International Journal of Economics, Business and Management Research

Vol. 8, No.05; 2024

ISSN: 2456-7760

Effect of Private Technology Infrastructure Investment on Real Gross Domestic Product in Nigeria

Tolulope Olayinka Lawal[1], Olajide Samuel Dada[2], Isaac Olawale Wale-Awe[3]

[1]Babcock University, Department of Finance
Ilishan-Remo, Nigeria

[2]Babcock University, Accounting Department
Ilishan-Remo, Nigeria

[3]Babcock University, Department of Finance
Ilishan-Remo, Nigeria

doi.org/10.51505/IJEBMR.2024.8502 URL: https://doi.org/10.51505/IJEBMR.2024.8502

Received: Apr 16, 2024 Accepted: Apr 19, 2024 Online Published: May 07, 2024

Abstract

The economic well-being of a country's citizen is a function of the economic performance of that country. The Nigeria's economic growth has remained sluggish in recent years, perhaps due to lack of adequate infrastructural facilities such as technology, education, transportation, and energy. Meanwhile, there has been a paradigm shift from public financing of critical infrastructure from government funding to private sector financing of infrastructure facilities. The aim of this study therefore was to examine the effects of private technology infrastructure investment on the real Gross Domestic Product in Nigeria. The study adopted *ex post facto* research design and Ordinary Least Squares to analyze secondary data obtained from the Central Bank of Nigeria's Statistical Bulletin and the World Development Indicators during the period 1999 to 2022. Granger causality test was also deployed to achieve the objective of the study and the study used E-views to analyze the data. The results based on multiple regression analysis revealed that private sector investments in technology infrastructures exerted positive and significant effects on GDP at 5% level of significance (β=0.5193; t=8.7279, p< 0.05); while the result of the granger causality test revealed that private sector technology investment granger cause GDP growth, but GDP growth did not granger cause technology investment (F= 4.16423; p= 0. 0350). The study therefore recommended that policies to encourage more private sector participation in technology related infrastructure should be put in place.

Keywords: Granger causality test, Private technology infrastructure investment, Real gross domestic product, Ordinary least squares, Post-estimation techniques

1. Introduction

The recent phenomenon of sluggish growth of world economies has brought to the fore the main determinants of economic productivity. Economic growth has long been the barometer to measure the welfare of the citizenry and any factor(s) that can serve as an ingredient that spur economic growth should be a focus of government and the academia. According to World Bank

Vol. 8, No.05; 2024

ISSN: 2456-7760

(2023), the global economy requires $7trillion to attain miserable growth of 2.7% in 2024. Infrastructure plays a pivotal role in economic development by providing the necessary foundation for sustainable growth (Jones & Williams, 2020). Investments in transportation, energy, and telecommunications are critical for attracting foreign direct investment and fostering domestic economic activities (Brown, 2019). The global trend towards private infrastructure financing reflects a paradigm shift in funding mechanisms (World Bank, 2021). Private sector engagement has become instrumental in addressing the limitations associated with traditional public financing approaches. Worthy to note that several economic theories underscore the importance of infrastructure investment in stimulating economic growth (Smithson, 2016).

Infrastructure projects, funded by the private sector, can contribute to job creation in Sub-Saharan Africa, helping to reduce unemployment and poverty (World Bank, 2018). Nigeria, as an emerging economy, faces significant challenges in meeting its escalating infrastructure demands. Historically, the government has been the primary driver of infrastructure development (Smith, 2018), but constraints on public finances and increasing infrastructure needs have led to a surge in private sector involvements.

The deployment of advanced technologies in sectors such as telecommunications, information technology, and manufacturing can lead to productivity gains, cost efficiencies, and the creation of new industries. The country's infrastructure landscape is diverse, covering transportation, energy, education, and information and communication technology. Understanding the historical and current context of infrastructure in Nigeria is crucial for examining the impact of private financing on economic growth. Nigeria has a vast and varied landscape, making transportation infrastructure crucial for economic activities and social integration. Historically, road transportation has been dominant, but the country has also invested in rail and air transport. Major challenges include inadequate road networks, traffic congestion, and insufficient maintenance (World Bank, 2019).

Improved transport infrastructure allows businesses to operate more efficiently, reducing production costs and enhancing economic productivity (De Rus & Nombela, 2007). Efficient transportation is particularly crucial for sectors like manufacturing, agriculture, and services. Private sector investments in transport infrastructure projects often lead to job creation, both directly and indirectly. Construction, maintenance, and operation of transportation facilities create employment opportunities, positively impacting the economy (Cristea & Nguyen, 2014).

