Adebosin, W. G.; George, E. O.; Salami, L. A. et al.

Article

Relative impact of transport infrastructure investment on sectoral growth in Nigeria

Reference: Adebosin, W. G./George, E. O. et. al. (2019). Relative impact of transport infrastructure investment on sectoral growth in Nigeria. In: EuroEconomica 38 (2), S. 324 - 335.

EE
E u r o E c o n o m i c a
Issue 2(38)/2019 *ISSN: 1582-8859*

Relative Impact of Transport Infrastructure Investment on Sectoral Growth in Nigeria

Adebosin, W. G.[1], Prof. George, E. O.[2], Salami, L. A.[3], Saula, D. T.[4]

Abstract: Literature on the relationship between infrastructure investment and economic growth revealed divergent of results especially across sample periods and sizes, and model specifications. This study examined the relative impact of transport infrastructure investment on sectoral growth in Nigeria. Ex post facto research design was employed using annual secondary data sourced from CBN, WDI (2016). The investigation of the sectors of the Nigerian economy showed that road transport infrastructure was most significant (β= 29.65291, t= 2.69504, p>0.05), with industrial sector productivity (β= -0.686874, t=-1.38578, p>0.05) and agricultural sector productivity (β=-0.495217, t= -0.73817, p>0.05) not exerting a significant effect on economic growth in Nigeria. It was also evident that health sector productivity (β= -144.6662, t= [-2.70142, p<0.05) and education sector productivity (β= -18.36868, t= -2.74476, p<0.05) exert a significant negative effect on economic growth in Nigeria at 5% level of significance. It was thus concluded that road transport infrastructure does not have a significant effect on sectoral growth in Nigeria. Hence it was recommended that the government should embark on development policies that will aim at strengthening the sub-sector of the economy so that it can operate in its full capacity and improve its contribution to economic growth.

Keywords: Road transport infrastructure; Investment; Sectoral growth and Nigeria

JEL Classificatin: R41

Introduction

There is a clear consensus amongst scholars that infrastructure plays a critical and positive role in economic growth of any economy. Almost all development economic theories (Rostow (1960), Solow (1956), Harrod (1948) and Domar (1946), directly or indirectly consider infrastructure as a key determinant of growth and development. Infrastructure interacts with the economy through a web of complex economic relationships that is captured by aggregate production, employment and wellbeing. Generally, infrastructure increase productivity and expand economic activities through the resultant decline in transport, production and transaction costs, in addition to the facilitation of market access.

The significance of foundation advancement for monetary development is all around reported in the writing, beginning with crafted by Aschauer (1989), Barro (1990), Munnell (1990), World Bank (2014),Calderon, et al(2010), Sahoo, et al (2010), Onokoya, et al (2012), Cheteni (2013), Srinivasu and Rao, (2013) and so on.

[1] Department of Business Education, Micheal Otedola College of Primary Education, Noforija-Epe, Corresponding author: ddwalid3@gmail.com.
[2] Department Of Economics, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria.
[3] Department Of Economics, Chrisland University, Abeokuta, Ogun State, Nigeria.
[4] Department of Business Education, Micheal Otedola College of Primary Education, Noforija-Epe.

Transportation foundation is a significant deciding component in the advancement procedure of a country, since it helps in enhancing an economy' generation base, extending exchange and building assets and markets into a coordinated economy, which could increment straightforwardly or by implication the welfare of the individuals (Oladipo and Olomola, 2016). Access to great street organize encourages exchange by giving transportation of rural item to rustic ranchers and enabling a rancher's harvest to arrive at commercial centers, diminish voyaging time, bringing about lower transportation cost, better living conditions, a decrease in the quantity of fender benders (Akhmetzhanoy and Lustoy, 2013; Dietzenbacher and Tukker, 2013; Osayomi, 2013).

As highlighted by Onakoya, Salisu and Oseni (2012), infrastructural investment exerts significant impact on output of the Nigerian economy both directly (through its industrial output) and indirectly (through the output of other sectors such as manufacturing, oil and other services).

