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THE EFFECT OF INFRASTRUCTURE DEVELOPMENT ON NIGERIA'S FOREIGN DIRECT INVESTMENT USING DATA-DRIVEN ALGORITHMS

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Abstract

This study analyzes the effect of infrastructure development on Nigeria's foreign direct investment (FDI) using data-driven algorithms from 2005 to 2023, utilizing time-series data sourced from the Central Bank of Nigeria Statistical Bulletin and the 2023 United Nations Annual Reports. This study focused on four key variables: Transport Infrastructure Development (TID), Energy Infrastructure Development (EID), Water Infrastructure Development (WID), and ICT Infrastructure Development (ICTD). The analysis employed auto-regressive distributed lag (ARDL) models, revealing that although infrastructure development negatively impacted FDI, the effect was statistically insignificant during the study period. This study recommends that the Nigerian government strengthen security measures and governance, develop targeted incentives to attract infrastructure-driven FDI, address macroeconomic challenges by stabilizing the exchange rate, and adopt an integrated approach to infrastructure development to maximize its effect on FDI.

This work was performed in collaboration with all the authors. Author CKO designed the study, developed the protocol, wrote the first draft of the manuscript, and managed the literature search. The author DU oversaw the analysis of the study and conducted the statistical analysis. All authors have reviewed and approved the final manuscript.

1. INTRODUCTION

Foreign direct investment (FDI) serves as a critical engine of economic growth, particularly in developing countries like Nigeria. By introducing foreign capital, technology, and managerial expertise, FDI contributes to industrialization, job creation, and enhanced productivity, ultimately fostering long-term economic development (Oguntoye, 2021). Historically, Nigeria has attracted substantial FDI inflows, particularly in the oil and gas sector, due to its abundant natural resources and strategic geographic position. Multinational corporations, especially in the post-independence era, played a pivotal role in shaping the Nigerian economy through investments that introduced modern technologies and management systems.

However, despite its potential, Nigeria has struggled with fluctuating FDI inflows, largely due to political instability, economic mismanagement, and a chronic lack of critical infrastructure. The economic downturn of

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the 1980s, marked by inflation, public debt, and poor governance, led to a decline in FDI inflows (Asiedu, 2006). Although economic reforms such as the Structural Adjustment Program (SAP) in 1986 aimed to reverse this trend by liberalizing the economy and encouraging foreign investment, the gains were limited. Infrastructure deficiencies, particularly in energy, transport, water, and information and communication technology (ICT), have continued to hinder Nigeria's ability to attract and retain foreign investors, raising operational costs and reducing competitiveness (Metu et al., 2021).

In recent decades, Nigeria has attempted to address these challenges through initiatives aimed at stabilizing the macroeconomic environment and improving critical infrastructure. Investments in ICT and energy infrastructure, as well as efforts to enhance transparency and governance, have contributed to some recovery in FDI inflows, particularly in sectors such as telecommunications and manufacturing (CBN, 2018). Nonetheless, the country's infrastructure gaps remain significant, limiting its capacity to leverage FDI for sustainable economic development.

Despite Nigeria's vast resources and market potential, the country continues to struggle with inconsistent and insufficient FDI inflows. One of the primary barriers to foreign investment is the inadequate state of the country's infrastructure. Unreliable power supply, poor transport networks, insufficient water infrastructure, and limited ICT connectivity significantly increase the cost of doing business in Nigeria, deterring potential investors and reducing the efficiency of those already operating in the country (Adenikinju, 2005; Egbe, 2023). For instance, companies often rely on costly self-generated power because of persistent electricity shortages, where as poor transport infrastructure slows the movement of goods and services, leading to operational inefficiencies.

Although the Nigerian government has implemented various reforms to improve infrastructure and create a more business-friendly environment, the overall effect of these measures on FDI inflows remains uncertain. Understanding the relationship between infrastructure development and FDI inflows is crucial because reliable infrastructure lowers operational costs, enhances productivity, and improves connectivity, making Nigeria a more attractive destination for foreign investors (Metu et al., 2021). This study explores the extent to which improvements in Nigeria's critical infrastructure sectors—energy, transport, water, and ICT—affect FDI inflows, providing insights into how targeted investments can foster economic development and support the country's diversification agenda.

Empirical studies by various researchers reveal contrasting perspectives on the effects of infrastructure development on foreign direct investment (FDI) in Nigeria. Some studies, such as those by Ogunjimi and Amune (2019), Iyoho (2022), Ariyibi, Akingunola, and Asogba (2023), and Eze, Ndubuisi-Okolo, and Anekwe (2017), suggest that infrastructure development significantly influences FDI inflows. Conversely, other studies, including those by Abdulrahman and Ajayi (2022), Allwell Ewubare and Onyema (2022), and Nguea (2020), concluded that the effect was insignificant. This divergence indicates that the empirical relationship between infrastructure development and FDI in Nigeria remains inconclusive, indicating a gap in the literature. The conflicting findings underscore the need for further investigation into this relationship, particularly from 2005 to 2023. The paper is organized into sections: the introduction (section one), a review of relevant literature (section two), the theoretical framework (section three), the methodology (section four), data analysis results and discussion (section five) and the conclusion and policy implications (section six).

2. Literature Review

Infrastructure development is a cornerstone of Nigeria's efforts to attract Foreign Direct Investment (FDI) and drive economic growth. Various forms of infrastructure, including transport, energy, telecommunications, and social infrastructure, create a supportive environment for businesses to thrive. Improved infrastructure reduces operational costs and enhances productivity, making Nigeria a more attractive destination for investors. Luo and Xu (2018) highlighted that investments in roads, ports, and power supply significantly reduce business expenses, improving foreign venture profitability. Similarly, Ahumibe, Ezeodili and Nze (2024)) underscored that reliable

electricity supply boosts investor confidence, underscoring infrastructure's pivotal role in economic stability. The Nigerian government has initiated policies and projects to address infrastructure deficits and enhance FDI inflow. A notable example is the National Integrated Infrastructure Master Plan (NIIMP), which outlines a long-term strategy for comprehensive infrastructure development across key sectors. The Federal Government of Nigeria (2022) notes that this plan creates a conducive environment for investment by prioritizing transportation, energy, and social infrastructure. Real-world examples, such as the Lekki Deep Sea Port and the Lagos-Ibadan railway, demonstrate the potential of infrastructure projects to attract significant foreign investment. According to the World Bank (2022), these projects reduce logistical bottlenecks, enhance connectivity, and lower business operational costs

Despite these strides, Nigeria continues to face challenges in leveraging infrastructure for FDI. Corruption, inefficiencies in bureaucratic processes, and policy inconsistencies remain significant barriers. Transparency International (2022) noted that procurement corruption can lead to inflated project costs and substandard outcomes, while bureaucratic delays hinder timely project completion. Additionally, security concerns in regions like the Northeast and Niger Delta intensify investors' risks. As Inah and Ekpang (2024) emphasize, addressing these security and governance challenges is crucial to ensuring that infrastructure projects succeed in attracting and retaining foreign investors. Public-private partnerships (PPPs) and international collaborations have emerged as viable solutions to Nigeria's infrastructure challenges. The Infrastructure Concession Regulatory Commission (2023) highlighted successful PPP projects, such as the concession of Murtala Muhammed International Airport's cargo terminal and the Second Niger Bridge, as examples of leveraging private sector expertise. Moreover, international financial institutions like the African Development Bank (AfDB) have been instrumental in funding key projects, including the Nigeria Electrification Project. As the AfDB (2021) highlights, improved infrastructure, particularly energy access, is critical for enhancing Nigeria's investment climate and fostering sustainable economic growth.