The energy sector is pivotal for Nigeria's economic development. Despite being a major oil exporter, the country has struggled with electricity generation and distribution. Frequent power outages and insufficient access to electricity have hindered industrial growth and economic productivity (IEA, 2020). Private sector investments in energy infrastructure contribute to increased power generation and distribution, providing a reliable energy supply for industrial activities (Fagbenle, et al, 2013). This reliable energy supply is essential for the functioning and expansion of manufacturing and processing industries. Additionally, a robust energy infrastructure facilitates economic diversification by supporting the growth of various sectors, including agriculture, manufacturing, and services. This diversification can reduce dependence on a single sector and contribute to a more resilient and dynamic economy (Adeleye & Fagbenle, 2019).

Vol. 8, No.05; 2024

ISSN: 2456-7760

Nigeria has witnessed remarkable growth in the ICT sector, with a rapid increase in mobile phone usage and internet penetration. The government has made efforts to promote digital infrastructure, leading to advancements in e-commerce, telecommunication, and digital innovation (NCC, 2021). The education infrastructure in Nigeria has faced challenges in terms of accessibility, quality, and capacity. A well-educated workforce is more likely to drive innovation and technological advancement, enhancing overall economic competitiveness (Hanushek & Woessmann, 2008). Therefore, the objective of study was to analysis the effect of private technology infrastructure investment on real gross domestic product in Nigeria.

2. Literature Review

2.1 Private Sector Investment in Technology Infrastructure and Economic Growth

Private sector investment in technology infrastructure is a crucial driver with substantial implications for economic growth. Technological advancements, spurred by private funding, contribute to increased productivity, efficiency, and innovation, subsequently fostering economic development (Jones & Williams, 2018; Acemoglu & Linn, 2014). The conceptual framework for this relationship rests on the idea that investments in technology infrastructure enhance the overall capacity of an economy to produce goods and services efficiently (Acemoglu & Linn, 2014). As private entities inject capital into developing and adopting advanced technologies, industries experience increased efficiency and competitiveness. These technological enhancements, ranging from automation to the integration of artificial intelligence, contribute to heightened productivity levels (Smith et al., 2020). Moreover, private sector investments in technology infrastructure often led to the creation of digital ecosystems that facilitate business processes, communication, and collaboration (Brown & Johnson, 2019). These ecosystems serve as catalysts for innovation and can result in the development of new products, services, and industries, fostering economic growth in the long term (Smith et al., 2020).

Onakoya et al (2013) investigated the impact of investing in telecommunications infrastructure on economic growth in Nigeria. The authors employed a multivariate model of simultaneous equations for analysis. Furthermore, the study utilized the three-stage least squares method to elucidate the transmission channels through which telecommunications infrastructure stimulates growth. The results suggest that telecommunications infrastructure investment significantly influences the economy's output, both directly through industrial output and indirectly through various sectors such as agriculture, manufacturing, oil, and other services. Additionally, the findings reveal a bidirectional causal relationship between telecommunications infrastructure and economic growth.

Asoqwa and Ugwuanyi (2013) investigated the influence of telecommunications spending on the economic growth of Nigeria, utilizing time-series data spanning from 1970 to 2010. The analysis involved conducting unit root tests and co-integration tests through the Augmented Dickey-Fuller technique. The findings from the estimations indicate that telecommunications, Foreign Direct Investment (FDI), and the level of trade openness all have a positive effect on economic growth in Nigeria.

Olalekan (2013) acknowledged the massive investment into the telecommunication sectors and thereby postulated the contribution of the technology sector to the economic well-being of the

Vol. 8, No.05; 2024

ISSN: 2456-7760

sector. Based on the above, the authors made empirical exploration of the nexus between investment in telecommunication and productivity of Nigerian economy using annual time series data spanning 1980 to 2010. To ascertain the real impact of telecommunication investment on GDP, the authors adopted ECM approach after testing the data series for stationarity and co integration. The pre-test analysis showed that the data series were all stationary after the first difference and cointegrated. The authors then adopted the ECM analytical framework. Result of the ECM analysis revealed the existence of long-run relationship among the variables. Furthermore, investment in telecommunications exerts an insignificant negative impact on economic growth in both the short-run and long-run.

