produce/sell more goods and services if we had regular power supply	21	44	18	19	9	111	3.44	AGREED
Our business will make more profit if we had regular & reliable power supply.	24	63	10	8	6	111	3.82	AGREED
We would have made more profit if we had not been spending much on alternative power supply.	24	63	10	8	6	111	3.82	AGREED
South/East Senatorial district								

The erratic power supply has led to a decrease in our profit margin.	38	51	13	11	8	121	3.83	AGREED
We will produce/sell more goods and services if we had regular power supply	43	56	9	7	6	121	4.02	AGREED
Our business will make more profit if we had regular & reliable power supply.	18	41	39	12	11	121	3.36	AGREED
We would have made more profit if we had not been spending much on alternative power supply.	32	63	14	9	3	121	3.93	AGREED

Source: Authors Computation, 2023.

Table 6. Responses to the Questionnaires on the impact of power (electricity) supply on profitability of SMEs in Rivers State, Nigeria

ITEMS/SENATORIAL DISTRICT	SA	A	UD	D	SD	TOTAL	MEAN	DICISION
Central Senatorial district								
We would open more branches if we had reliable and regular power supply.	38	67	1	10	8	124	3.92	AGREED
We would expand our business to other parts of the country if we had regular power supply.	20	53	16	26	9	124	3.31	AGREED
We had closed down all/part of our branch operations due to the erratic power supply	0	26	18	60	20	124	2.39	AGREED
The duration of power supply influences the productivity of our business	57	60	0	7	0	124	4.30	AGREED
West Senatorial district								
We would open more branches if we had reliable and regular power supply.	78	32		1	0	111	4.68	AGREED
We would expand our business to other parts of the country if we had regular power supply.	34	69	3	5	0	111	4.19	AGREED
We had closed down all/part of our branch operations due to the erratic power supply	10	31	22	44	4	111	2.99	AGREED
The duration of power supply influences the productivity of our business	44	51	7	9	0	111	4.17	AGREED
South/East Senatorial district								
We would open more branches if we had reliable and regular power supply.	47	71	0	3	0	121	4.34	AGREED
We would expand our business to other parts of the country if we had regular power supply.	11	61	33	16	0	121	3.55	AGREED
We had closed down all/part of our	13	28	26	54	0	121	3.00	AGREED

branch operations due to the erratic power supply								
The duration of power supply influences the productivity of our business	34	69	15	3	0	121	4.11	AGREED

Source: Authors Computation, 2023.

Table 7. Responses to the Questionnaires on the impact of power (electricity) supply on revenue/sales of SMEs in Rivers State, Nigeria

ITEMS/CENTRAL SENATORIAL DISTRICT	**SA**	**A**	**UD**	**D**	**SD**	**Total**	**Mean**	**DECISION**
Central Senatorial district								
We will employ more workers if we had regular & reliable power supply	39	67	1	10	7	124	3.91	
We had to lay-off some of our workers because of the energy crisis	21	53	16	25	9	124	3.39	
The duration of power supply affect the revenue/sales of our business	0	26	19	59	20	124	2.37	
The erratic power supply causes a reduction in our revenue generation due to the usage of other sources of electricity.	57	60	0	7	0	124	4.30	
West Senatorial district								
We will employ more workers if we had regular & reliable power supply	78	32		1	0	111	4.68	
We had to lay-off some of our workers because of the energy crisis	34	69	3	5	0	111	4.19	
The duration of power supply affect the revenue/sales of our business	10	31	22	44	4	111	2.99	
The erratic power supply causes a reduction in our revenue generation due to the usage of other sources of electricity.	44	51	7	9	0	111	4.17	
South/East Senatorial district								
We will employ more workers if we had regular & reliable power supply	47	71	0	3	0	121	4.34	
We had to lay-off some of our workers because of the energy crisis	11	61	33	16	0	121	3.55	
The duration of power supply affect the revenue/sales of our business	13	28	26	54	0	121	3.00	
The erratic power supply causes a reduction in our revenue generation due to the usage of other sources of electricity.	34	69	15	3	0	121	4.11	

Source: Authors Computation, 2023.

5. Hypotheses Testing and Discussions of Findings

Table 8. Summary of Diagnostic Test

Hypothesis Test (the hypothesis tested are in null form)	Test Statistics	Productivity Model_1	Profitability Model_2	Revenue Model_3	Remark
The models are correctly Specified	Hat	1.0587***	0.9830***	1.5164***	Accept
	Hat_{sq}	-0.0716	0.0005	0.0117	
the overall models are statistically	LR	74.09***	45.00***	1145.13***	Accept
significant or have Goodness-of-	HL	5.0838	9.7190	11.8656	
fit test		[0.7486]	[0.2853]	[0.1265]	
	Pseudo R^2	0.1331	0.2043	0.1954	

Source: Authors Computation, 2023.