Energy infrastructure in Nigeria is a critical component of the nation's economic development, encompassing the generation, distribution, and utilization of energy to support industrial activities and households. The sector, which is largely reliant on fossil fuels such as natural gas and hydroelectric power, faces challenges such as outdated facilities, inefficiencies, and frequent power outages. These issues significantly impact industrial productivity and daily life, causing economic losses and hindering growth. Earth bond (2024) stated that the inability of the national grid to meet demand stems from inadequate maintenance and a lack of modernization, which necessitated urgent reforms. Efforts to address these issues, including privatization under the Power Sector Reform Act of 2005, have yielded mixed results, with progress constrained by regulatory inefficiencies and financial challenges. The government has also explored renewable energy as a way to improve electricity access and reduce dependence on fossil fuels. Initiatives such as the National Renewable Energy Action Plan and incentives for solar energy have led to improved access in underserved rural areas (Emezirinwune, Adejumobi, Adebisi & Akinboro,2024). Enhancing energy infrastructure offers significant advantages, including economic growth, improved quality of life, investment attraction, and increased energy security. However, disadvantages such as high capital costs, environmental concerns, unequal access, and regulatory challenges persist. Olabi et al. (2023) underscored, the importance of upgrading power plants, expanding transmission networks, and addressing regulatory bottlenecks to create a sustainable and inclusive energy system. These efforts are vital to driving Nigeria's economic development and ensuring a stable and efficient energy supply for all.

ICT infrastructure in Nigeria encompasses the physical and technological systems essential for transmitting and receiving information, including telecommunications networks, broadband systems, data centers, and regulatory frameworks. This infrastructure underpins economic growth, social connectivity, and improved quality of life.

Nigeria has made notable progress, particularly in expanding mobile telecommunication services, which have bridged the digital divide in rural areas and fostered financial inclusion through mobile banking and e-commerce (Torsten & Jack, 2023). However, challenges such as unequal access, with urban areas like Lagos and Abuja benefiting disproportionately, and poor service reliability due to outdated technology and insufficient investment persist. Regulatory inefficiencies further compound these issues, hindering consistent progress in the development of ICT infrastructure. To address these challenges, both public and private investments are crucial. Government initiatives, such as the National Broadband Plan 2020-2025, increase broadband penetration, improve service quality, and promote digital literacy. Meanwhile, private sector participation, driven by competition, has spurred innovations and improved service delivery. Despite the high development costs and risks associated with technological obsolescence, robust ICT infrastructure is vital for Nigeria's digital transformation. In addition to economic benefits, it enhances educational and health care access, facilitates remote work, and supports disaster management, making it indispensable for national development and social equity.

Transport infrastructure in Nigeria comprises physical and organizational frameworks that enable the movement of people, goods, and services. It includes roads, railways, airports, seaports, and supporting technologies that are critical to, economic development through trade facilitation and regional integration. However, the sector faces significant challenges, particularly in road transport, which handles 90% of freight and passenger movement, and suffers from poor maintenance, inadequate funding, and traffic congestion (Onokala & Olajide, 2020). Rail transport has seen revitalization with projects like the Lagos-Ibadan Railway, offering potential economic benefits, although much of the network remains outdated. Similarly, air transport plays a crucial role, but it faces outdated infrastructure and high operational costs, which necessitate reforms and investments. Nigeria's seaports are vital to international trade but are hindered by congestion and inefficiencies, prompting the need for modernization. Efforts to address these issues include government initiatives such as the National Integrated Infrastructure Master Plan and the Economic Recovery and Growth Plan, which emphasize public-private partnerships and international collaborations to bridge infrastructure gaps. Notable projects like the Lekki Deep Sea Port enhance maritime capacity and regional trade. Improved transport infrastructure yields substantial socioeconomic benefits, including reduced transportation costs, enhanced market accessibility, and job creation, contributing to economic growth and poverty reduction (Yusuf & Muhammad, 2024). However, challenges like high development costs, environmental impacts, and maintenance demands persist, necessitating a holistic approach involving increased investment, policy reforms, and stakeholder collaboration to maximize the potential of Nigeria's transport sector.

Water infrastructure in Nigeria is essential for public health, economic development, and agriculture, yet it faces significant challenges, such as outdated systems, inadequate maintenance, and insufficient access to clean water. Around 70 million Nigerians lack access to clean drinking water, with rural areas relying on unsafe sources like rivers and wells, worsening waterborne diseases and public health crises (Isukuru,et al , 2024). The inadequate infrastructure also hampers agricultural productivity because, many farmers depend on rainfed systems that are vulnerable to seasonal and climate variability. Investments in irrigation and water storage facilities could mitigate these issues and boost food security. Furthermore, rapid urbanization and population growth have strained existing infrastructure, highlighting the urgency of modernizing and expanding Nigeria's water systems. Efforts to address these issues include government-led policy reforms like the National Water Resources Bill, investments in public-private partnerships, and support from international organizations such as the World Bank. These initiatives improve water accessibility, promote sustainable resource management, and attract private sector participation. However, challenges such as corruption, technological obsolescence, and environmental impacts from large-scale projects persist, requiring robust governance and community engagement. By integrating local

participation, building technical capacity, and addressing climate resilience, Nigeria can achieve sustainable water infrastructure essential, for economic growth, social equity, and public health.

Foreign Direct Investment (FDI) is a vital component of Nigeria's economic development, contributing to capital inflows, technology transfer, and job creation. As Africa's largest economy, Nigeria's market potential attracts investors, with FDI playing a key role in diversifying sectors like telecommunications, agriculture, and manufacturing beyond its oil-dependent economy (Agwu, 2014). However, challenges such as corruption, policy inconsistencies, and inadequate infrastructure hinder FDI's optimal impact (Emeka, 2024). Although the Nigerian Investment Promotion Commission (NIPC) and initiatives like the Economic Recovery and Growth Plan (ERGP) aim to improve the investment climate, implementation gaps and security concerns remain significant barriers. Despite these challenges, FDI offers critical benefits, including improved infrastructure, human capital development, and economic integration, which foster sustainable growth. However, risks such as profit repatriation, environmental degradation, and inequality require regulatory vigilance and strategic reforms. Public-private partnerships and policy coherence can enhance Nigeria's absorptive capacity, enabling it to better leverage FDI for economic development while addressing sectoral disparities and regional inequities.