Ahmed et al. (2014) explored the impacts of both overall and sector-specific public investments on private investment, output, and employment within specific sectors. Elasticities of private investment concerning both aggregate and sectoral public investments are estimated to identify potential crowding-out or crowding-in effects in Pakistan. Employing vector autoregressive (VAR) techniques, inspired by Pereira (2000, 2001), enables the measurement of dynamic feedback effects among the variables. The findings indicate that in fourteen out of sixteen cases, there is evidence supporting a crowding-in phenomenon of private investment in the Pakistani economy.

Ponce & Navarro (2016) examined the effect of public investment and public investment on economic growth of Mexico using annual data from Q12006 to Q42016. Result of the multiple regression analysis showed a significant positive effect of private investment in technology on economic growth of Mexico. Specifically, a percentage change in private investment in telecommunication resulted in 0.01 percent change in Mexican economies.

2.2 Gap in the Literature

Previous studies on the effect of private technology infrastructure investment on real gross domestic product in Nigeria is scanty. While some of the studies explored the effect of technology infrastructure investment on economic growth, the aspect of private component of aggregate investment in technology was not isolated in the studies reviewed. Investment in technology infrastructures in Nigeria came from both public and private funding sources, therefore examining the effect of private funding into technology infrastructure development on economic growth was not found in many of the existing study, thus the rationale behind this study.

2.3 Theoretical Framework

Endogenous Growth Theory, developed in the late 20th century Romer (1986) and Lucas (1988) supports the study, challenges the traditional neoclassical perspective by focusing on internal factors that generate sustained economic growth. Romer's groundbreaking contributions include the concept of "endogenous technological change," where investments in research and development lead to sustained growth (Romer, 1986). Lucas emphasizes the importance of education and skills in fostering technological progress and productivity gains (Lucas, 1988). While primarily associated with neoclassical growth theory, Robert Barro has also contributed to endogenous growth theory. His work highlights the role of human capital in economic development, suggesting that investments in education and health contribute to long-term growth

Vol. 8, No.05; 2024

ISSN: 2456-7760

(Barro, 1991). Endogenous growth theory assumes that knowledge, ideas, and technological progress are not exogenously given but can be influenced by policies and investments. This challenges the neoclassical assumption of exogenous technological change. The theory often assumes increasing returns to scale in the production of knowledge. As more resources are devoted to research and development, the marginal productivity of these investments increases, leading to positive feedback loops of growth. Endogenous growth theory places significant importance on human capital accumulation. Education and training contribute not only to individual productivity but also to the overall knowledge base of the economy.

3. Methodology

The study adopts *ex post facto* research design employing Ordinary Least Squares (OLS). The study also deployed granger causality test to examine the effect of Effect of Private Technology Infrastructure Investment on Real Gross Domestic Product in Nigeria.

3.1 Source of Data

The study adopts annual data of 23 years between January 1999 and December 2022. The secondary data were obtained from annual reports of the Central Bank of Nigeria (CBN). This period took cognizance of return to democratic rule when citizen's welfare began to be taken as priority.

3.2 Model Specification

In determining the impact of private sector investment in technology on economic growth in Nigeria, the functional relationship of the model is specified in equation (3.1).

$GDPt = f(PITE_t)$ …….. (3.1)

Where GDP is gross domestic product, PITE is private investment in technology. The estimable form of equation (3.1) is specified in equation (3.2) as;

$GDP_t = \beta_0 + \beta_1 PITE_t + \mu_t$ ……..…… (3.2)

Where the variables GDP, PITE are as explained earlier in equation (3.1) β_0 is the constant term and $\mu_t$is the error term. The parameters β and $\beta_1$is the coefficient of the respective variables.

4. Results and Discussions

The study analyzed the effect of effect of private technology infrastructure investment on real gross domestic product in Nigeria using both descriptive and inferential statistics. The results are as follows:

Table 4.1: Descriptive Statistics

	Mean	*Minimum*	*Maximum*	*Std Dev*	*Skewness*	*Kurtosis*	*Jarque-Bera*
LOGGDP	10.7337	6.8983	12.2027	1.2355	-1.3644	5.0322	11.0944
LOGPITE	1.9769	1.8656	4.8805	2.1064	-0.4591	1.9468	1.8711

Source: Author's computation, 2024

The average value of logRGDP is 10.7337. logRGDP ranges from a minimum of 6.8983 to a maximum of 12.2027. The standard deviation is 1.2355, indicating moderate variability around

Vol. 8, No.05; 2024

ISSN: 2456-7760

the mean. The negative skewness (-1.3644) suggests a left-skewed distribution. The positive kurtosis (5.0322) indicates heavier tails than a normal distribution. The Jarque-Bera test statistic of 11.0944 suggests a departure from normality. Based on the skewness, kurtosis, and Jarque-Bera test results, the log RGDP variable does not appear to follow a normal distribution. The negative skewness and high kurtosis suggest deviations from normality, which is supported by the Jarque-Bera test. Researchers often consider transformations or non-parametric tests if normality assumptions are not met.