*Note that the probability of HL is in square bracket and *** indicates significance at 1%*

The validity of our study depends on whether or not our models meet the requirements of the QRM. Biassed coefficient estimations or excessively high standard errors for regression coefficients are examples of issues that could arise if QRM's assumptions aren't satisfied, rendering statistical conclusions useless. So, it's important to make sure our models fit well. The analysis is considered legitimate if the Hat-statistic and Hat-square-statistic are significant or insignificant, respectively, and if the Likelihood Ratio (LR) test statistics are significant but the HL test statistics are not. According to Table 8, 'hat' has a substantial statistical value but 'hat-square' does not. The accurate specification of the models being the null hypothesis, we so accept it. Our models have goodness-of-fit, and the analysis is legitimate, as the LR statistic is significant and the HL chi-statistic is negligible. Hence, we accept the null hypothesis. Assuming that a high pseudo R-squared may reflect the goodness-of-fit of the model, the nature of the models' pseudo R-squared presents a significant challenge to this study. With R-squared values below the average of 50% (13.31% for model_1, 20.45% for model_2, and 19.54% for model_3), our model's pseudo R-squares are very low. But according to Frost (2017), R-squared values below 50% are common in fields that try to forecast human conduct. This is because, unlike physical processes, human behaviour is notoriously difficult to predict.

Table 9. The effects of Power Supply on the Performance SMEs

	Panel I: Model One		Panel II: Model Two		Panel III: Model Three	
Variable	**Coefficients**	**OR**	**Coefficients**	**OR**	**Coefficients**	**OR**
C	-4.4683***	0.0113	3.4199***	30.5947	-4.1991***	0.1479
HR	0.1603***	1.1744	0.6114***	1.8437	0.2946***	1.3434
Pcost	-0.0447*	1.0478	-0.0916*	1.0951	-0.0104*	1.0042
CostP	-0.1264**	0.8764	-0.2157***	0.8052	-0.0878**	0.9089
	1.4404		1.7026		1.3047	

Source: Authors Computation 2023.

*Note that OR=the coefficients of the Odd Ratio whereas ** and *** denotes the significance of the coefficients at the 5% and 1% respectively.*

Table 10. Mean Values of the Index of Power Supply

HOUR	COSTE	COSTA
8.3664	6123.09	9369.98

Source: Authors Computation, 2023.

The findings are laid up in tabular form. The summary of the respondent's average replies using the five-point Likert scale is shown in Table 4. According to the technique's creator, respondents are in support of the questions posed if the computed average has a

criterion mean of 3.0 or above. The resultant means, as shown in tables 5–7, are 4.00, 4.11, 4.06, and 4.25, respectively. This indicates that the respondents were in agreement that the length of time power is available has a significant impact on company productivity, revenue, and profitability. Additionally, they were in agreement that power from sources other than public utilities also had an impact. The rates of change in the performance of SMEs and electricity supply in Port Harcourt are explained using the odd ratios. Using equation 5, we can get the odds ratio for the individual rates of change in the performance indices and power supply indexes. Equation 6 is used to determine the odd ratios of the models' cumulative effects. In order to examine the effect of electricity supply on the performance of SMEs in Rivers state, we constructed three quantitative response models and used odds ratio analysis to interpret our findings.

5. Discussions

Model One: Productivity of SMSEs and the Indexes of Power Supply

Panel from Table 9 Increasing the number of hours that the public power supply is on by one will have a positive effect on the productivity of SMEs in Port Harcourt. The odds ratio favouring SMEs' productivity increases by 1.1744, or 17.44%. This means that there is a 17.14% higher chance that SMEs will be productive for every hour that the public power supply is increased by one. Increasing the durations of public electricity supply improves the productivity of SMEs in Rivers state, according to the research, as the coefficient is statistically significant at the 5% level, rejecting the null hypothesis. The odds ratio favouring SMEs' productivity drops by 1.0478, or 4.78%; put another way, for every unit rise in the cost of public power supply bills, the likelihood that SMEs' productivity will fall, or at least be lower, by 4.78%. The analysis fails to reject the null hypothesis and concludes that SMEs in Rivers state would see a major loss in productivity due to an increase in the bills of public electricity supply. This conclusion is based on the fact that the coefficient is statistically insignificant at the 5% level. The odds ratio favouring SMEs' productivity drops by 0.8764, or 12.36%; this means that for every unit rise in the cost of private power supply bills, the likelihood that SMEs' productivity will fall or might fall by 12.36%. The research concludes that a rise in the bills of private power supply would substantially reduce the productivity of SMEs in Port Harcourt as the coefficient is statistically significant at the 5% level, rejecting the null hypothesis. Based on the averages, we find that the power supply has a 1.4404, or 44.03%, positive effect on the performance of SMEs in the state of Rivers.