3. Theoretical Framework

The Eclectic Paradigm (OLI Framework), propounded by John H. Dunning (1977) proposed a comprehensive theory that explains the determinants of foreign direct investment (FDI). It posits that FDI occurs when three key advantages align: Ownership, which refers to the firm-specific assets or competencies (e.g., technology, brand, or expertise) that give a competitive edge; Location, which highlights the benefits a host country offers, such as infrastructure, natural resources, market size, or favorable policies; and Internalization, which explains why firms prefer direct investment over other modes like licensing to retain control and minimize transaction costs. This theory provides a robust framework for analyzing how infrastructural development (a critical location advantage) can attract FDI by enhancing a country's competitiveness.

The **growth pole theory was proposed** by French economist **François Perroux** in **1955**. This theory posits that economic development is not uniform across a region but occurs around specific "poles" or centers of economic activity, which are often driven by industries or sectors with strong growth potential. These poles act as catalysts for regional development, attracting investment, labor, and resources, which in turn stimulate surrounding areas through spillover effects. Growth poles are typically associated with strategic investments in infrastructure, innovation, and industrial development, which create multiplier effects that enhance overall economic growth and regional integration. This theory emphasizes the importance of focusing development efforts on high-potential areas to achieve broader economic transformation.

Implications of Eclectic Paradigm on the Effect of Infrastructural Development on Foreign Direct Investment in Nigeria

The **Eclectic Paradigm (OLI Framework)** has significant implications for the study of infrastructural development and foreign direct investment (FDI). This theory underscores the critical role of location-specific advantages, such as robust infrastructure, in attracting FDI. Adequate infrastructure—spanning transportation, energy, water supply, and ICT—enhances a host country's productivity, reduces operational costs for foreign investors, and improves connectivity to domestic and global markets. This aligns with the **Location** advantage of the OLI framework, emphasizing that countries with well-developed infrastructure are more competitive in attracting FDI. Furthermore, the theory suggests that the **Internalization** advantage is strengthened when investors see stable and efficient infrastructure as a factor that reduces transaction costs and operational risks. Thus, this study highlights the strategic need for governments to prioritize infrastructure development as a means

of enhancing their attractiveness to FDI, fostering economic growth, and integrating more effectively into the global economy.

3.3 Empirical Review

Anytime (2012) examined, the extent to which poor infrastructure repels foreign investment and hinders economic growth in Nigeria between 2000 and 2010. He identified a poor infrastructure as the primary cause of low and unequal foreign investment in Nigeria. He specifically identified the deplorable states of road networks, energy generation, limited skilled labor force, and insecurity as the barriers to FDI inflow to Nigeria. He asserted that there is a high level of infrastructural decadence that has really discouraged investors from investing in Nigeria.

Agbigbe (2016) examined the relationship between road network investments and economic development in Nigeria. The theoretical framework comprises Solow's economic growth theory and Frischmann's transportation infrastructure theory. Data were collected through personal interviews with a purposeful sample of 20 Nigerians, including previous and current public and private sector transportation-linked individuals directly involved in investment, management, and policy administration. The interview data were compiled and organized using qualitative software for content analysis. Recurring responses were identified, and patterns and trends were documented from the data. Findings revealed corruption in road contract awarding, lack of contract monitoring, and inefficient governance hindering economic development in Nigeria. This study supports positive social change by informing decision-makers that by investing in a network of roads, the time to project completion and financial savings may promote economic development, thus improving the standard of living of Nigerians.

Owolabi-Merus (2015) examined infrastructure development and the economic growth nexus in Nigeria. The impact and significance of infrastructure development on the economic growth of a country cannot be overemphasized. This is because it is a major component required to ensure an increase in domestic productivity and attract foreign direct investment (FDI) inflows. Through the use of Ordinary Least Squares and Granger Causality econometric techniques, this study investigated the infrastructural development and economic growth nexus in Nigeria. The former is proxied by Gross Fixed Capital Formation (GFCF), whereas the latter is proxied by Gross Domestic Product (GDP). The period under review is 1983–2013, and data for this study are obtained from the World Bank's Africa Development Indicators. The empirical results revealed that infrastructural development has a positive and statistically significant impact on Nigeria's economic growth. However, the Granger Causality test connotes that there is no mutual correlation between the two variables in Nigeria during the period under review.

Nguea (2020) investigated the effects of communication, energy, and transport infrastructure development on Foreign Direct Investment (FDI) in Cameroon. This study employs an autoregressive distributed lag (ARDL) approach to co-integration and an error correction model based on ARDL approach using time series data from 1984 to 2014. The results reveal that communication infrastructure has a positive and significant impact on FDI in both the long and short run. Findings also revealed a negative impact of energy infrastructure on attracting FDI in the long- and short-runs, while an insignificant impact of transport infrastructure on FDI is registered in both the long- and short-runs. The results suggest that improving the business climate through improved infrastructure plays a major role in attracting FDI in Cameroon.

Eze, Ndubuisi-Okolo, and Anekwe (2017) examined the role of infrastructure in attracting FDI, which is considered an instrument of development. This paper adopted a conceptual approach to its analysis of data obtained from secondary sources. Researchers vary in their opinions regarding the impact of foreign direct investment on the economy of a nation. However, it became clear that FDI cannot be wished away with regard to its contribution to the economy; otherwise, the effort to attract foreign capital, as made by many nations today, especially developing ones like Nigeria, would not have been observed. We discovered that the inflow of FDI to

Nigeria has been relatively on the increase and, that Nigeria tops the list in terms of FDI inflow into the whole of Africa. Equally, Nigeria, as a developing nation, has been making a series of efforts in terms of state policies and programs to attract foreign investment. Such efforts include economic liberalization, the establishment of the Nigerian Investment Promotion Commission, and the privatization and reform programs of successive governments beginning from the 1980s. It also became clear that Nigeria's economy will benefit from foreign direct investment. To sustain the momentum of FDI inflows and their contributions to development.

Ariyibi, Akingunola, and Asogba (2023) examined the effect of foreign debt on Nigeria's infrastructure developments. The study used an autoregressive distributed lag (ARDL) using, annual time series from 1983 to 2019. We collected data from the CBN statistical bulletin, National Bureau Statistics (NBS), World Development Indicators (WDI) database, and UNCTAD Database. The ARDL long-run coefficient reveals that BMFI and BBFI have a negative and positive insignificant and significant effect on INFRA in Nigeria, whereas the control variables of FDI and TOPEN have a positive and negative significant effect on INFRA in Nigeria. These findings accord with the dual gap theory postulation that, external debt is a phenomenon that can improve the level of growth of an economy.

