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Physical Infrastructure and Economic Growth in Nigeria

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ABSTRACT

This study investigated the nexus between physical infrastructure and economic growth in Nigeria for the period of 1986 - 2020. The data such as Gross Domestic Product (GDP) growth rate (proxy of economic growth), electricity production, road and rail lines, air transport and telecommunication infrastructure were considered for the study. The data were culled from World Development Indicator (WDI). The techniques such as descriptive statistics, correlation analysis, ADF unit root test, co-integration test, Autoregressive Distributed Lag (ARDL) and diagnostic tests were employed to analyze the data collated. The findings show the existence of short run relationship between physical infrastructure and economic growth in Nigeria. However, physical infrastructure has no relationship with economic growth in Nigeria in the long run. The study concludes that physical infrastructure is an indisputable ingredient for the growth process in the short run. In fact, it is an engine of growth and lubricant for obstacles of attracting foreign investments into Nigerian economy. It was therefore recommended among others that Nigerian government should focus on the improvement of road and electricity production if truly the country wishes to be among the top 20 economies of the world as stipulated in the failed vision 2020.

Keywords: Physical infrastructure, Electricity Production, Economic Growth, ARDL.

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INTRODUCTION

The importance of infrastructural development in developing economies cannot be overemphasized. In fact, several economists and scholars have identified it as an engine of growth and economic improvement, especially on social, natural and human development (Davies et al, 2019). Infrastructure improves the quality of life via the provision of social amenities and consumable goods such as energy, transport and communication services (Nedozi, Obasanmi, & Ighata, 2014). It is a pillar of country's production system and wheel of economic activity because of its role in the distribution process.

Infrastructure investment can either be hard (physical) or soft (human). Hard infrastructure involves construction of bridges, highways, roads etcetera (Oke, 2013). In a remote area, infrastructure is an incentive to motivate and attract industrial activities as it facilitates investment in such area. For instance, farmers use electricity to process the harvested cassava into garri. Thus, it is fundamental for rural transformation and agricultural development and.

Africa, especially Nigerian economy is characterized by malfunctional infrastructure to attain good economic performance. The infrastructure decay affects social economic wellbeing and draw attention of the government as it has been established that improved infrastructure is the bedrock for foreign investment inflows (Olufemi et al, 2013).

In some areas, absence of tangible infrastructure is categorized into different phases. These include utility such as sanitation, water, communication and power; physical like good roads, rail, air and water transport; and social (health and education). This justified the failure of Nigeria to achieve the proposed vision of being among top 20 economies globally as at 2020. Nedozi, Obasanmi and Ighata (2014) elucidate that power blackout, bad roads and inadequate telecommunication services coupled with poor equipment to enhance human capital development are the challenges confronting Nigerian economy, thereby retarding growth of the nation.

These challenges have posed serious question on whether the existing infrastructure can contribute to the Nigeria economic expansion. Hence, several studies have been conducted to response to this question. Aworinde and Akintoye (2019), Eke, Lucky and Nsikan (2017) established negative relationship between infrastructural development and economic growth while Nedozi, Obasanmi and Ighata (2014), Ogbaro and Omotoso (2017) found a positive and significant influence of infrastructural development on economic growth. However, Koner, Purandare, and Dhume (2012) confirmed that rapid infrastructure can lead to unbalanced process of development. Thus, some part of the country developed rapidly while other are underdeveloped. Hence, population shifted from undeveloped area to developed ones, which poses serious burden to the resources available in that area. This called for proactive policies of the government to tackle infrastructural decay in the country in order to enhance economic growth. Consequently, this study assesses the role of physical infrastructure on Nigerian economy.

Literature Review

Physical Infrastructure and Economic Growth

Infrastructure is the basic physical system of countries such as communication, sewage, water, power and transportation (Ebuh et al, 2019). This system is essential and require large

inflow of investments to achieve growth and development of a nation. Hence, funding options like private, public or private-public partnership arose due to the huge capital involved. According to Chan et al (2009), infrastructure is a physical structure used by various industries as input for the goods and services manufactured or produced in the country. Infrastructure entails the facilities or services provided for the good of the people, including health care, education, water supply, electricity, telecommunication etcetera (Kari, Collins & Ernest, 2019). Adequate access to these services serves as a lubricant to economic challenges (Adeyemo, 1989). A good infrastructure helps to evaluate the success or failure of productive output, alleviating poverty, and improve environmental conditions. However, dearth of infrastructure results to scarce goods and services which can be secured in higher prices, thereby leading to poor growth and development (Olaseni & Alade, 2012)