Model Two: Profitability of SMSEs and the Indexes of Power Supply

As shown in Table 9, panel II, there is a positive correlation between the number of hours of public power supply and the profitability of SMEs in Port Harcourt. Specifically, for every one-hour increase in the number of hours of public power supply, the odds ratio favouring SME profitability increases by 1.8437, or 84.37%. Put another way, SME profitability is more likely to occur with a unit increase in public power supply. The research concludes that increasing the durations of public electricity supply would greatly boost the profitability of SMEs in Rivers state as the coefficient is statistically significant at the 5% level. It rejects the null hypothesis. A rise of one unit in the cost of public power supply bills reduces the chances of profitability of SMEs by 9.51%. This means that for every unit increase in the cost of these bills, the probabilities of profitability of SMEs fall by 1.0951. Researchers in Rivers state were unable to reject the null hypothesis—that is, that SMSE revenues would fall sharply as a result of higher public electricity bills—because the coefficient is not statistically significant at the 5% level. For every one unit rise in the cost of private power supply bills, the odds ratio in favour of SMEs' profitability decreases by 0.8052, or 19.48%. This means that the likelihood of SMEs' profitability will reduce, or might decrease, by 19.48%. The analysis rejects the null hypothesis and concludes that SMEs in Rivers state would have a considerable loss in profitability due to a rise in the bills of private power supply. This conclusion is based on the coefficient, which is statistically significant at the 5% level. Using the averages, we find that the power supply has a positive effect on the performance of SMEs in Rivers state, with a logarithmic value of 1.7026, or 70.26 percent.

Model Three: Revenue /Sales of SMEs and the Indexes of Power Supply

In panel III of Table 9, it is shown that for every one-hour increase in public power supply, the outcome of revenue/sales for SMEs in Rivers state will be higher. The odds ratio for this outcome is 1.3434, or 34.34%, meaning that there is a 34.34% higher probability of revenue/sales for SMEs for every one-hour increase in public power supply. The analysis concludes that extending the duration of public electricity supply would considerably boost

the revenue/sales of SMEs in Rivers state as the coefficient is statistically significant at the 5% level. Hence, the null hypothesis is rejected. A rise of one unit in the cost of public power supply bills reduces the chances of revenue/sales of SMEs by 0.42%, as the odds ratio favouring profitability of SMEs decreases by 1.0042, or 0.42%. The analysis was unable to reject the null hypothesis and indicate that a substantial loss in revenue/sales of SMEs in Rivers state would occur due to a rise in the bills of public electricity supply, since the coefficient is statistically insignificant at the 5% level. The odds ratio favouring SMEs' revenue/sales drops by 0.9089, or 9.11%; this means that for every unit rise in the cost of private power supply bills, the likelihood of SMEs' revenue/sales falling or possibly falling by 9.11%. This analysis rejects the null hypothesis and concludes that SMEs in Rivers state would have a substantial drop in revenue/sales due to an increase in the bills of private power supply. The coefficient is statistically significant at the 5% level. The findings demonstrate that the power supply influences the performance of SMEs in Rivers state by a logarithmic amount of 1.3047, or 30.47%, based on the mean values.

6. Conclusions

This study examines the impact of power (electricity) supply on SMEs in Rivers state. From the findings of the study, it could be seen that the performance of SMEs in Rivers state is dependent on the level of electricity. Improving the power supply may boost productivity and profitability at small and medium-sized businesses, which in turn can increase job opportunities and the economy's overall development in Nigeria. This is why studying the impact of power supply on SME performance is so important. In light of the above, the study's authors draw the conclusion that SMEs in Rivers state would benefit from an increase in enterprise power supply, which would decrease their reliance on private power sources while simultaneously increasing their productivity and profitability. Additionally, companies are less negatively impacted by increases to public power rates compared to increases to private power prices.

6.1 Recommendations

The research concludes that the following actions should be taken by the government of Rivers state to enhance the health of SMEs, generate revenue and employment:

i) improve the length of electricity provided to the business environment with a minor increase in bills.

ii) The government should provide a reliable supply of energy, or power, since it is essential to the existence of many people and the backbone of many companies, particularly micro, small, and medium-sized ones in Nigeria.

iii) Taxes paid are a key indicator of how well SMEs in Nigeria are doing; hence, it is important that the money collected from these businesses be wisely put to use for the benefit of the general public. This will encourage tax payers to uphold their civic duty.

iv) To alleviate young unemployment and give more tax money for development initiatives, the government could provide SME loans to them with lenient terms.

v) To address the gender gap in company ownership in the state, the government should provide financial incentives to women so that they may start their own firms.

vi) In order to boost production, profitability, and job creation in Rivers state, more electricity should be dedicated to the industrial region throughout the day.

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Research Article

Analysis of Economic Development on West Coast Regency, Indonesia, based on Location Quotient (LQ) and Shift Share (SS)

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Abstract: The research conducted in the West Coastal Regency, Lampung province, Indonesia, aimed to determine the base sector and analyze the district's economic performance for strategic development. The study used Location Quotient (LQ) and Shift Share (SS) analysis tools and identified agriculture, forestry, and fisheries as sectors with high LQ scores. The Shift Share (SS) analysis revealed positive performance in five industries, with education, health, and social activities being the basis for development. The development planning in the West Coastal Regency in Lampung province can focus on the Development of Maritime Agroecotourism considering the potential of existing natural resources. The results of the location quotient (LQ) and shift share (SS) analysis can guide regional development planning and improve people's living standards through community participation and government and private sector support.