In the literature, several studies conducted on infrastructure and economic growth relationship gave divergence results. While some of the studies found positive link between infrastructure and economic growth (Adesoye, 2014; Easterly and Rebelo, 2003; Dash and Sahoo, 2010; Canning and Pedroni, 1999; Ijaiya and Akanbi, 2009;Srinivasu and Rao (2013); Fatkota, 2014; Yasim, 2009), other studies(Maku, 2009; Egbetunde and Fasanya, 2013;Onuwah and Akujobi, 2012) found negative relationship between the variables. The direction of causality also varies, while studies like Sturm, Jacobs and Groote (1999), Dash a,ndSahoo (2010) Pravakar, Rajan, Dash and Nataraja (2010) found unidirectional casualty that runs from infrastructure to growth, studies like Onakoya, Salisu and Oseni (2012),Kumo (2012),Rudra*et al* (2013) and Tong, Yu and Rolank (2014) found bidirectional casualty that runs between the variables, implying that infrastructure and economic growth have a feedback effect. However, Keho and Echui (2011), Onikosi-Alliyu (2012), Snieska and Simkunaite (2009) and Kustepeli, *et al* (2012) found no causal link between the two variables.

Despite the fact that Nigeria is a resource based economy with high rate of government expenditure and various financial institutions, yet the country is faced with different macroeconomic problems ranging from unemployment, corruption, terrorism, insurgency, Fulani/herdsmen crisis, inadequate credit facilities and dilapidated infrastructural facilities that crippled the economy (Usman, Nathan & Kumar, 2016).

This study is to investigate the impact of road transport infrastructure investment on economic growth in Nigeria and specifically to examine the trend and pattern in road transport infrastructure investment in Nigeria and examine the impact of road transport infrastructure investment on selected sectors of the Nigerian economy.

Theoretical Review

Many studies have analysed the relationship between infrastructure and economic development. The general consensus from these studies is that the basic infrastructural facilities are related to economic performance including Barro (1988), Aschauer (1989) and (Calderon and Serven, 2008). Pravakar (2010) advocated that investment in infrastructure creates; production facilities and stimulates economic activities, reduces transaction costs and trade costs improving competitiveness and provides

employment opportunities to the people while in contrast, lack of infrastructure creates bottlenecks for sustainable growth and poverty reduction. Infrastructures are the basic amenities or social capital of a country, or a part of it, which make economic and social activities possible by providing transportation, public health and education services and buildings for community activities, railways, airports, hospitals, schools, roads, sewage systems and reservoirs etc., constitute the major types of infrastructure investment (Sedar, 2007).

Transportation modes in Nigeria include roads, railways, airways, inland waterways, coastal waters, the deep sea and the pipeline (Anyanwu et al, 1997). The potential significance of road development for investment, trade, growth and poverty alleviation has long been recognised. Not only does road transport infrastructure facilitate the direct provision of services to consumers it also provides intermediate inputs that enter into production of other sector and raise factor productivity (Ighodaro, 2006). According to Onakomaya (2005), the economic development of Nigeria has reflected the development of her transport system that is particularly true of the road transport system, which is by far the most widely used mode of transport in the country of all commodity movement to and from the sea ports, at least two-thirds are now handled by road transport while up to 90% of all other internal movement of goods and person take place by roads.

The theoretical foundations of the effect of infrastructure on growth and more generally on development outcomes are mostly found in Growth theory (Aghionand Howitt, 1998; Agenor, 2004; Agneor, 2010; Agenorand Moreno-Dodson, 2006; Barrow and Sala-i-Martin, 2004 and Straub, 2007). Economic growth is the increase in the amount of the goods and services produced by an economy over time (Sullivan, Arthur; Steven and Sheffrin, 2003.

The Centre for Spatial Economic (2004) in a report titled 'Asset-Based Financing, Investment and Economic Growth in Canada' prepared for the Canadian Finance and Leasing Association identifies two basic schools of thought: the Neoclassical model first described by Solow (1957) and Swan (1956) and the New growth theory (also known as Endogenous growth theory) articulated by Romer (1986 and 1990), Lucas (1988) and Grossman and Helpman (1991). This study is based on the endogenous theory because the models emphasises technical progress.