Since infrastructure is a means of social comfort to the citizens, decay infrastructure exacerbates the condition of workers, hence reduces workers' motivation. Particularly, electricity infrastructure has been in a state of decline for several decades to the extent that it has turned to despair in the face of the populace. This has tremendously affected the psychology and physical sense of reasoning of the citizens which in turn leads to low productivity (Aworinde & Akintoye, 2019). Massive power supply interruption often disrupts business activities in the country. Road infrastructure is another medium through which infrastructure influence the growth of an economy. However, poor road network either by land or rail hinder the movement of goods and services within and outside the country.

Oshikoya et al (1999) state that adequate physical infrastructure does not only enhance growth but also helps to reduce poverty in the country. This can be done in two different ways: the nexus between good infrastructure and economic growth; and the connection between adequate infrastructure and pro-poor growth process. Hence, the results of the two cases are poverty reduction. Providing essential infrastructure such as schools, and roads assist in reducing the rate of unemployment and illiteracy, thereby leads to greater income and better nutrition. Agenor (2009) corroborates that physical infrastructure boost a nation's productivity, which in turn accelerate overall growth (Agenor & Moreno-Dodson, 2006)

Literatur Review

This study rest on the tenet of Cobb Douglas production function and unbalanced growth theory. The latter was propounded by Rostow, Fleming, Hirschman and Singer as a technique to be adopted by developing nations. The theory emphasizes on the need to invest in specific areas or sectors while other aspect of the economy will develop through 'linkage effect'. Hirschman (1969) states that the creation of imbalances in the system is the only solution and best strategy to achieve economic growth since the resources available in developing economies are limited. Thus, the available ones must be prioritized and used efficiently. According to Singer (1958), it is a better development technique to channel available resources to vibrant investment that is capable of expanding economic system.

In line with Cobb-Douglas production function, the model explains the nexus between production inputs and economic outputs. It further accentuates more on the technological relationship between various inputs (such as capital and labour) and output.

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Recently, several studies have argued the impact of infrastructural development on economic growth in various countries, especially developing countries like Nigeria. Yet majority of the results were inconclusive, to mention but few. Ebuh et al (2019) examined the relationship between infrastructures and the growth of Nigerian economy using granger causality test. The study also employs vector error correction model and discovered that upsurge in infrastructural investments will lead to long run expansion of economic growth in Nigeria. Nedozi, Obasanmi and Ighata (2014) used simultaneous equation to assess the effect of infrastructural development on economic growth in Nigeria. It was found that infrastructure is an intermediate commodity to industrial sectors and finished product for the final consumer. This in turn leads to economic growth in Nigeria. Eke, Lucky and Nsikan (2017) studied the influence of infrastructures on industrial sector growth in Nigeria between 1990 and 2015. The study uses regression analysis to discover a positive but insignificant influence of electricity infrastructure on industrial sector growth while other variables such as gross capital formation and public spending have negative connection with industrial sector growth in Nigeria. The study of Omotoso (2019) revealed a positive influence of power, air, rail lines and communication infrastructures on economic growth in Nigeria. However, the study of Kari, Collins and Ernest (2019) found that the current state of Nigeria's infrastructures is a perpetual neglect of the major economic actors.

METHOD

Data Source and Analytical Techniques

The study uses time series and secondary source of data. This was confirmed in the studies of Kari et al, (2019) and Ebuh et al, (2019). The data were culled from World Development Indicator (WDI) for the period of 35years (1986 -2020). The variables such as economic growth (represented by gross domestic product growth rate), electricity production, road and rail lines, air transport, and telecommunication infrastructure were considered for the study. The study employs Autoregressive Distributed Lag (ARDL) to evaluate the connection between physical infrastructures and economic growth in Nigeria in the short and long run

Theoretical Framework and Model Specification

As stated earlier, this study rests on the postulations of Cobb-Douglas, which explain the relationship between outputs and inputs. The model is specified as:

$Y = AL^{\alpha}K^{\beta}$ ……1

Where Y is an output, K (capital) and L (labour) inputs. A in the model represents constant while α and β denote elasticity of labour and capital outputs.