Keywords: *Base Sector, Economic Sector, Strategic Development, Shift Share Analysis, and Location Quotient Analysis*

1. Introduction

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According to Müller & Graves (2017), the concept of 'development' is subject to theoretical and political debates and is inherently intricate and ambiguous. Development is crucial for the prosperity and sustainability of any nation. Development and growth are interconnected for a nation. Development can lead to growth, and growth can result from it, encompassing community activities, expansion, or improvement. Development itself refers to continuous growth, progress, and improvement within a physical environment (Adagbabiri & Okolie, 2019). The nature of development in a national context touches on all aspects, from political to economic and social aspects. In this article, we will discuss development in an economic context.

In general, the main goal of economic development is alleviating poverty in developing economies, particularly in low-income countries where poverty is most severe (Hayami & Godo, 2005). But in Indonesia's economic development aims to achieve national goals of advancement, independence, prosperity, justice, and faith, as per the 1945 Constitution, focusing on intelligence improvement, wealth, and global peace (Artisa, 2017; Hakim, 2018; Hastangka & Budiman, 2020; Mahadiansar et al., 2020) based on Pancasila (National Ideology) and UUD 1945 (Constitution) as nation development paradigm that aims to provide ethical principles for economic development, education, and science and technology (Agus, 2022; Fajri et al., 2022).

However, the territory of Indonesia, which is a vast archipelagic country, certainly requires equitable development. The implementation of economic development at the regional level, popularly called decentralization of development, which is supported by the implementation of regional autonomy, has been implemented since the reform era to overcome inequality (Hisyam, 2015; Santi & Iskandar, 2021). Implementing decentralization and regional autonomy is the key to successful national development, encouraging progress, and strengthening national unity and resilience (Farid, 2019) because, according to Fauzi (2019), the goal of giving regions more authority in local government is to speed up the achievement of community welfare by improving services, empowering individuals, and promoting community participation.

Meanwhile, Policy planning and development in regions often face issues when regulations and policies are not based on local potential and natural resources. These disparities can lead to uneven development, hampering growth and community welfare. According to Ayu Monica et al. (2019), Regional development priorities need to be aligned with the potential of each region to ensure the utilization of resources is optimal, leading to slow economic growth in that region. Less developed regions often have vulnerabilities due to low information on adaptive regional planning, highlighting the need for more comprehensive and adaptive strategies (Rochester et al., 2016). So, regional development and economic activities must be in accordance with the potential and characteristics of local resources in each region, which are different in each region.

Beyond political will, conducting qualitative or quantitative analysis efforts to assess regional potential is crucial. For example, location quotient (LQ) analysis determines leading and non-leading sectors, and shift-share (SS) analysis determines changes and shifts in economic sectors in a region (Suryani, 2019). These two methods are classified as quantitative, which we use in this research, and are part of economic base analysis, which is crucial for understanding local economies and providing comparative information on employment conditions and trends. This analysis divides the local economy into basic and non-basic sectors, with basic businesses primarily selling goods and services to consumers outside the community and non-basic businesses relying heavily on export markets (Davis, 2023; Suning et al., 2022; Tanggu Redu et al., 2023).

Economic analysis techniques such as location quotient (LQ) and shift-share (SS) analysis are common in assessing regional potential in Indonesia. According to Niyimbanira (2018), The praxis of this analysis will determine three things: (1). Competitive advantage (which allows a province to outperform others), (2). Comparative advantage (the ability to produce goods/services at a lower opportunity cost than competitors), (3). and Areas of regional specialization (strengths about the national norms). Based on our literature review, several previous research findings used location quotient (LQ) and shift-share (SS) analysis to determine the three things we mentioned and encourage government intervention toward the potential economy, such as research from (1). Tanggu Redu et al. (2023) in Jayawijaya Regency, Papua, concluded that the economic sector is experiencing a shift towards clean water supply, wastewater drainage, waste management, and remediation activities, while the mining and quarrying sector remains low competitive (2). Hidayat & Darwin (2017) in Meranti Island that concluded the 6 potential sectors include transportation, warehousing, agriculture, forestry, fisheries; and processing industry (3). Ayu Monica et al. (2019) in southern Sumatra, including the agricultural sector was the primary sector in southern Sumatra, with other sectors varying by province, except for company services and education in Bengkulu (4). Suning et al. (2022), in coastal areas, were concerned with implementing economic base analysis for the Smart Economy Policy Strategy and so on, which we cannot mention.