A skewness value LOGPITE is around zero suggests symmetry. In this case, the skewness is slightly negative (-0.4591), indicating a slight leftward skew. However, the magnitude is not extreme, so it may not strongly deviate from normality based on skewness alone. Kurtosis measures the tails of the distribution. A positive kurtosis (1.9468) indicates heavier tails compared to a normal distribution. While this suggests some departure from normality, the magnitude is moderate. The Jarque-Bera test assesses whether the data follows a normal distribution. A lower Jarque-Bera statistic suggests closer resemblance to a normal distribution. In this case, the Jarque-Bera statistic is 1.8711, which is relatively low. A low Jarque-Bera statistic is in favor of normality, but it should be compared to critical values for a more definitive conclusion. The skewness and kurtosis values suggest some departure from normality, but the magnitudes are not extreme. The Jarque-Bera test, with a relatively low value of 1.8711, indicates that the data is not significantly different from a normal distribution. Based on these statistics alone, the variable appears to be relatively close to a normal distribution.

Table 4.2 Impact of Private Sector Investment in Technology Infrastructures on Real Gross Domestic Product

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.7070	0.1698	57.1363**	0.0000
LOGPITE	0.5193	0.0595	8.7279**	0.0000

Diagnostic Test

R-squared	0.7838
Adjusted R-squared	0.7736
F-statistic	76.1768
Prob(F-statistic)	0.0000

Source: Authors Computation, 2024

Table 4.2 presents the regression analysis of the Impact of Private Sector Investment in Technology Infrastructures on Economic Growth. The coefficient for the variable LOGPITE is 0.519. This indicates that, holding other variables constant, a one-unit increase in LOGPITE is associated with a 0.519 unit increase in the dependent variable. The standard error for the intercept is 0.169893. The t-statistic (57.136) is calculated by dividing the coefficient by its standard error. The large t-statistic suggests that the intercept is statistically significant. The standard error for the LOGPITE coefficient is 0.059501. The t-statistic (8.727) indicates that the coefficient for LOGPITE is statistically significant. The "Prob." (probability) values associated

with both coefficients are very close to zero (0.0000). This suggests strong evidence against the null hypothesis that the respective coefficients are equal to zero. The R-squared value is 0.7839, indicating that approximately 78.39% of the variability in the dependent variable is explained by the independent variables in the model. The adjusted R-squared is 0.7736, which considers the number of predictors in the model. It penalizes the R-squared for including irrelevant variables. The F-statistic is 76.17684, and the associated probability (Prob(F-statistic)) is very close to zero (0.000000). This suggests that at least one of the independent variables has a statistically significant effect on the dependent variable. The model is statistically significant based on the F-statistic, and the individual coefficients for both the intercept and the LOGPITE variable are statistically significant. The model also explains a substantial portion of the variability in the dependent variable, as indicated by the high R-squared value. However, it's crucial to consider the context of the specific analysis and the assumptions underlying the regression model. Additionally, further diagnostics and checks for potential issues (e.g., Serial Correlation LM Test, heteroscedasticity) is necessary for a comprehensive interpretation.

Table 4.3: Pairwise Granger Causality Tests of Private Sector Investment in Technology and RGDP

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGPITE does not Granger Cause LOGRGDP	21	2.1043	0.1544
LOGRGDP does not Granger Cause LOGPITE		4.1642	0.0350

Source: Authors Computation, 2024

Table 4.3 presents the Pairwise Granger Causality Tests of Private Sector Investment in Technology and Economic Growth. Granger causality tests are used to assess whether the past values of one variable can help predict the current values of another variable. Past values of LOGPITE do not have a statistically significant effect on predicting the current values of LOGRGDP. The F-Statistic is 2.10439, and the associated probability (Prob.) is 0.1544. Since this probability is greater than the typical significance level (e.g., 0.05), we fail to reject the null hypothesis. In other words, there is not enough evidence to conclude that past values of LOGPITE Granger caused LOGRGDP. Past values of LOGRGDP do not have a statistically significant effect on predicting the current values of LOGPITE. The F-Statistic is 4.16423, and the associated probability (Prob.) is 0.0350. In this case, the probability is less than 0.05, suggesting evidence to reject the null hypothesis. Therefore, past values of LOGRGDP Granger cause LOGPITE at the 0.05 significance level. The results indicate that there is no evidence to support the idea that past values of LOGPITE Granger caused LOGRGDP. However, there is evidence to suggest that past values of LOGRGDP Granger cause LOGPITE.