Allwell Ewubare and Onyema (2022) examined the effect of infrastructure on FDI inflows in Nigeria from 1988 to 2018. The study used annual time series data sourced from the Central Bank of Nigeria, World Bank, IMF, and International Financial Statistics; using time series data analytical techniques to solve the problems of non-stationarity. Infrastructure and other determinants of FDI inflows, such as trade openness and economic growth, were used to analyze their effects on FDI inflows; the Phillips-Perrron (PP) unit root test was used to determine whether the variables were stationary. The result revealed that only one variable was stationary at level, while the remaining variables were integrated of order one I(1) series. Since the variables are of different orders of integration; it necessitate the use of the ARDL Bound test to test for the cointegration relationship among the variables. The result shows that the null hypothesis is rejected since the f-statistic is greater than the upper bound limit at 5%, indicating a long-run relationship among the series in the model. The ARDL technique was also chosen for analysis because it is more appropriate for analysis when the variables used in a model are of different order of integration. The, result of the ARDL analysis reveals that there will be no improved and sustainable FDI inflow into Nigeria if there is no effective tackling of the challenges of basic infrastructural needs of the country by ensuring efficient, stable, and reliable power supply, safe potable water, effective, efficient, and functional public transportation system, effective communication system, good trade openness relationship, and efficient and stable economic growth in Nigeria, as these variables are the prerequisite for FDI inflow.

Ogunjimi and Amune (2019) examined the role of infrastructure in attracting foreign direct investment (FDI) into Nigeria from 1981 to 2014. The study also investigates the type of infrastructure that has the greatest impact on FDI attraction. The unit root test results show that none of the variables in the study is integrated of order two, that is, I(2), a condition that justifies the use of the Autoregressive Distribution Lag (ARDL) framework. The ARDL Bounds Test approach to cointegration was employed to determine the long-run relationship among the variables in our model, and the result shows that there is a long-run relationship between infrastructure and FDI in Nigeria. The result of the estimation of the selected ARDL Error Correction Model shows that none of the infrastructure variables (tractor, telephone lines and electricity) employed in this study is significant in attracting FDI into Nigeria in the short run, although electricity production (power supply) was found to influence FDI in the long-run.

Abdulrahman and Ajayi (2022) investigated the impact of infrastructure on foreign direct investment inflows to Nigeria from 1995 to 2021. The study made use of descriptive statistics, unit root tests, pairwise correlations, and multiple regressions to find the result on the Effect of independent variable on the dependent variable. The result

revealed that the exchange rate has a p-value of 0.035, which is statistically significant at a 5% level of significance, implying that the exchange rate has a substantial impact on the amount of foreign direct investment flowing into Nigeria. The p-value for Electricity Consumption is 0.176, which is statistically insignificant at the 5% level of significance. This finding, suggests that Electricity Consumption has a negligible effect on Nigeria's Foreign Direct Investment inflow. Market Size has a p-value of 0.024, which is statistically significant at a 5% significance level, indicating that market size has a substantial impact on the inflow of FDI into Nigeria.

Iyoho (2022) asserted that the potential of FDI in a host nation's economic progress and technological advancement is not controversial. Meanwhile, infrastructure level sets the pace of foreign direct investment (FDI) flows. This study used a descriptive research design and annual time series data from the Central Bank of Nigeria (CBN) Statistical Bulletin for 1981–2019. The Fully Modified Ordinary Least Squares technique was used to estimate the econometric model. The result indicates that social infrastructure (= 0.024313, t = 2.935285, p<0.05), has a significant positive influence on foreign direct investment in Nigeria. It was also found that economic infrastructure (=-0.673199, t=-3.318014, p<0.05) showed a negative significant effect on foreign direct investment in Nigeria, while transport infrastructure did not show any effect on foreign direct investment in Nigeria.

4 METHODOLOGIES

This study obtained data from the Central Bank of Nigeria Statistical Bulletin 2023 and the World Bank Data Base. The data used in the study cover the period of 2005 to 2023, and the study adopted an ex-post facto research design. The study adapted and modified the model by Ogunjimi and Amune (2019), who studied the impact of infrastructure on foreign direct investment in Nigeria: An autoregressive distributed lag (ARDL) approach. His model is thus

LFDIt = f (LELPDt, LFTSt, LTRCT) ……...eq 1

Where:

LFDI = Log of Foreign Direct Investment

LELPD = Log of Electricity Production (KwH)

LFTS = Log of Fixed Telephone subscriptions (per 100 people)

LTRCT = Log of Tractors per 100 sq. km of arable land

However, our model for the study is as follows:

FDIt = f (EID, ICTD, TID, WID) eq2

$FDI_t = \beta_1 + \beta_2 EID_t + \beta_3 ICTD_t + \beta_4 TID_t + \beta_5 WID_t + \mu_t$ eq3

Where;

FDI = Foreign Direct Investment

EID = Energy production

ICTD = ICT infrastructure

TID = Transport Infrastructure

WID = Water Infrastructure

μ_t is the error term. The a priori expectation is such that α_1; α_3; α_5; >0and α_2<0

5. RESULTS AND DISCUSSION

Table 1: Descriptive statistics results

	FDI	TID	EID	WID	ICTD
Mean	765.1274	50661.00	83.18121	84.58816	1.07E+08
Median	759.3800	59182.00	84.41900	86.48000	1.27E+08
Maximum	1360.310	77482.00	87.10000	90.00100	1.73E+08

Minimum	-79.50000	16045.00	72.40000	67.00500	135675.2
Std. Dev.	398.2233	21773.86	4.184201	6.743542	54394332
Skewness	-0.582019	-0.771545	-1.502284	-1.906970	-0.613805
Kurtosis	3.044649	2.022674	4.248767	5.435505	2.000325
Jarque-Bera	1.074276	2.641233	8.381258	16.21161	1.984214
Probability	0.584418	0.266971	0.015137	0.000302	0.370795
Sum	14537.42	962559.0	1580.443	1607.175	2.03E+09
Sum Sq. Dev.	2854472.	8.53E+09	315.1358	818.5564	5.33E+16
Observations	19	19	19	19	19

Source: CBN Statistical Bulletin, 2022.

Table 1 presents the descriptive statistics outcomes for the complete study sample. In this comprehensive dataset, the mean (or standard deviation) values for Foreign Direct Investment (FDI), Transport Infrastructure Development (TID), Energy Infrastructure Development (EID), Water Infrastructure Development (WID), and ICT Infrastructure Development (ICTD) are 765.1274, 50661.00, 83.18121, 84.58816, and 1.07E+08 (alternatively 398.2233, 21773.86, 4.184201, 6.743542 and 54394332). The maximum and minimum values spans from 77482.00 to -79.50000 for the five variables, with skewness exhibiting only negative values, indicative of a distribution that is negatively skewed.

Augmented Dickey-Fuller (ADF) unit root text was used to determine the stationarity of the variables. Tables 2, 3, and 4 show that some variables were stationary at level, 1st diff, and 2nd diff, meaning there is mixed integration; hence, there is a need to use ARDL as a method of data analysis. The attainment of stationarity by variable(s) is necessary in model estimation because of the influence of non-stationarity on regression output. To this end, the Augmented Dickey-Fuller (ADF) unit root test was used to prove that the data were stationary.