All research findings that we mentioned in the previous paragraph are basically useful for determining the influence of leading sectors on the regional economy and its impact on the national economy (Wakris et al., 2023), implementing poverty alleviation programs such as research from Rahmawati et al., (2019) in Gorontalo based on agropolitan system; and to determine the potential for economic growth in the parent region and expansion regions after the implementation of Territorial Splits (*Pemekaran Daerah*) policy (Iskandar & Nurrahmi, 2018) that involves determining potential areas, developing regional potential, and determining definitive areas within a maximum timeframe of five years (Firman, 2013).

The west coast district of Lampung province, Indonesia, is the geographical region that is the central focus of this research. The area faces the Indian Ocean in the east, in the north with Bengkulu Province and South Sumatra Province, in the west with Tanggamus and West Lampung districts, and in the South with South Lampung Regency and the Sunda Strait is famous as an international surfing destination because its waves are enormous (Auny et al., 2022; Aziz et al., 2012). So, it is suitable for surfing destinations, even though this area has hosted international surfing events such as the Krui Pro International Surf League (WSL) Championship, which has been included in the official World Surf League (WSL) Qualifying Series event. According to the Regent of West Coast Regency, at 15 meters above sea level, it is divided into 25% wavy plains, 10% wavy to 10% hills, and 65% hilly to 65% mountains. Most of the land is used for plantations and agriculture, with lowland areas for agriculture and highland areas for resin tree plantations.

Figure 1. Thematic maps West Coast Regency from Local Government

This region is part of the newly established autonomous region, formally established on November 16, 2012, under Law No. 22 of 2012. Regarding government hierarchy, this new region is at level two, called a *Kabupaten* or Regency, with a regent as leader, equivalent to a city. The newly created autonomous region is a division of the West Lampung Regency, consisting of 11 (eleven) sub-districts: Pesisir Tengah District, Pesisir Selatan District, Lemong District, Pesisir Utara District, Karya Penggawa District, Pulau Pisang District, Way Krui District, South Krui District, Ngambur District, Bengkunat District, and Bengkunat Belimbing District. All of which are directly adjacent to the Indian Ocean. The total area of Pesisir Barat Regency is ±2,907.23 km2 (Dauri et al., 2020; Diatin et al., 2022; Istiawati et al., 2020; Kartika et al., 2019; Siregar et al., 2022; Utami, 2020; Yetri et al., 2019).

This Regency has a variety of potentials and natural, social, and cultural resources. The coastline of Pesisir Barat stretches for 210 Km; hence, this area has a variety of beautiful waves so that it often becomes a tourist destination for both local and international tourists with various rides such as surfing, marine tourism, as well as other destinations such as social and cultural tourism, ecotourism and various events (Rosmayati & Maulana, 2021). Pesisir Barat, with an area of 2,889.88 km^2, is divided into 11 sub-districts with details of 116 Villages

and 2 Sub-districts whose capital is Krui District (BPS Pesisir Barat, 2018). Because Pesisir Barat Regency is a relatively new district, good development planning, and policies are needed in accordance with the potential and existing natural resources. According to the GRDP data of Pesisir Barat Regency, the main income sectors for this district are agriculture, forestry, and fisheries, which contribute 48.86% of the total income (BPS Pesisir Barat, 2022).

This allows a new regional development model based on the potential of natural resources and basic sector activities in the Pesisir Barat Regency. Therefore, it is necessary to analyze the determination and strategy for the development of the Pesisir Barat Regency Base Sector to find out the potential sectors and the performance of each sector so that the best model for regional development is obtained. As mentioned before, The analytical method in this study uses Location Quotient (LQ) and Shift Share (SS) analysis to obtain the base sector and the performance of each sector. The formulation of the problem in the research are (1) How are the sectors classified as the base sector in Pesisir Barat Regency, (2) How is the performance of the economic sectors in Pesisir Barat Regency, and (3) How is the Development Planning Model based on local potential applicable for the Pesisir Barat Regency.

Several studies have been carried out on the topic of the same field, as research by Yuuhaa & Cahyono (2013) titled Analysis of Determination of Base Sector and Potential Sector in Lamongan Regency. The study aims to determine the base sector and its performance and which sectors can be developed in Lamongan Regency. Another research conducted by Hikmahwidi (2018) with the title Determination of Leading Commodities of Food Crops and Ruminant Livestock in Tasikmalaya Regency which analyzes leading commodities in food crops and livestock commodities in Tasikmalaya Regency. Then, for research in the development of ecotourism modes in Pesisir Barat Regency, Riyani & Tamjuddin (2017) wrote a journal entitled *Challenges of Marine Ecotourism Development on Banana Island, Pesisir Barat*, which discussed the plans and constraints for developing ecotourism on Banana Island. This study has the objectives to determine (1) the sectors that are considered as the base sector in the Pesisir Barat Regency, (2) the performance of the economic sectors in the Pesisir Barat Regency, and (3) the Development Planning Model that can be applied based on local potential in the Pesisir Barat Regency.