Canning and Pedroni (2004) applied panel cointegration techniques to test whether GDP per capita and paved roads per capita form a long-run relationship and direction of causality. Their data cover 42 developed and developing countries between 1961 and 1990. They find support for cointegration and that causality runs in both directions. Furthermore, they find evidence of cross-country heterogeneity in terms of causality as well as regarding the sign of the long-run parameter. The observed heterogeneity suggests the need to also examine country groups, but in their paper this does not seem to alter their conclusions.

Sahoo and Dash (2012) investigated the impact of infrastructure on output by developing an index of infrastructure stocks for South Asian countries. Finding shows that infrastructure development contributes significantly to output growth. Furthermore, there is a two-way causality between total output and infrastructure development. Robles (1998) also find similar results of the impact of infrastructure on growth for Latin American countries.

Hassan and Abdullah (2017) examined the role of government revenue and expenditure on economic output of agriculture, industrial and services sectors in Sudan. The study analyses the impact of government expenditure components on sectoral output for the period1960-2013 by applying ARDL and bound approach for co-integration as the methods of estimation. The results show that the government expenditure components have long-run effect in agriculture and industrial GDP but not supporting the services sector output in Sudan.

Sahoo, Dash and Nataraj (2010)used six sub-headings under the foundation list to reveal the effect on development for China for the period 1975-2007.These sub-headings are electric power utilization per capita, vitality utilization per capita, phone lines per thousand, railroad line per thousand, the quantity of individuals utilizing aviation route and the level of walkways to the complete streets length. Discoveries of the investigation represent that creating framework strongly affects development. Foundation speculations have a more noteworthy effect than the ventures of open and private segment. There is a unidirectional causality interface from framework to development. Hong, Chu and Qiang(2011)also utilized transportation framework to analyze its effect on development for China. Result show that interstate and drinkable water foundation ventures effectively affected development. It was discovered that there is a development in spite of the fact that thruway foundation ventures were low. Moreover, water foundation ventures additionally have constructive outcome on development when a specific measure of speculation was realized. In any case, the impact of aviation routes framework speculations was not adequate.

Oyesiku, Onakoya and Folawewo (2013) also investigated the impact of public sector investment in transport on economic growth, using Nigeria as a case study. The empirical model for the study was developed using the endogenous growth model in which transport investment entered into the production function as input, using the Ordinary Least Squares (OLS) estimation technique and time series properties tests conducted on variables. Their findings show that transportation played an insignificant role in the determination of economic growth in Nigeria. An increase in public funding and complete overhauling of the transportation system in the country was recommended.Onakoya and Somoye (2013) examine the impact of public capital expenditure on economic growth in Nigeria using three-stage least squares (3SLS) technique and macro-econometric model of simultaneous equations to capture the disaggregated impact of public capital expenditure on the different sectors of the economy. Their study shows that public capital expenditure contributes positively to economic growth in Nigeria. The results also indicate that public capital expenditure directly promotes the output of oil and infrastructure but is directly deleterious to the output of manufacturing and agriculture.

Usman *et al* (2011), in their study, explained how public expenditure is used as proxy for public capital which is further decomposed by sectors. This helps to investigate the impact of each sector on economic growth. A multivariate time series framework was used. Augmented Dickey- Fuller test indicated that two of the variables are stationary at levels. Philip Peron test show that there are stationary at levels and others became stationary at first difference. Result of the regression show that in the short run public spending has no impact on growth. However, cointegration and VEC results show that there is long run relationship between public expenditure and growth.

Methodology

The study employed an *ex-post* facto research design using annual secondary data sourced from Central Bank of Nigeria (2016), National Bureau of statistics and World Development Indicator, for the period of 1980 – 2015. This is to capture various development plans and event in the country's growth process such as the Structural Adjustment Programme (SAP) of the 1980s, the Economic boom of early 1990s, the return to democracy in 1999, Transformation Agenda 2011 and GDP rebasing of 2014.

Theoretical Framework

The endogenous growth model argues that any shocks to infrastructure has an effect of increasing the steady state level of output (Lucas, 1988, Barro, 1990). Production function framework can be used to explain the connection between investment and economic growth where infrastructure is included as an additional factor of production by incorporating it in the neoclassical growth model (Samuel and Strike, 2016). Factors of production can be captured by the general Cobb-Douglas function (Sahoo *et al*, 2012 and Akanbi and Ijaya, 2009)

$$Y_i = (A, K, L, \text{Infrastructure}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

This model shows that economic growth, Y_i, depends on the level of capital, K, labour force, L and the level of expenditure on infrastructure.