Table 2: Results of ADF Unit Root Test at Different Levels

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
FDI	-2.418598(0.1508) **	-3.857386	-3.040391	Not Stationary
TID	-1.837637(0.3517) **	-3.857386	-3.040391	Not Stationary
EID	-0.747661(0.8097) **	-3.857386	-3.040391	Not Stationary
WID	-1.125499(0.2265) **	-2.699769	-1.961409	Not Stationary
ICTD	-0.642557(0.4247) **	-2.699769	-1.961409	Not Stationary

Source: Authors' Computation

Table 3: Results of ADF Unit Root Test at 1ST DIFF

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
FDI	-5.373237(0.0005) **	-3.886751	-3.052169	Stationary
TID	-3.805025(0.0118) **	-3.886751	-3.052169	Stationary
EID	-4.504965(0.0030) **	-3.886751	-3.052169	Stationary
WID	-2.059886(0.0410) **	-2.708094	-1.962813	Stationary
ICTD	-0.465291(0.4984) **	-2.708094	-1.962813	Not Stationary

Source: Authors' Computation

Table 4: Results of ADF Unit Root Test at 2nd DIFF

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
FDI	-8.091630(0.0000) **	-3.920350	-3.065585	Stationary
TID	-5.744144(0.0003) **	-3.920350	-3.065585	Stationary

EID	-7.699953(0.0000) **	-3.920350	-3.065585	Stationary
WID	-2.244732(0.0280) **	-2.717511	-1.964418	Stationary
ICTD	-2.372144(0.0213) **	-2.717511	-1.964418	Stationary

Source: Authors' Computation

The Augmented Dickey-Fuller (ADF) unit root text in tables 2, 3, and 4 indicates that FDI, TID, EID, and ICTD were not stationary at a level, implying that the variables should be further differentiated. Again, only FDI, TID, and EID were stationary at the first difference Table 3. Table 4 shows that at the second difference, all variables, including ICTD, were stationary. This is because their ADF test statistic value is greater than the Mackinnon critical value of 5% in absolute terms. As a result, an autoregressive distributed lag model (ARDL) was required for data analysis.

With the determination of ARDL as a method of data analysis, especially the short-run relationship, there is a need to determine the long-run relationship using ARDL Co-Integration Relationship**.**

ARDL Co-integration Relationship

The confirmation of the stationarity of the data through the unit root test of ADF allows for the determination of the co-integration relationship between the dependent and explanatory variables in the models. The ARDL model was chosen as against the traditional Johansen co-integration because it is structured in such a way that it takes into account the different order of integration of financial time-series data. **Co-integration test For Long-run Effect**

ARDL Co-Integration Test

The confirmation of the stationarity of the data through the unit root test of ADF allows for the determination of the co-integration relationship between the dependent and explanatory variables in the models. The ARDL model was selected as against the traditional Johansen co-integration because it is structured in such a way that it considers the different order of integration of financial time-series data. The bound test follows the critical criterion at the lower bound and upper bound for decision at the three levels of significance: 1%, 2.5%, 5%, and 10%. Given a computed F statistics Value of 4.786919, which is greater than the lower and upper critical bound values at 2.5%, 5%, and 10%, respectively, indicating the existence of a steady-state long-run relationship among the variables. This suggests that the selected variables have a long-run relationship with economic growth.

Table 5. ARDL bound tests for co-integration in Model 1

F-Bounds Test		Null Hypothesis: No-level relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.786919	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Author's calculation using E-Views 12 Software

Given a computed F statistics value of 4.786919, which is greater than the lower and upper critical bound values at 1%, 2.5%, 5%, and 10%, respectively, indicating, the existence of a steady-state long-run relationship among the variables. These findings suggest that the various selected variables have a long-run relationship with Foreign Direct Investment in Nigeria.

Decision rule: We reject the null hypothesis of co-integration to accept the alternative of co-integration. We conclude that infrastructure development, represented by Transport Infrastructure Development (TID), Energy Infrastructure Development (EID), Water Infrastructure Development (WID), and ICT Infrastructure Development (ICTD), has a long-run effect on Foreign Direct Investment (FDI) in Nigeria within the period studied.

Nature of long-run relationship/ARDL Error Correction Model

The ARDL result has proven that Foreign Direct Investment (FDI), Transport Infrastructure Development (TID), Energy Infrastructure Development (EID), Water Infrastructure Development (WID), and ICT Infrastructure Development (ICTD) are co-integrated in the long run. Consequently, the determination of the nature of the long-run relationship as well as the speed of the adjustment to equilibrium are necessary.

Table 6: ARDL Co-integration and Long-run Form for FDI→ TID + EID+WID+ICTD

Co-integrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI (-1) *	-0.023162	0.563234	-0.041123	0.9672
TID**	-0.003760	0.007984	-0.470968	0.6502
EID**	-13.23088	45.14828	-0.293054	0.7769
WID**	-116.9944	50.34071	-2.324051	0.0486
ICTD**	-2.42E-05	8.72E-06	-2.768467	0.0244
CointEq(-1)*	-0.023162	0.003812	-6.076385	0.0003
Long-run coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TID	-0.162337	4.157079	-0.039051	0.9698
EID	-571.2321	13694.93	-0.041711	0.9678
WID	9716.801	237848.6	0.040853	0.9684
ICTD	-0.000565	0.013732	-0.041126	0.9682
C	-718380.5	17640961	-0.040722	0.9685

Computer Output Data using E-views 12.0

The ARDL result shows that Foreign Direct Investment (FDI), Transport Infrastructure Development (TID), Energy Infrastructure Development (EID), Water Infrastructure Development (WID), and ICT Infrastructure Development (ICTD) are co-integrated/related in the long run. Consequently, the determination of the nature of the long-run relationship, as well as the speed of the adjustment to equilibrium, becomes necessary. The result in Table 6 shows that TID, EID, and ICTD have negative and insignificant effects on FDI, respectively, and that WID has a positive but insignificant effect on FDI. Regarding the speed of adjustment, Table 6 reveals that the model moves toward equilibrium following disequilibrium in the explanatory variables. The ECM is negatively signed with a coefficient of 0.023162, suggesting that 2.362 of the error generated in the previous period is corrected in the current period and is statically significant.

Diagnostic Test

Table 7 Heteroskedasticity and serial correlation LM test

	F-statistics	Probability
The Serial Correlation LM Test:	4.452875	0.0652
Heteroskedasticity Test	0.476087	0.8429

Source: Author's calculation using E-Views 12 Software

Test for heteroskedasticity and serial correlation LM test In line with the classical linear regression assumption, the model was subjected to the diagnostic analysis of the serial correlation LM test and heteroskedasticity test. The p-values of 0.0652 and 0.8429 for the serial correlation LM test and heteroscedasticity test are insignificant at the 5% level of significance. This implies that the model has no serial correlation LM test and heteroscedasticity test problem.

CUSUM and CUSUM of square tests of stability

The stability test results are shown in figure 2 and 3. The CUSUM and CUSUM of squares tests were used to check the stability of the model. The results of the stability test provide evidence that the model is stable. This is indicated by the movement of the blue lines located within the critical lines (two-red dotted lines) in the figures. Therefore, at a 5% significance level, the CUSUM and CUSUM of squares stability tests confirmed the good performance of the model.