This study substitutes Y for Gross Domestic Product (GDP) growth rate and inputs include indices of physical infrastructure. Thus, the model is written in implicit form as:

$GDPgr = f(Pinfr)$ …… 2

In explicit form

$GDPgr = \beta_0 + \beta_1 Pinfr + \mu$ …… 3

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Inserting physical infrastructure variables, we have;

$GDPgr = \beta_0 + \beta_1 EPR + \beta_2 RAL + \beta_3 AIT + \beta_4 COMM + \mu$ 4

Considering the connection between the Physical Infrastructures and economic growth in the short and long run

$$\Delta GDPgr = \alpha_0 + \sum_{t=1}^{p1} \alpha 1 \Delta GDPgr_{t-1} + \sum_{t=1}^{p2} \alpha 2 \Delta EPR_{t-1} + \sum_{t=1}^{p3} \alpha 3 \Delta RAL_{t-1} + \sum_{t=1}^{p4} \alpha 4 \Delta AIT_{t-1} + \sum_{t=1}^{p5} \alpha 5 \Delta COMM_{t-1} + \beta_1 GDPgr_{t-1} + \beta_2 EPR_{t-1} + \beta_3 RAL_{t-1} + \beta_4 AIT_{t-1} + \beta_5 COMM_{t-1} + \mu \quad \ldots\ldots 5$$

Where;
GDPgr = Gross Domestic Product (GDP) growth rate
EPR = Electricity Production
RAL = road and rail line infrastructure
COMM = Telecommunication infrastructure
AIT = Air Transport
α_1-α_5 = short-run coefficient
β_1,- β_5 = long-run coefficient
μ = error term

RESULTS AND DISCUSSIONS

Table 1. Descriptive statistics of variables

Variable	Mean	Median	Std dev.	Skew	J-B Stats	J-B Prob.	N(Obs)
GDPgr	4.20	4.23	3.96	0.47	1.40	0.49	35
EPR	29.55	32.58	8.08	-0.26	3.28	0.19	35
RAL	3539	3528	16.73	-0.22	2.36	0.31	35
AIT	13.41	10.04	10.06	0.60	2.60	0.27	35
COMM	43.34	46.24	38.93	0.06	5.22	0.07	35

Source: Auhor's computation from Eviews

The attributes of the variables were presented in table 1. The mean is based on individual series as it was shown by the results. The variables show high level of consistency as reflected by their mean values. From the results, investment in road and rail show the highest value of mean at 3539, followed by telecommunication infrastructure at 43.34. The standard deviation which measures the degree of fluctuation recorded a high value for telecommunication infrastructure. It is an indication that telecommunication infrastructure is the highest fluctuating variable. Similarly, it can be found that all the series are moderately skewed. That is, the values of these variables are tending towards zero. Furthermore, the probability of JB statistic of all variables of study exceed 0.05. Hence, the study concludes that all the series are normally distributed.

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Table 2. Correlation Analysis

	GDPgr	EPR	RAL	AIT	COMM
GDPgr	1.000000	0.070051	-0.411422	-0.156926	0.036365
EPR	0.070051	1.000000	0.565009	-0.010723	0.821632
RAL	-0.411422	0.565009	1.000000	0.234017	0.554118
AIT	-0.156926	-0.010723	0.234017	1.000000	-0.035261
COMM	0.036365	0.821632	0.554118	-0.035261	1.000000

Source: Auhor's computation from Eviews

This test was carried out to confirm whether there exist of collinearity among the variables of interest. Based on the results, there is evidence of low and moderate correlation among the series except for the nexus between electricity production and telecommunication infrastructure positive which shows positive and high value.

Table 3. ADF Unit Root Test

Null Hypothesis: the variable has a unit root						
	At Level					
		GDPGR	EPR	RAL	AIT	COMM
With Constant	t-Statistic	-3.6816	-0.7332	-1.8209	-2.9097	-1.4383
	Prob.	***0.0090***	***0.8248***	***0.3644***	***0.0547***	***0.5520***
		***	n0	n0	*	n0
With Constant & Trend	t-Statistic	-3.5769	-3.1407	-2.6889	-2.9036	-3.8679
	Prob.	***0.0471***	***0.1150***	***0.2471***	***0.1740***	***0.0247***
		**	n0	n0	n0	**
Without Constant & Trend	t-Statistic	-2.2747	-0.9753	-0.5127	-2.1881	-0.8927
	Prob.	***0.0241***	***0.2882***	***0.4870***	***0.0295***	***0.3222***
		**	n0	n0	**	n0
	At First Difference					
		d(GDPGR)	d(EPR)	d(RAL)	d(AIT)	d(COMM)
With Constant	t-Statistic	-3.9397	-6.3358	-5.7127	-6.5204	-6.0579
	Prob.	***0.0050***	***0.0000***	***0.0000***	***0.0000***	***0.0000***
		***	***	***	***	***