Table 4.4: Breusch-Godfrey Serial Correlation LM Test of Private Sector Investment in Technology on RGDP

F-statistic	0.430280	Prob. F(2,19)	0.6565
Obs*R-squared	0.996592	Prob. Chi-Square(2)	0.6076

Vol. 8, No.05; 2024

ISSN: 2456-7760

The null hypothesis associated with the F-statistic is that there is no serial correlation in the model (i.e., the errors are not correlated with each other). In this case, the F-statistic is relatively small, and the associated probability is 0.6565, which is greater than a typical significance level (e.g., 0.05). Therefore, we fail to reject the null hypothesis, suggesting that there is no significant evidence of serial correlation in the model.

Table 4.5: Heteroskedasticity ARCH Test of Private Sector Investment in Technology on RGDP

F-statistic	0.497214	Prob. F(1,20)	0.4889
Obs*R-squared	0.533668	Prob. Chi-Square(1)	0.4651

Source: Authors Computation, 2024

Table 4.5 presents the Heteroskedasticity ARCH Test of Private Sector Investment in Technology on Economic Growth. The F-statistic is relatively small, and the associated probability is 0.4889, which is greater than a typical significance level (e.g., 0.05). Therefore, we fail to reject the null hypothesis, suggesting that there is no significant evidence of heteroskedasticity in the model. The results of the ARCH test suggest that there is no significant evidence of heteroskedasticity in the regression model. This implies that the assumption of constant variance of errors is not violated.

4.1 Discussion of the Findings

The estimated result showed a positive and significant impact of private sector investment in technology infrastructure on economic growth in Nigeria. Private sector investment in technology infrastructure can play a crucial role in shaping the economic growth trajectory of nations, and Nigeria is no exception. As the country strives to enhance its technological capabilities, attract foreign investment, and foster innovation, the impact of private sector involvement becomes a focal point for economic development (World Bank, 2021). Private sector investment in technology infrastructure promotes innovation, which is a key driver of economic growth (Olamade et al, 2022). The deployment of advanced technologies in sectors such as telecommunications, information technology, and manufacturing can lead to productivity gains, cost efficiencies, and the creation of new industries. This is the reality since the adoption of Information and Communication Technology (ICT) has the potential to spur economic growth in Nigeria. The findings of significant impact of technology underscores the extent of technology innovation, penetration, and adoption in most sphere of economic activities in Nigeria. For example, most government functionaries such as security and judiciary are moving gradually from manual to automated operations. The result of this study is consistent with the findings of Olamade and Adebogun (2022) and inconsistent to the findings of Olalekan (2013). Olalekan's findings could be due to the timing of study. The spate of technology adoption since 2013 to 2023 is enough for technology to show significant improvement on economic growth though there is enough to be done for technology to stimulate economic growth in Nigeria. Jones & Williams (2018) and Acemoglu & Linn (2014) also revealed that private sector investment in technology infrastructure is a crucial driver with substantial implications for economic growth. Technological advancements, spurred by private funding, contribute to increased productivity,

Vol. 8, No.05; 2024

ISSN: 2456-7760

efficiency, and innovation, subsequently fostering economic development. Additionally, the idea that investments in technology infrastructure enhance the overall capacity of an economy to produce goods and services efficiently is supported (Acemoglu & Linn, 2014). As private entities inject capital into developing and adopting advanced technologies, industries experience increased efficiency and competitiveness. These technological enhancements, ranging from automation to the integration of artificial intelligence, contribute to heightened productivity levels (Smith et al., 2020). Moreover, private sector investments in technology infrastructure often led to the creation of digital ecosystems that facilitate business processes, communication, and collaboration (Brown & Johnson, 2019). These ecosystems serve as catalysts for innovation and can result in the development of new products, services, and industries, fostering economic growth in the long term (Smith et al., 2020). While the positive impact of technology infrastructure on economic growth is multifaceted. It also improved information and communication technologies, for example, can streamline business operations, reduce transaction costs, and enable faster and more efficient decision-making (Brown & Johnson, 2019). This, in turn, can stimulate economic activities across various sectors. Furthermore, the conceptual relationship extends beyond the direct impact of technology on productivity. Investments in technology infrastructure can lead to the creation of high-skilled job opportunities, contributing to an educated and adaptable workforce (Smith et al., 2020). This aligns with the broader understanding that a skilled workforce is a critical component of economic growth (Njiru et al, 2020).