Both K and L are interaction variables between road transport infrastructure investments and economic growth and as interaction variables they are assumed to be constant (Ijaya and Akanbi, 2009)

We further replace Q in the function above with **rgdp** and adjust the independent variables accordingly to yield:

$$Yt = RGDP = \beta_0+\beta_1RDTRI+\beta_2INDP+\beta_3AGRP+ \beta_4HSP + \beta_5EDUP\ldots\ldots.. \quad (2)$$

Where:

Yt = Real Gross Domestic Product

X_1 = Road Transport Infrastructure investments

X_2 = Industrial sector productivity

X_3 = Agricultural sector productivity

X_4= Health sector productivity

X_5 = Education sector productivity

μ, α, β, ƹ, ƶ, σ, ∂, φ = Parameters that represent technology

The Cobb-Douglas production function is known to exhibit a non-linear relationship and the appropriate transformation is to develop the logarithmic form of the variables in equation 5. We therefore estimate the econometric relationship as:

$$Yt = A +\alpha LnX_1 + \beta LnX_2 + ƹLnX_3 + ƶLnX_4 + \sigma LnX_5 + Z\ldots\ldots\ldots.. \quad (3)$$

Where *Z* is the stochastic error term

The a-priori expectations are:

α>0,β>0,ε>0, ɀ>0, σ>0, ∂>0, φ>0

This econometric growth model for this study is adapted from the works of Igbokwe,(2015). Ogundipe & Aworinde (2011); Oyesiku,Onakoya & Folawewo (2013); Owolabi & Ibukun-Fakayi (2015) and Oladipo and Olomola (2016). Specifically, while Ogundipe and Aworinde (2011) and Owolabi and Ibukun-Fakayi (2015), which incorporate indicators for economic growth, private capital investment (as done in this study), but their models do not include proxies for industrial sector, agricultural sector, and manufacturing sector productivities. Also, Ogundipe&Aworinde (2011) and Owolabi & Ibukun-Fakayi (2015) use Gross Domestic Product (GDP) instead of real gross domestic product (rgdp) been used in this study. Also, Oladipo and Olomola (2016) model does not include all the variables used in this study except real GDP and road transport infrastructure investment.

In order to satisfy the study's objective, equation (3) can be expressed in a natural log form as:

$$\text{InGDP}t = a_0+\beta_1\text{InX}_1+\beta_2\text{InX}_2+\beta_3\text{InX}_3+\beta_4\text{InX}_4+\beta_5\text{InX}_5 +u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots 4$$

The expected sign of estimators is $\beta_{1,2,3},\beta_4,\beta_5,\beta_6 > 0$.

The dynamics between road transport infrastructure investment and growth can be analyzed using the following VAR(p) model:

$$\text{In}Y_t = a_0 + \sum_{i=1}^{p} \theta_i \, \text{In}Y_{t-i} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

whereY_t is a k×1 vector for all seven endogenous variables, i.e. real GDP, road transport infrastructure investment, industrial sector productivity, agricultural sector productivity, manufacturing sector productivity, Health and education sector productivities, private capital investment and economic growth.a_0 represents the intercept coefficients, θi are $k \times k$ coefficient matrices for all regressors, p is the VAR order or lag length and ut is a vector of independently distributed error terms.

An impulse response function is employed for a graphical presentation of impulse reactions between real GDP, road transport infrastructure investments, industrial sector productivity, agriculture productivity, e.t.c, under the VAR model. Should the variables be either (1) or (2) and cointegrated, the VECM presentation of the model is given as:

$$\Delta\text{In}Y_t = a_0 + \Pi \, \text{In}Y_{t-1} + \sum_{i=1}^{p-1} \Phi_i \, \Delta\text{In}Y_{t-i} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6$$

where Δ is the first difference parameter, Yt is a k×1 vector for all endogenous variables, Π is a $k \times k$ long run multiplier matrix and Φi are $k \times k$ coefficient matrices describing the short run dynamic effects.