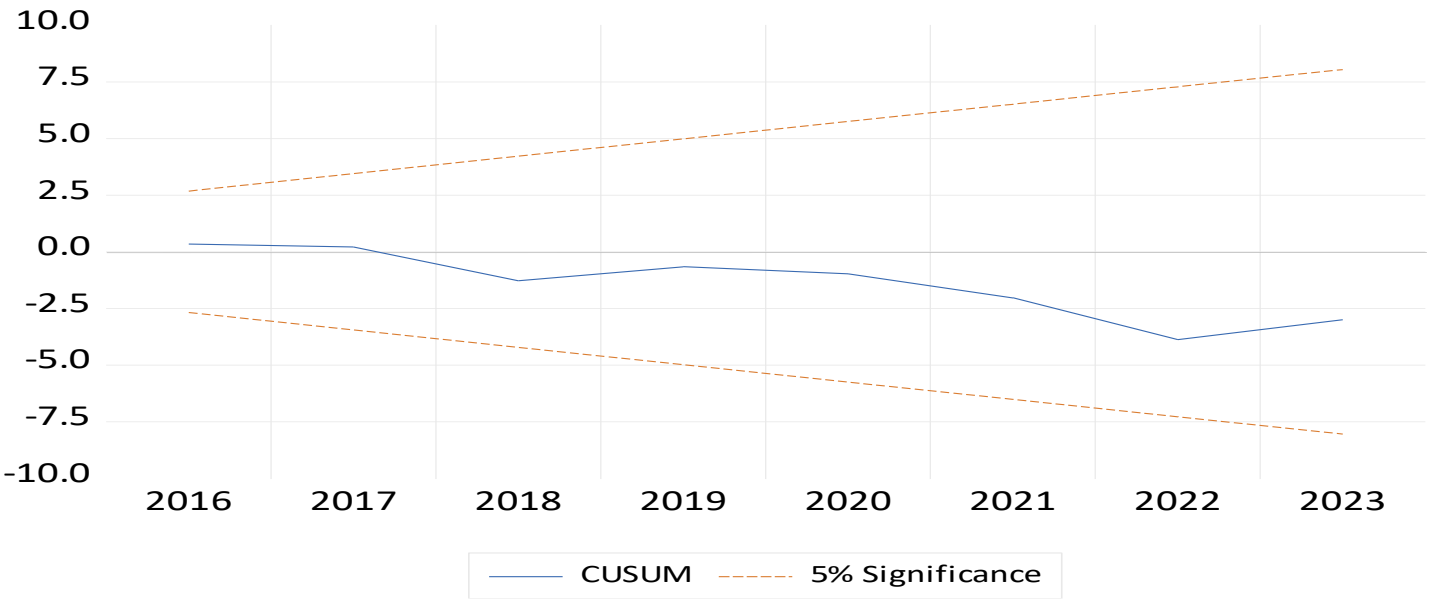

Fig. 1: *CUSUM text.*
Source: E-views 12.0 data output

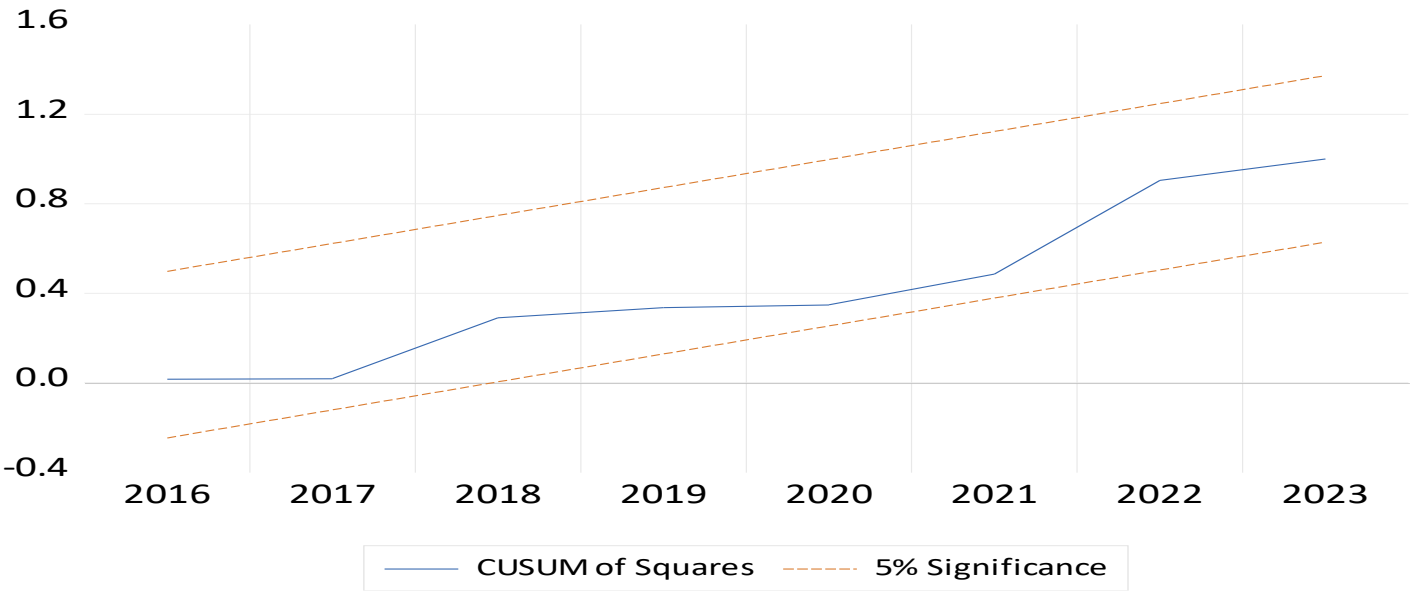

Fig. 2: *Sum of square text*
Source: E-views 12.0 data output

Short Run OLS Relationship

In analyzing the short-run nexus between infrastructure development and FDR in Nigeria, the OLS regression was applied, and the result is shown in Table 8. The outputs were interpreted using the coefficients of individual variables, Adjusted R-squared, f-statistic, and Durbin–Watson.

Table 8: OLS Regression: Infrastructure Development and Foreign Direct Investment

Dependent Variable: FDI
Method: ARDL
Dynamic regressors (1 lag, automatic): TID EID WID ICTD
Fixed regressors: C

Number of models evaluated: 32
Selected Model: ARDL (2, 0, 0, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
FDI (-1)	0.196471	0.381502	0.514993	0.6205
FDI (-2)	0.780367	0.475725	1.640374	0.1396
TID	-0.003760	0.007984	-0.470968	0.6502
EID	-13.23088	45.14828	-0.293054	0.7769
WID	-116.9944	50.34071	-2.324051	0.0486
WID (-1)	342.0549	109.9763	3.110261	0.0144
ICTD	-2.42E-05	8.72E-06	-2.768467	0.0244
ICTD (-1)	1.11E-05	7.11E-06	1.556539	0.1582
C	-16639.13	5392.073	-3.085850	0.0150
R-squared	0.744363	Mean dependent var		779.9241
Adjusted R-squared	0.488726	S.D. dependent variable		419.7225
S.E. of regression	300.1161	Akaike information criterion		14.55127
Sum squared residual	720557.2	Schwarz criterion		14.99238
Log likelihood	-114.6858	Hannan-Quinn writer.		14.59511
F-statistic	2.911795	Durbin-Watson stat		2.405619
Prob(F-statistic)	0.045876			

*Note: p-values and any subsequent tests do not account for the model selection.