Source: Auhor's computation from Eviews

The essence of a good research is the validity of the results and the ability to ratify or accept the decisions of researchers by the policy makers. Thus, all the variables of study were subjected to a unit root test using ADF technique. As shown in the table 3, Gross Domestic Product (GDP) growth rate and telecommunication infrastructure are stationary at level 1(0) while electricity production, road and rail infrastructure, as well as air transport are stationary at first difference 1(0) considering 1% and 5% level of significance. Thus, the series are suitable for ARDL approach and also freed of spurious analysis.

Table 4: Cointegration Test

Trace Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**

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None	0.557736	50.88160	60.06141	0.2335
At most 1	0.323898	23.95857	40.17493	0.7084
At most 2	0.178641	11.04198	24.27596	0.7810
At most 3	0.112254	4.547728	12.32090	0.6317
At most 4	0.018566	0.618432	4.129906	0.4926

Trace test indicates no cointegration at the 0.05 level

Maximum Eigenvalue Cointegration Rank Test

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.557736	26.92303	30.43961	0.1290
At most 1	0.323898	12.91659	24.15921	0.7007
At most 2	0.178641	6.494254	17.79730	0.8574
At most 3	0.112254	3.929296	11.22480	0.6397
At most 4	0.018566	0.618432	4.129906	0.4926

Max-eigenvalue test indicates no cointegration at the 0.05 level

As shown by the results in table 4, it was established that long run relationship does not exist among of the variables as confirmed by Trace and Maximum Eigenvalue cointegration test. Hence, the need to reconfirmed these results using ARDL technique.

Table 5: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-596.3759	NA	4.64e+09	36.44702	36.67377	36.52332
1	-507.2670	145.8146	97240095	32.56164	33.92210*	33.01939*
2	-476.3153	41.26893*	75825501*	32.20093*	34.69511	33.04014

The VAR lag selection criteria was conducted to determine the appropriate lag selection for ARDL model. Using AIC lag selection criteria, it was established that lag 2 is deem appropriate for the analysis.

Table 6: ARDL - Short Run Analysis (GDPgr)

Dep Var/HDI	Coeff.	Std error	Prob.
C	155.04	238.07	0.52
GDPgr (-1)	0.14	0.20	0.48
GDPgr(-2)	0.34	0.18	0.07
EPR	-0.07	0.33	0.83
EPR(-1)	0.39	0.31	0.23
RAL	-0.17	0.06	0.01
RAL(-1)	0.13	0.07	0.09
AIT	0.08	0.09	0.34

AIT(-1)	-0.12	0.08	0.12
COMM	-0.02	0.04	0.53
COMM(-1)	0.09	0.05	0.09
COMM(-2)	0.12	0.04	0.00
R^2	0.64	***AIC***	5.39
Adj. R^2	0.45	***SIC***	5.83
F-stat	3.41	***H-Q C***	5.47
Prob.(F-stat)	0.01	***DW***	1.61

Table 6 presents the results of short run nexus between physical infrastructure and economic growth using ARDL approach. As shown in the table, the lagged 1 period of GDPgr has positive and insignificant influence on current period of GDPgr while that of lag 2 has a significant impact. The current period of electricity production has a negative influence on Gross Domestic Product (GDP) growth rate while that of lag1 period indicate a positive relationship. While the current period of road and rail infrastructure show a negative connection with GDPPgr, the preceding period has a positive relationship. Hence, only the current period has a significant impact on Gross Domestic Product (GDP) growth rate at 1%. As regards air transport, while current period reveals positive relationship, lag 1 period shows otherwise. In telecommunication infrastructure, all the periods have a positive relationship with Gross Domestic Product (GDP) growth rate except the current period. Among all the periods, only lag 2 is statistically significant at 1%.