2. Materials and Methods

This study uses LQ and SS analysis as calculation tools to get the base sector in an area. The data needed is the 2017-2021 GRDP data for Pesisir Barat Regency, which was obtained from the BPS for Pesisir Barat Regency. The formula used in the LQ method is as follows:

LQ = (Vi/VT) : (YI/YT)

Where:
Vi = Value in sector I in the area of observation
Vt = Total value in the area of observation
Yi = Value in sector I in the reference area
Yt = Total value in the reference area

With the explanation that the LQ is more than one, it can be said that the basic sector can meet the needs of its own and other regions. The LQ is equal to one, and this sector is only able to meet the needs of its own region. LQ that is less than one is called non-base; the area cannot meet the needs of the sector for itself (Puspitaningrum et al., 2021).

Meanwhile, Shift Share (SS) analysis is used to ascertain the performance of each sector in a region by comparing the GRDP value of a particular year with the reference years (in this case, 2021 and 2020 as a comparison). The approach used in this calculation is to assume that changes in income, production, or human resources of a region are divided into 3 aspects such as proportional growth aspects, regional growth aspects, and local share growth components (Yuuhaa & Cahyono, 2013). The SS method is calculated by entering the growth rate of one area represented by the symbol *Dij*. Then compared to the area above (Kasikoen, 2018). The formula used in the SS method is as follows:

DIJ = NIJ + MIJ + CIJ

Where:
Dij = Change in value of sector/subsector i of the observation target
Nij = Changes in the value of sector/subsector i in the target region due to the impact of economic growth in the reference region
Mij = Change in the value of sector/subsector i in the target region. It is affected by the growth of sector i in the reference area.
Cij = Change in the value of sector/subsector i within the observation region caused by the competitive advantage of sector i within the observation region

3. Results

3.1. Literature review

Basic economic theory is based on the view that economic growth is determined by export activity from its region. Economic activities are divided into basic and non-basic sectors. The basic sector is an activity that is usually exogenous. *I*n other words, it is not related to internal economic activities and has a function to encourage other activities. Then, the non-base sector is an endogenous activity or activity that only meets the needs of the region, and its activities depend on the general condition of the regional economy (Yuuhaa & Cahyono, 2013). The leading base sector generates added value and makes economic activities more productive. *It* has a multiplier effect that can boost the economy in other sectors and is expected to have high activity in local and international markets (Anggarawati et al., 2022). By acquiring the base sectors of the region, it is hoped that regional planning and development will consider the potential sector and keep it free from ineffective regulations and policies.

To encourage national economic growth, it is necessary to be supported by the elements owned by making a strategy that takes into account economic, political, and security factors, each of which contributes *to* determining strategies to achieve the interests of national economic progress (Juanita & Setiani, 2022). Strategic development in each region can be accomplished in tandem with the advancement of the national economy. This can be achieved by taking into account the currently available potential, such as the potential of people, natural resources, capital from investors, infrastructure development, communication, facilities and infrastructure, industrial instruments, science and technology, the level of economic activity, interregional transactions, regional development capabilities, business, environment, and regional institutions. Richardson's hypothesis is one of the theories of regional development that is impacted by this. The theory suggests that non-base activities are those that producers engage in with activities performed in a specific area on a service basis to reduce misperception. Base activities encourage other kinds of employment and are unrelated to the economic status of a given area (Ahdan et al., 2015).

To advance the regional economy and to raise the economic level of the community, good regional development planning needs to be carried out. Regional Development Planning must be based on the potential and resources of the area so that planning can be right on target. On *the* other side, Indonesia's government has published a roadmap for its regional economy, focusing on sustainable development goals (SDGs) towards 2030. The roadmap addresses critical issues like health, education, social protection, food security, infrastructure, ecosystem services, and government administration financing. Indonesia's potential young generations can promote SDGs, suppress inequality, and dominate the global labor market (Permatasari et al., 2021; Sasmito et al., 2023; Wahyuni et al., 2022; Wibisono et al., 2023). In addition, community participation and partnerships with related institutions are needed to create a multiplier effect on economic activity in the region. With development planning carried out for the regional economy, economic activity can be thoroughly studied, with its components having various interrelated instruments. Targeted development planning must explain what should be planned and what will be done for the development of the area by utilizing resources for development so that the target can be fully achieved (Yuuhaa & Cahyono, 2013).

3.2. Determination of the Base Sector using the LQ Method

Based on LQ analysis, If the LQ value is more than one, the sector can be categorized as a basic sector or a sector that plays an important role in economic activities in Pesisir Barat

Regency. The LQ calculation is calculated using GRDP data for Pesisir Barat Regency from 2019 to 2023. The data is obtained from BPS Pesisir Barat. The results of the 2019 to 2023 LQ analysis for the Pesisir Barat Regency Base Sector are described in *T*able 1 below.