Results and Discussion

Descriptive Analysis

The result of the Jarque-Bera test of normality for the descriptive evaluation of the data and establish the nature of the distribution of the data is presented in table 1.

Table 1. Descriptive statistics

	RGDP	RDTRI	INDP	AGRP	HSCP	EDUP
Mean	30294002	12963.90	9155159.	6760772.	200698.4	502272.2
Median	22060982	2047.750	8523708.	4390461.	153348.8	336011.2
Maximum	69023930	90028.00	13791247	15952220	484336.5	1498707.
Minimum	13779255	31.42200	5264881.	2303505.	110697.7	242555.9
Std. Dev.	17253201	20223.47	2500230.	4521295.	108172.5	350258.2
Skewness	0.985031	2.211583	0.305948	0.759787	1.442899	1.637599
Kurtosis	2.591488	8.028920	1.854878	2.050219	3.814121	4.468277
Jarque-Bera	6.072038	67.28164	2.528583	4.816784	13.48594	19.32413
Probability	0.048026	0.000000	0.282439	0.089960	0.001179	0.000064
Sum	1.09E+09	466700.5	3.30E+08	2.43E+08	7225142.	18081798
Sum Sq. Dev.	1.04E+16	1.43E+10	2.19E+14	7.15E+14	4.10E+11	4.29E+12
Observations	36	36	36	36	36	36

Source: Authors' computation, 2017

The result of the descriptive analysis of the data showed that the mean and median of all the variables in the data set as presented in Table1 lie within the maximum and minimum values. All the variables are positively skewed and highly symmetrical since their means are greater than their medians and skewness coefficient is greater than one. The positive values of the kurtosis of all the variables established the fact that these variables are leptokurtic in nature. The values of the Jarque-Bera statistic show that real GDP, road transport infrastructure RDTRI, agricultural sector productivity AGRP, health sector productivity HSCP and education sector productivity EDUP are normally distributed since their p-values are statistically significance at 5% level of significant while industrial sector productivity INDP is not. Hence, the result shows that most of the variables are normally distributed except for industrial sector productivity INDP.

Unit root test

The unit root test result using Augmented Dickey Fuller (ADF) to examine the stationarity of the chosen variables is presented as follows:

Table 2. Unit root test results.

	Variables	ADF test (Prob)	PP test (Prob)	Order	Stationary at
		Cons &trend	Cons &trend		
Level	**RGDP**	0.9567	0.9918	-	-
	RDTRI	0.0112	0.4141	I(0)	Level (ADF)
	INDP	0.1093	0.1075	-	-
	AGRP	0.9159	0.9159	-	-
	HSCP	1.0000	1.0000	-	-
	EDUP	1.0000	1.0000	-	-
First Diff	**ΔRGDP**	0.0667	0.0449	I(1)	1st Diff (PP)
	ΔRDTRI	0.0022	0.0000	I(1)	1st Diff
	ΔINDP	0.0004	0.0004	I(1)	1st Diff
	ΔAGRP	0.0002	0.0002	I(1)	1st Diff
	ΔHSCP	0.0646	0.0430	I(1)	1st Diff (PP)
	ΔEDUP	0.2562	0.0000	I(1)	1st Diff

Source: Authors' computation, 2017

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level

The result of the Phillip-Perron unit root test showed that although all the variables are non- stationary at 5% level of significance, they were found to be stationary at their first difference. The Augmented Dickey Fuller Test showed that all are stationary at first difference [I(1)] and at 5% level of significance except road transport infrastructure all other variables are all non- stationary at level but after taking their first difference all other variables becomes stationary while RGDP remain non-stationary even at first difference. The study concludes that all the variables are stationary at first difference based on the Phillip-Peron test which performed better.