The R^2 of 64% implies that the variation in Gross Domestic Product (GDP) growth rate is explained by the regressors while 36% of variables not considered are captured by the error term. The adjusted R^2 of 45% explains the model fitness. The Durbin Watson of 1.61 indicates absence of autocorrelation in the model. The *f*-statistic results confirmed the existence of a short run relationship between physical infrastructure and economic growth in Nigeria.

Table 7. ARDL - Long Run Analysis (GDPgr)

	Long run analysis and Bound Test Dep: (Δ HDI)		
Dep Var/HDI	Coeff.	Std error	Prob.
C	300.80	375.39	0.43
EPR	0.61	0.37	0.11
RAL	-0.08	0.11	0.42
AIT	-0.07	0.16	0.67
COMM	-0.10	0.08	0.23
F-stat	1.19		
Upper Bound	4.01		
Lower Bound	2.86		
Sig. level	0.05		

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Table 7 presents the coefficient of electricity production, road and rail infrastructure, air transport and telecommunication infrastructure within the period of study. The coefficient of road and rail infrastructure, air transport and telecommunication infrastructure reflect a negative relationship while that of electricity production show a positive interaction with GDPgr. However, all these variables have no significant impact on GDPgr considering their pvalues exceeding 0.05. As regards the F- bound test, the F-statistic results fall below the lower and upper bound limits which explained the nonexistence of long run relationship among the variables.

Table 8: Diagnostic Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.453419	Prob. F(1,20)	0.2421
Obs*R-squared	2.235673	Prob. Chi-Square(1)	0.1349

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.796039	Prob. F(11,21)	0.6427
Obs*R-squared	9.710913	Prob. Chi-Square(11)	0.5566
Scaled explained SS	4.008969	Prob. Chi-Square(11)	0.9697

The result of diagnostic test was presented in table 8. These tests include LM and Heteroskedasticity tests. As shown in the table, the model is freed of autocorrelation and heteroskedasticity problems since their pvalues exceed 0.05.

Discussion

The pre-estimation techniques were conducted using descriptive and correlation analyses. From the results, it was found that the series show high level of consistency as appeared in their values. Road and rail infrastructure shows the highest mean value over the period. This is an indication that investment on road and rail has been increasing over the years. The increase in the standard deviation value of telecommunication infrastructure is not surprising as telecommunication has been affected by economic instabilities. The skewness coefficient show that all the variables are moderately skewed. In term normality test, it can be affirmed that all the series are normally distributed. In correlation analysis, only electricity production and telecommunication are highly correlated with each other. This is could be attributed to intertwine relationship between electric utilities and telecommunication technology.

In order to achieve valid results, the study subjected all the variables to a unit root test using ADF approach. It was discovered that Gross Domestic Product (GDP) growth rate and telecommunication infrastructure are stationary at level 1(0) while road and rail infrastructure, electricity production and air transport are stationary at first difference I(1).

AIC lag selection was employed and it was proved that lag 2 is deem appropriate for ARDL model. As regards the short run interaction between physical infrastructures and economic growth, the current period of electricity production has negative relationship with growth rate. This implies that a unit increase in electricity production will reduce growth rate overtime. However, the preceding period of electricity production indicate a positive connection

with growth rate. That is, as electricity production increases by one unit, growth rate rises by 0.38units. The reason for the negative relationship of current electricity is not farfetched as the electricity supplies in Nigeria drops in recent time.

The relationship between current period of road and rail infrastructure and telecommunication as well as lag 1 period of air transport show a negative relationship growth rate while the lag1 period of road and rail, current period of air transport, and the lag 1 and 2 periods of telecommunication reveal a positive connection with growth rate. Hence, the current period of road and rail has a significant impact on growth rate. This is attributed to recent increase in spending on road and rail constructions by the Nigerian government. Although the relationship is negative in recent time, the more government invests on this kind of infrastructure, the better the economy in the short run.

As revealed by the f-statistic results, it has been proven that a short run relationship exists between physical infrastructure and economic growth in Nigeria. However, f-statistic bound test shows that no long run relationship exists between the variables of study. This could be attributed to the level of physical infrastructure decay such as bad road, poor electricity supply and incessant network failure in Nigeria.