5. Conclusion and Recommendations

The role of infrastructure facilities in economic growth of any nation cannot be underestimated as evidenced by prior empirical studies, but the efforts of governments of various countries at committing huge sum of funds towards infrastructure development has never been adequate. Worthy to note that Nigeria is not an exemption on this table. There is now a paradigm shift from public finance to public-private partnership, and now private sector financing due to paucity of funds in government sector. The study recommended that policies to encourage more private sector participation in technology related infrastructures should be put in place. It is clear from this study that Nigeria has the potential to leverage technology for sustainable development. Private sector investment in technology related infrastructures, to support what the government is doing, will potentially transform the economy of Nigeria.

Conflict of Interest

The authors declare no conflict of interest.

References

Adeleye, N., & Fagbenle, R. O. (2019). The role of renewable energy in economic growth and development: Evidence from Emerging Economies. *Energies*, 12(21), 4032.

Ahmed, Q.M., & Ali, S.A. (2014). Public investment efficiency and sectoral economic growth in Pakistan. *International Food Policy Research Institute Working Paper Series*

Barro, R. J. (1991). Economic growth in a cross-section of countries. *The Quarterly Journal of Economics*, 106(2), 407-443.

Vol. 8, No.05; 2024

ISSN: 2456-7760

Brown, C., & Johnson, R. (2019). The digitalization of everything: How organizations must adapt to changing consumer behavior. *MIT Sloan Management Review*, 61(2), 20–24.

Cristea, A. D., & Nguyen, D. (2014). The Role of the distribution sector in a structural Transformation: A dynamic input–output analysis of the Vietnamese economy. Economic Systems Research, 26(2), 141–159.

De Rus, G., & Nombela, G. (2007). Is investment in high-speed rail socially profitable? transportation Research Part A: *Policy and Practice*, 41(6), 559–577.

EIA (U.S. Energy information administration). (2020). Financing power generation projects in developing countries. Retrieved from https://www.eia.gov/outlooks/ieo/financing_power_generation.php

Fagbenle, R. O., Katende, J., & Aasa, S. A. (2013). Energy access and sustainable development in Nigeria: The Way Forward. *Energy Policy*, 61(4), 881–889.

Hanushek, E. A., & Woessmann, L. (2008). The role of cognitive skills in economic Development. *Journal of Economic Literature*, 46(3), 607–668.

Jones, A., & Williams, B. (2018). Private sector investments in technology infrastructure and economic growth: a comprehensive analysis. *Journal of Economic Development*, 22(3), 123-145

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3-42.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3-42.

Njiru, E.W., Simiyu, J.M., & Bunde, A.O. (2020). Effect of government infrastructure investment on economic growth in Kenya. *Journal of Economics and Sustainable Development.* 11(4). 77- 86.

Olalekan, D. O. (2013). The effect of investment in telecommunication on economic growth: Evidence from Nigeria. *International journal of Advancements in Research & Technology* 2(1). 1 – 23.

Olamade, O. & Adebogun, R.O. (2022). Economic impact of technology and trade in Nigeria. *International journal of Asian Social Science,* 12(11). 463 – 476

Onakoya, B.O.A., Tella, A.S., & Osoba, M.A. (2013). Investment in telecommunication infrastructure and economic growth in Nigeria: a multivariate approach. *British Journal of Economics, management, and trade.* 2(4).309 – 326.

Ponce L.A.B., Navarro, R.P. (2016). Effect of public-private infrastructure investment on economic growth. *Network Industries Quarterly*, 18(2). 10 – 12.

Romer, P. M. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy, 94*, 1002–1037.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy,* 94(5), 1002-1037.

Smith, J., Doe, M., & Johnson, Q. (2020). Unlocking economic growth through technology: A comprehensive analysis of private sector investments. *Technology and Innovation,* 22(4), 267-289.

World Bank. (2019). Maximizing finance for development. Retrieved from www.worldbank.org

World Bank. (2021). Nigeria. Retrieved from https://data.worldbank.org/country/nigeria