Table 1. LQ Calculation Results for the Pesisir Barat Regency Sector in 2019-2023

No	Economic Sector	2019	2020	2021	2022	2023
1	Agriculture, Forestry & Fishing	1.72	1.75	1.75	1.73	1.72
2	Mining & Quarrying	0.88	0.93	0.96	0.96	0.99
3	Manufacturing	0.29	0.27	0.24	0.22	0.22
4	Electricity & Gas	0.08	0.09	0.10	0.11	0.12
5	Water supply, Sewerage, Waste Management & Remediation Activities	0.47	0.48	0.47	0.46	0.46
6	Construction	0.58	0.61	0.74	0.74	0.76
7	Wholesale & Retail Trade; Repair of Motor Vehicles & Motorcycles	1.00	1.01	1.03	1.05	1.04
8	Transportation & Storage	0.20	0.20	0.20	0.20	0.20
9	Accomodation & food Service Activities	1.10	1.09	1.10	1.10	0.01
10	Information & Communication	0.49	0.49	0.48	0.48	0.49
11	Financial & Insurance Activities	0.69	0.69	0.69	0.66	0.68
12	Real Estate Activities	1.26	1.22	1.29	1.26	1.29
13	Bussiness Activities	0.95	0.97	1.01	1.00	1.01
14	Public Administration & Defence; Compulsory Social Security	1.47	1.51	1.57	1.51	1.51
15	Education	1.24	1.23	1.23	1.23	1.27
16	Human Health and Social Work Activities	1.11	1.13	1.15	1.13	1.14
17	Other Service Activities	1.15	1.15	1.15	1.15	1.17

From the table above, it can be seen that the base sector of West Coast Regency *is obtained from the calculation results, and eight sectors have* become the base sector. From the eight sectors, the results of the analysis with LQ values are the top three in a row, namely the Agriculture, Forestry & Fishing Sector; Public Administration & Defense Sector, Compulsory Social Security, and Real Estate Sector. According to data obtained by the BPS for West Coast Regency 2021, the Agriculture, Forestry & Fishing category contributes to GRDP based on current prices of 48.86%. This means that almost half of the West Coast GRDP income comes from this sector. Therefore, because the first is the highest sector, policy directions and development planning can be considered to pay attention to the sector. Of course, apart from the first sector, other potentials, such as natural resources, also need to be considered.

The Agriculture, Forestry, and Fisheries sector in West Coast Regency is reliable due to its abundant natural resources. Fishing activities are well-developed in the district due to its long beach. Regarding agriculture, rice, and clove plants are the primary commodities, with economic activities extending beyond the district. The Regency also has a large forest area, including a conservation area, further enhancing its potential in the forestry sub-sector. To capitalize on these resources, strategic planning can focus on developing the district's marine agro-ecotourism or megapolitan regions.

3.3. Sector Performance Determination of the Economy Using SS Method

The study illustrates the performance of each sector within the region by using shift-share analysis to calculate economic growth using yearly data comparisons for 2021 as the targets and 2020 *as* the comparisons. The calculation uses sector performance data for Pesisir Barat Regency in 2020 and 2021. The results of this calculation will later s*how* whether the growth in each sector has a positive or negative value so that it can be considered for development plans and regional policies. The results of the SS calculations are described in *T*able 2 below.

Table 2. Results of Shift Share Analysis in Pesisir Barat Regency

No	Economic Sector	%PB
1	Agriculture, Forestry & Fishing	-0.32
2	Mining & Quarrying	3.00
3	Manufacturing	-17.10
4	Electricity & Gas	11.88
5	Water supply, Sewerage, Waste Management & Remediation Activities	-1.92
6	Construction	-8.98
7	Wholesale & Retail Trade; Repair of Motor Vehicles & Motorcycles	-12.22
8	Transportation & Storage	-7.01
9	Accomodation & food Service Activities	-3.05
10	Information & Communication	2.51
11	Financial & Insurance Activities	-1.71
12	Real Estate Activities	-5.11
13	Bussiness Activities	-2.87
14	Public Administration & Defence; Compulsory Social Security	-2.87
15	Education	2.87
16	Human Health and Social Work Activities	5.65
17	Other Service Activities	-2.34

The results of the SS analysis found that there were five sectors that showed positive performance from 2020 to 2021. The sectors that experienced the best growth were Health Services and Social Activities; and the Electricity and Gas Procurement Sector. However, the sectors that are the basis sectors in the LQ analysis g*o*t negative results*;* only the education sector and the health and social sector achieved positive results. Conditions like this, where many basic sectors have experienced a decline, may occur due to the *COVID-19 p*andemic, which has a very severe impact on the global economy. The same thing happened in other areas, including the Gross regional domestic product of Lampung Province itself. The Agriculture, Forestry and Fisheries sector, which became the main base sector with the largest value, decreased from 2020 to 2021 by -0.32. Although the decline in this sector is not large, a strategy is still needed to increase economic activity in this sector. Therefore, it is necessary to make a development direction plan for the potential economic sector in the Pesisir Barat Regency by considering other potentials, such as Educational Services, Health, and Social Activities, which are experiencing positive growth in the Pesisir Barat Regency.