CONCLUSION

Based on the findings, the study concludes that a short run relationship exists between physical infrastructure and economic growth in Nigeria. Hence, physical infrastructure is an engine of growth and lubricant for obstacles of attracting foreign investments to improve economic performance. In view of this, the study recommends that:

There must be adequate improvement on road and electricity production in Nigeria if truly the country wishes to be among the top 20 economies of the world as stipulated in failed vision 2020. The policy makers should pay adequate attention to disaggregated infrastructure indices for better understanding of their impact on economic output within the short and long periods.

Hence, further research is required in term of infrastructural investment through Private-Public Partnership (PPP) as government alone cannot singlehandedly improves the economy considering the current problems of high unemployment rate, poverty and inflation rate that characterized Nigeria

REFERENCES

Adeyemo, A. M. (1989). Spatial variation in accessibility to secondary school facilities in Oyo State, Unpublished PhD Thesis, Geography Department, University of Ibadan, Nigeria.

Agénor, P. & Moreno-Dodson, B. (2006). Public infrastructure and growth: New channels and policy implications. *Policy Research Working Paper* No. 4064, Washington, D.C.: World Bank.

Agénor, P. (2009). Public capital, health persistence and poverty traps. *Discussion Paper Series*, No. 115, Manchester: Centre for Growth and Business Cycle Research, Economic Studies, University of Manchester.

Aworinde, O. B. & Akintoye, I. R. (2019). Institutions, infrastructure and economic growth in Nigeria. *Economica*, 15(3), 205-216.

Chan, A. P. C., P. T. Lam, D. W. Chan, E. Cheung, and Y. Ke. 2009. Drivers for adopting Public-Private Partnerships (PPP): Empirical comparison between China and Hong Kong special administrative region. *Journal of Construction Engineering and Management* 135(11). doi:10.1061/(ASCE)CO.1943-7862.0000088.

Davies, I. E., Nwankwo, C. O., Olofinnade, O. M., & Michaels, T. A. (2019). Insight review on infrastructural development during the SDGs in developing nations: A case study of Nigeria. 1st International Conference on Sustainable Infrastructural Development, 1-10.

Ebuh, G. U., Ezike, I. B., Shitile, T. S., Smith, E. S., & Haruna, T.M. (2019). The infrastructure-growth nexus in Nigeria: A reassessment. *Journal of Infrastructure Development*, 11(1), 41-58.

Eke, O. K., Lucky, W. I., & Nsikan, U. (2017). The impact of infrastructural development on Nigeria's industrial sector. *African Research Review*, 11(3), 23-30.

Hirschman, A. O. (1969). The strategy of economic development in Agarwal, A.N. and Singh, S.P.(eds), *Accelerating Investment in Developing Economies* (London Oxford Press, 1969).

Kari, U., Collins, O. & Ernest, E. (2019). The challenges of infrastructural development in Nigeria: An assessment of the pains and the gains. *International Journal of Political Science and Development*, 7(4), 101-108.

Koner, J., Purandare, A., & Dhume, A. (2012). An empirical study on impact of infrastructural development on social and economic growth in Indian States. *European Journal of Business and Management*, 4(17), 16-26.

Nedozi, F. O., Obasanmi, J. O., & Ighata, J. A. (2014). Infrastructural development and economic rowth in Nigeria: Using simultaneous equation. *Journal of Economics*, 5(3), 325–332.

Ogbaro, E. O. & Omotoso, D. C. (2017). The impact of infrastructural development on economic growth in Nigeria. Nigerian Journal of Management Sciences, 6(1), 270-275

Oke, A. E. (2013). Indices of infrastructural development in a developing economy: *Focus on Nigeria*: in Sustainable Infrastructural Development in a Developing Economy

Olaseni, M., & Alade, W. (2012). Vision 20:2020 and the Challenges of Infrastructural Development in Nigeria. *Journal of Sustainable Development, 5*(2), 63-66

Olufemi, E. A., Olatunbosun, A. J., Olasode, O. S., & Adeniran, I. G. (2013). Infrastructural development and its effect on economic growth: The Nigerian perspective. *European Scientific Journal*, 9(31), 431-452

Oshikoya, T.W., Jerome, A., Hussein, M. N., & Mlambo, K. (1999). Closing the infrastructure deficit. *In Proceedings of the African Development Bank Conference on "Can Africa Claim the 21st Century?",* 6-9 July, Abidjan.

Singer, H. (1958). The Concept of Balanced Growth and Economic Development; Theory and Facts," University of Texas Conference on Economic Development, April 1958.