Trend Analysis of Transport Infrastructure Investment in Nigeria

The trend and pattern in transport infrastructure investment in Nigeria as stated in the first objective is presented using the line graph is presented as:

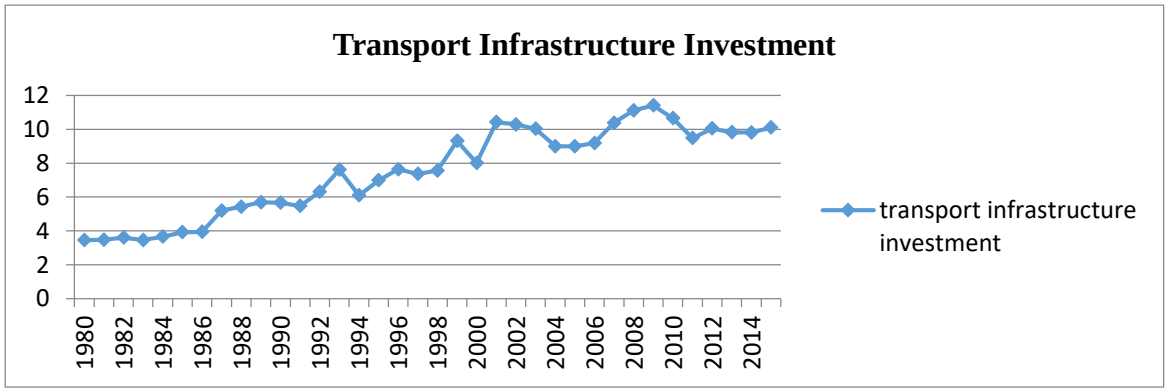

Figure 1. Trend of Economic Growth in Nigeria 1980-2015

Source: Authors' computation, 2017

The trend of transport infrastructure investment as shown in figure 1 showed that, the growth in transport infrastructure investment which increased sluggishly between 1980-1987 has been rising and falling over the entire period. It is evident from the trend analysis using the line graph that over the entire period there is a significant variation in the pattern of movement in transport infrastructure investment in Nigeria

Empirical Analysis impact of road transport infrastructure investment and economic activities

The VAR estimation results to examine the impact of road transport infrastructure investment and economic activities in Nigeria as stated in the fourth objective is presented in table 3**.**

Table 3. Vector Autoregression Estimates

Dependent variables→	ΔRGDP	ΔRDTRI	ΔINDP	ΔAGRP	ΔHSCP	ΔEDUP
C	774891.2	-342.7296	-78524.75	108324.5	37468.78	85214.47
	(1613155)	(27420.5)	(1112116)	(1096400)	(9818.43)	(38841.8)
	[0.48036]	[-0.01250]	[-0.07061]	[0.09880]	[3.81617]	[2.19389]
$\Delta RGDP_{t-1}$	1.785879	0.006578	0.051940	0.569070	0.013992	0.054019
	(0.50323)	(0.00855)	(0.34693)	(0.34202)	(0.00306)	(0.01212)
	[3.54885]	**[0.76906]**	**[0.14971]**	**[1.66383]**	**[4.56822]**	**[4.45818]**
$\Delta RDTRI_{t-1}$	29.65291	0.633977	-6.561880	17.72357	-0.186903	-1.648096
	(11.0028)	(0.18703)	(7.58536)	(7.47817)	(0.06697)	(0.26493)
	[2.69504]	[3.38978]	[-0.86507]	[2.37004]	[-2.79093]	[-6.22095]
$\Delta INDP_{t-1}$	-0.686874	-0.006411	0.527854	-0.089361	-0.018021	-0.056524
	(0.49566)	(0.00843)	(0.34171)	(0.33688)	(0.00302)	(0.01193)
	[-1.38578]	[-0.76094]	[1.54474]	[-0.26526]	[-5.97352]	[-4.73612]
$\Delta AGRP_{t-1}$	-0.495217	0.003542	0.443802	0.313404	-0.019371	-0.063434
	(0.67087)	(0.01140)	(0.46250)	(0.45597)	(0.00408)	(0.01615)
	[-0.73817]	[0.31063]	[0.95957]	[0.68734]	[-4.74412]	[-3.92698]
$\Delta HSCP_{t-1}$	-144.6662	0.752963	-55.09816	-44.73978	-0.701470	-3.409403
	(53.5519)	(0.91028)	(36.9189)	(36.3972)	(0.32594)	(1.28943)
	[-2.70142]	[0.82718]	[-1.49241]	[-1.22921]	[-2.15213]	[-2.64412]
$\Delta EDUP_{t-1}$	-18.36868	-0.243730	-10.32102	-7.371714	-0.046752	0.480675
	(6.69228)	(0.11376)	(4.61368)	(4.54849)	(0.04073)	(0.16114)
	[-2.74476]	[-2.14257]	[-2.23705]	[-1.62070]	[-1.14779]	[2.98301]
R-squared	0.999179					
Adj. R-squared	0.998710					
F-statistic	2130.713					
Log likelihood	-493.7042					
Akaike AIC	29.80613					
Schwarz SC	30.38974					