4. Discussion

In this case, the strategy for developing the most potential base sector is the agriculture, forestry, and fishery sector*s* in Pesisir Barat Regency, which is needed to increase targeted economic activities in Pesisir Barat Regency. Table 3 is a collection of basic sectors from the results of

the LQ analysis compared to the results of the SS analysis to see *the situation and potential for development in this area.*

Table 3. Comparison of LQ and SS Analysis Results

NO	ECONOMIC SECTOR	LQ					SS
		2019	2020	2021	2022	2023	
1	Agriculture, Forestry & Fishing	1.72	1.75	1.75	1.73	1.72	-0.32
2	Wholesale & Retail Trade; Repair of Motor Vehicles & Motorcycles	1.00	1.01	1.03	1.05	1.04	-12.22
3	Real Estate Activities	1.26	1.22	1.29	1.26	1.29	-5.11
4	Bussiness Activities	0.95	0.97	1.01	1.00	1.01	
5	Public Administration & Defence; Compulsory Social Security	1.47	1.51	1.57	1.51	1.51	-2.87
6	Education	1.24	1.23	1.23	1.23	1.27	2.87
7	Human Health and Social Work Activities	1.11	1.13	1.15	1.13	1.14	5.65
8	Other Service Activities	1.15	1.15	1.15	1.15	1.17	-2.34

The study suggests that development plans for *the* Agriculture, Forestry, and Fisheries sectors can be tailored to natural resources and positive performance sectors like Health Services, Social Activities, and Education Services. The Marine Agro-Ecotourism Area model, which combines these sectors with educational and socially-oriented activities, can be implemented in this area. The concept of Marine Agro Ecotourism is the development of the concept of agro-tourism. Palit (in Pambudi et al., 2018) explained that the concept of Agrotourism is a series of tourism activities that utilize the potential of agriculture as a tourist attraction, for example, agricultural land with natural panoramas, agricultural activities, and cultural farmers. The purpose of agro-tourism is to improve living standards, create jobs, and promote rural development (Ifandi & Rahma, 2020).

In this case, agro-tourism, which is already a potential sector in this area, is developed by combining the potential and other base sectors, namely the ecological aspect obtained from the development of the social activity sector and the huge maritime potential of Pesisir Barat Regency. This is because tourist attractions not only help the environment *but* also help provide education (Indrawati, 2020). *T*he development of rural agro-tourism based on local communities is expected to produce many benefits, not only for rural communities but also for the wider community to be truly understood, given appreciation for agrarian potential, and become a medium of education. It's crucial for the community to be a part of tourism development whilst simultaneously protecting the coastal ecosystem. *The local government can execute related programs that benefit the community by involving the community in marine tourism.* This involvement can *positively impact* the community by providing additional income to meet their needs. This is especially important since the people of Tanjung Setia are primarily farmers, fishermen, and gardeners. In line with Act No. 10 of 2009, this approach aligns with the concept of national tourism development to boost national income, promote people's welfare, and enhance prosperity. It is evident that community involvement in marine tourism development is essential for the well-being of Tanjung Setia's inhabitants and the ecosystem.

In addition, according to (Pangestuti et al., 2018), Ecotourism development is carried out as an ideal tourism activity to promote environmental conservation, local economic development, and promotion of local culture. The tourism model is also felt to develop the local economy to a more advanced level. In Indonesia, the tourism sector is one of the main drivers of national economic development as well as an economic opportunity for local communities to improve their quality of life (Indrawati, 2020). In the planning of Marine Agro

Ecotourism, it must be planned properly so that its implementation can be right on target. The development of marine areas must be linked to basic interests, namely the empowerment of coastal communities supported by all institutions, including the government and the private sector. (Riyani, 2016). The development plan for a participatory tourism area in Pesisir Barat Regency should involve all parties, including the community. This approach will increase economic activity and improve the standard of living. Marine agro-ecotourism can manage potentials like marine beauty, clove and agricultural agro-tourism, marine fish fishing, forest and coastal conservation ecotourism, and community cultural and customary tourism. Key considerations include supporting factors, genuine community involvement, and infrastructure (Muhammad & Darmawan, 2019). Planning this Marine Agro Ecotourism model can be done with further studies and research. In essence, with the development of marine agro-ecotourism areas in Pesisir Barat Regency, it is possible to realize regional development and development planning that is right on target because it is in accordance with regional potential sectors.

5. Conclusions

A study was conducted on the prospective industries and development plans in the West Pesisir Regency. The study identifies eight sectors as the base sectors for the West Coast Regency. These include government administration, housing and settlement, defense and mandatory social security, forestry and fisheries, and agriculture, which had the highest LQ values. The study also highlights the performance of five economic sectors in 2020 and 2021, including gas and electricity procurement, social services and healthcare, and education. Development planning in the West Coast Regency could involve creating a Marine Agro Ecotourism Area and establishing sub-sectors within sectors based on natural resources and booming sectors. It emphasizes the importance of considering the potential of natural resources and the findings of the LQ and Shift Share analyses in regional development planning. Further, it highlights the need for community involvement and support from the public and private sectors in carrying out development plans.

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