Source: Author's E-view of 12 computations

Text of Probability

The constant parameters in the study exhibit a negative effect on FDI. This is evidenced by a negative coefficient of -16639.13, indicating that in the short term, FDI is expected to decrease by 16639.13 units when all explanatory variables remain constant. The probability value of 0.0150, which is below 5%, and the t-statistics value of 3.085850, which exceeds 2, confirm the significance of the constant parameters. Thus, when all variables are held constant, the constant (C) has a negative and significant effect on FDI. The probability values for WID and ICTD are 0.0486 and 0.0244, indicating significance below the 5% threshold, signifying that WID and ICTD have a negative but significant effect on FDI. However, the probability values for TID and EID are 0.6502 and, 0.7769, respectively, which exceed 5%. These results suggest that these variables have a negative and insignificant effect on FDI. These findings highlight that despite increased government spending on infrastructure, the impact on attracting foreign direct investment (FDI) remains minimal due to several critical factors. First, inadequate maintenance and inefficiencies in infrastructure delivery often result in suboptimal service quality, deterring potential investors. Second, persistent challenges such as corruption, bureaucratic bottlenecks, and inconsistent policy implementation undermine foreign investors' confidence. Furthermore, Nigeria's infrastructure investments have often been concentrated in select urban centers, leaving many areas underdeveloped and unable to support large-scale business operations. Finally, systemic issues such as insecurity, power supply instability, and limited access to finance further reduce the attractiveness of the country's infrastructure for FDI, despite government efforts to improve it. Addressing these challenges holistically is essential to unlock the full potential of infrastructure investment in attracting FDI.

The R-squared value of 0.7443 reveals that 74.43% of the variations in FDI are accounted for by the independent variables and their lags, while the adjusted R-squared value of 0.4887, which considers the number of predictors, reflects a moderate model fit. The Durbin-Watson statistic of 2.4056 suggests the absence of significant autocorrelation in the residuals. Additionally, the F-statistic of 2.9118, with a p-value of 0.0459, confirms that the overall model is statistically significant at the 5% level.

Granger Causality Test

Table 9, which presents the Granger causality test, indicates that there is a unidirectional/one-way causal relationship between FDI on water and ICT infrastructure development at a 5% level of significance. Causality may run from foreign direct investment (FDI) to water and ICT infrastructure development because FDI often brings capital, technology, and expertise that can directly enhance infrastructure sectors. Multinational companies investing in an economy may require robust water and ICT facilities to support their operations, prompting them to invest in or partner with local entities to improve these infrastructures. Furthermore, FDI can influence policy priorities by encouraging host governments to develop infrastructure to attract and retain foreign investors. This investment inflow can lead to the modernization of water supply systems and the expansion of ICT networks, ultimately contributing to overall infrastructure development.

Table 9. Granger Causality Output for Infrastructure Development and Foreign Direct Investment

Null Hypothesis:	Obs	F-Statistic	Prob.	Implication
TID does not Granger-cause FDI	17	1.34852	0.2963	No Causality
FDI does not Granger-cause TID		0.47856	0.6310	No Causality
EID does not Granger-cause FDI	17	1.22720	0.3274	No Causality
FDI does not Granger-cause EID		0.32797	0.7266	No Causality
WID does not Granger-cause FDI	17	2.72471	0.1058	No Causality
FDI does not Granger-cause WID		11.5659	0.0016	Causality
ICTD does not Granger-cause FDI	17	2.23243	0.1499	No Causality
FDI does not Granger cause ICTD		8.91100	0.0042	Causality

Source: Computer output data using E-views 12

6. SUMMARY, CONCLUSION, AND POLICY

Infrastructure development plays a critical role in attracting foreign direct investment (FDI) by creating an environment that reduces operational costs and enhances investors' efficiency. High-quality infrastructure, such as reliable transportation systems, stable energy supply, advanced telecommunications, and modernized water and sanitation networks, can improve connectivity, facilitate the smooth movement of goods and services, and enhance overall productivity. This makes a country more attractive to foreign investors who seek competitive locations for their operations. In addition, infrastructure development signals a government's commitment to economic growth and stability, further boosting investor confidence and fostering long-term investments that contribute to job creation, technology transfer, and economic diversification. However, empirical studies have yielded mixed results on this topic. Therefore, this study examines the effect of Infrastructure development on Nigerian FDI from 2005 to 2023.

The analysis began by testing the stationarity of the variables, which revealed different orders of integration: some were integrated at first order (I(1)), while others were integrated at second order (I(2)). Then, auto-regressive distributed lag (ARDL) models were used. The results indicate that Infrastructure development negatively affects Nigeria's foreign direct investment, but this effect is not statistically significant. This highlights the necessity for governments to fund more critical infrastructure while improving the security situation in the country. Based on

these findings, the study proposes the following recommendations: The Nigerian government should prioritize enhanced security measures to address the challenges of insecurity, as this remains a significant deterrent to foreign investors. Initiatives such as increased funding for security agencies, deployment of advanced surveillance technologies, and fostering community-based policing can help improve the safety of infrastructure projects and attract investors. Additionally, implementing strict anticorruption frameworks and ensuring accountability in infrastructure expenditures will strengthen investor confidence. To mitigate the impact of high operational costs, the government should provide targeted incentives to investors in sectors dependent on transport, energy, water, and ICT infrastructure. These incentives could include tax holidays, streamlined customs processes for importing equipment, and reduced bureaucratic barriers. Establishing public-private partnerships (PPPs) for infrastructure development can also attract private sector expertise and funding, thus reducing the burden on public resources. The volatility of exchange rates and rising fuel prices significantly increase the cost of doing business in Nigeria. The government should adopt policies that stabilize the exchange rate, such as maintaining robust foreign exchange reserves, promoting export diversification, and encouraging remittances. Additionally, investments in renewable energy and local refining capacity could reduce dependence on imported fuel, thereby lowering businesses' energy costs. A coordinated approach to infrastructure development is essential for maximizing its impact on FDI. The government should ensure that transport, energy, water, and ICT infrastructures are developed concurrently to create synergies. For example, improving road networks around industrial zones while simultaneously upgrading energy supply and ICT connectivity will make these areas more attractive to foreign investors. A dedicated monitoring and evaluation system should be implemented to track progress and ensure compliance with national development goals.

Reference

Abdulrahman, B. S. & Ajayi, O. E (2022). Impact of infrastructure on foreign direct investment inflows to Nigeria. *Journal of Economics and Allied Research*, *7*(2),42-52.

Adenikinju, A. (2005). Analysis of the Cost of Infrastructure Failures in a Developing Economy: The Case of the Electricity Sector in Nigeria. AERC Research Paper 148, African Economic Research Consortium, Nairobi.

African Development Bank (2021). Nigeria: *Economic Governance and Energy Transition Support Program (EGET-SP), Phase I-Project Appraisal Report*. Retrieved from https://www.afdb.org/sites/default/files/documents/projects-and-operations/nigeria_-economic_governance_and_energy_transition_support_program_eget-sp_phase_i-_project_appraisal_report.pdf.

Agbigbe,W.A.(2016) The Impact of Transportation Infrastructure on Nigeria's Economic Development. Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy Management.

Agwu, M. E. (2014) Foreign direct investments: a review from the Nigerian perspective. *Research Journal of Business and Management,1*(3),318-337.

Ahumibe, F. N, Ezeodili, W.& Nze, U. L(2024) Effect of power supply on the socio-economic development of South East, Nigeria. *Journal of Policy and Development Studies, 16*(2),13-34.

Allwell, O., Ewubare,D & Onyema, J. I. (2022). Effect of infrastructural development on foreign direct investment in Nigeria. Iconic Research and Engineering Journals, 5(8), 74-109.

Anyadike, N. O. (2012). Poor Infrastructure: The Hindrance to Foreign Investment and Economic Development in Nigeria. Interdisciplinary Journal of Contemporary Research in Business, 4(4),1-10.

Ariyibi,M.E, Akingunola, R & Asogba,I.O(2023) Foreign Debt and Infrastructural Development in Nigeria Journal of Business,12(2),23-36.

Asiedu, E. (2006). Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions, and political instability. *The World Economy*, 29(1), 63-77. Central Bank of Nigeria (CBN). (2018). *Annual Report and Statement of Accounts*. Abuja: CBN.

Earthbond. (2024). *National Grid Collapses Again: Get Your Business Off the Grid with Earthbond*. Retrieved from https://earthbond.co/post/national-grid-collapses-again-get-your-business-off-the-grid-with-earthbond/?srsltid=AfmBOoqsegUdG9Kj7Ox17YdPOrMTz0Xlt-zV5pej-4vE9hjOcDHSeXpu.

Egbe, J. (2023). Trends and challenges in ICT infrastructure investment in Nigeria. *An Interdisciplinary International Journal of Concerned African Philosophers, 12*(2),52-63.

Ekpo, A. H. (1997). Foreign direct investment in Nigeria: evidence from time-series data. *CBN Economic and Financial Review, 35*(1), 59-78.

Emeka, I. (2024). Foreign direct investment (FDI) and economic growth in Nigeria. *Journal of*

Poverty, Investment and Development, 9(1), 13–25.

Emezirinwune,M.U, Adejumobi,I.A, Adebisi, O.I & Akinboro,F.G (2024) Synergizing hybrid renewable energy systems and sustainable agriculture for rural development in Nigeria. *E-Prime - Advances in Electrical Engineering, Electronics and Energy,7*(1),20-43.

Eze, F. J, Ndubuisi-Okolo PU and Anekwe R. I. (2017). Infrastructural development as attracting foreign direct investment economic development. *International Journal of Trends in Scientific Research and Development,1*(5),1100-1115.

Federal Government of Nigeria. (2022). *Revised National Integrated Infrastructure Master Plan (NIIMP)*.

Inah, E .M & Ekpang, J .E. (2024). National security challenges: Implications for foreign direct investments in Nigeria. *International Journal of Developmental Research in Education, 4*(1),136-145.

Infrastructure Concession Regulatory Commission (ICRC). (2023). *Successful Public-Private Partnership Projects in Nigeria*.

Isukuru, E.F, Opha, J. O., Obaro, W. I, Orovwighose,B & Emmanuel,S.S.(2024) Nigeria's water crisis: Abundant water, polluted reality. *Cleaner Water,2*(1),1-23.

Iyoho, N.E. (2022). The role of infrastructure development in attracting foreign direct investment In Nigeria. *Benue Journal of Sociology, 9*(2), 140-153.

Luo X & Xu, X. (2018). Infrastructure, value chains, and economic upgrades. *Journal of Infrastructure, Policy and Development, 2*(2), 1-12.

Metu;A.G, Chekwube V. Madichie;C.V, Anyanwu; U, Kalu,C.U & Ihugba,O.A (2021)Economic diversification and inclusive growth in nigeria: does institution quality matter? Handbook of Research on Institution Development for Sustainable and Inclusive Economic Growth in Africa, 19.

Nguea, S. M. (2020). Impact of Infrastructure development on Foreign Direct Investment in Cameroon. *Hall Open Science, 1*(2), 1-10.

Njuguna, A. E. & Nnadozie, E. (2022). Investment climate and foreign direct investment in Africa: the role of ease of doing business. *Journal of African Trade, 9*(1),23–46.

Nwakoh, F. I. (2017) Effect of trade liberalization on the economic growth of Nigeria. *This Dissertation was Submitted to the Department of Accounting/Banking & Finance, Faculty of Management Sciences, Delta State University, Abraka, Thailand.*

Ogunjimi,J.A & Amune, B. O. (2019). Impact of infrastructure on foreign direct investment in Nigeria: An autoregressive distributed lag (ARDL) approach. *Journal of Economics and Sustainable Development, 10*(3), 1-8.

Oguntoye, M.A. (2021) An Appraisal of the impact of the oil sector on the Nigerian economy. *Submitted to the Faculty of Law, University of Lagos, Akoka, Lagos in Partial Fulfillment of the Award of Master of Laws (LLM).*

Olabi, A.G, Elsaid,K, Obaideen,K, Abdelkareem,M.A, Rezk,H, Wilberforce,T, Maghrabie,H.M & Sayed,E.T (2023). Renewable energy systems: Comparisons, challenges and barriers, sustainability indicators, and the contribution to UN sustainable development goals. *International Journal of Thermofluids*, 20(1),1-18.

Onokala,P.C & Olajide,C.J(2020) Problems and challenges facing the Nigerian transportation system, which affect their contribution to the economic development of the country in the 21st century. *ScienceDirect Transportation Research Procedia, 48*(1), 2945–2962.

Owolabi-Merus, O. (2015). Infrastructure Development and Economic Growth Nexus in Nigeria. *International Journal of Academic Research in Business and Social Sciences,5*(1),376-382.

Torsten, W & Jack, J. K. R., (2023). "Nigeria—Fostering Financial Inclusion through Digital Financial Services", IMF Selected Issues Paper.

Transparency International. (2022). *Corruption in Procurement: How It Inflates Costs and Reduces Outcomes*. Retrieved from https://www.transparency.org.

World Bank. (2022). *Trade Facilitation and Logistics.*

Yusuf, N.B. and Muhammad, A. (2024). 'The Effects of Transport Infrastructure Development on the Socioeconomic Wellbeing of Baro Residents: A Study of Baro Inland Port in Niger State. *Lapai Journal of Economics; Volume, 8*(1),203-213.