Note: Standard errors in ( ) & t-statistics in [ ]

Source: Authors' computation, 2017

The result obtained from the analysis shows that road transport infrastructure (β= 29.65291, t= 2.69504, p>0.05), industrial sector productivity (β= -0.686874, t=-1.38578, p>0.05) and agricultural sector productivity (β=-0.495217, t= -0.73817, p>0.05) do not exert a significant effect on economic growth in Nigeria. While health sector productivity (β= -144.6662, t= [-2.70142, p<0.05) and educational sector productivity (β= -18.36868, t= -2.74476, p<0.05) exert a significant negative effect on economic growth in Nigeria at 5% level of significance.

In line with a priori expectation, the positive insignificant effect of road transport infrastructure was in conformity with a priori expectation while the negative insignificant effect of industrial sector productivity invalidate a priori expectation. Also, the negative significant effect of agricultural sector productivity and health sector productivity invalidated the a prior expectation

Discussion of Findings

The preliminary results based on Jaque-Bera normality test showed that most of the variables are normally distributed except for industrial sector productivity INDP. The study found that all the variables stationary at first difference based on the Phillip-Peron test which performed better and was evident from the trend analysis using the line graph that over the entire period there is a significant variation in the pattern of movement in transport infrastructure investment in Nigeria. The investigation of the sectors of the Nigerian economy that investment in transport infrastructure most significant showed that road transport infrastructure (β= 29.65291, t= 2.69504, p>0.05), industrial sector productivity (β= -0.686874, t=-1.38578, p>0.05) and agricultural sector productivity (β=-0.495217, t= -0.73817, p>0.05) do not exert a significant effect on economic growth in Nigeria. It was also evident that health sector productivity (β= -144.6662, t= [-2.70142, p<0.05) and educational sector productivity (β= -18.36868, t= -2.74476, p<0.05) exert a significant negative effect on economic growth in Nigeria at 5% level of significance.

The result established that road transport infrastructure does not have a significant effect on economic growth in Nigeria and corroborated the findings in the study conducted by Oyesiku, Onakoya and Folawewo (2013) on the impact of public sector investment in transport on economic growth, using Nigeria as a case study. Their findings show that transportation played an insignificant role in the determination of economic growth in Nigeria. The result was also in part in line with the findings of Oyesiku, Onakoya and Folawewo (2012) on the impact of infrastructure on economic growth in Nigeria using the multivariate model of simultaneous equations and three-stage least squares technique to capture the transmission channels through which infrastructure promotes growth. The finding shows that infrastructural investment has a significant impact on output of the economy directly through its industrial output and indirectly through the output of other sectors such as manufacturing, oil and other services. The agricultural sector is however not affected by infrastructure. The result also shows a bi-directional causal relationship between infrastructure and economic growth. The result however contradicts the findings Onakoya and Somoye (2013) on the impact of public capital expenditure on economic growth in /Nigeria. Their study shows that public capital expenditure contributes positively to economic growth in Nigeria. The results also indicate that public capital expenditure directly

promotes the output of oil and infrastructure but is directly deleterious to the output of manufacturing and agriculture.

Conclusion

The investigation of the sectors of the Nigerian economy revealed that investment in transport infrastructure was most significant (β= 29.65291, t= 2.69504, p>0.05), while industrial sector productivity (β= -0.686874, t=-1.38578, p>0.05) and agricultural sector productivity (β=-0.495217, t= -0.73817, p>0.05) do not exert a significant effect on economic growth in Nigeria. It was also evident that health sector productivity (β= -144.6662, t= [-2.70142, p<0.05) and educational sector productivity (β= -18.36868, t= -2.74476, p<0.05) also exert a significant negative effect on economic growth in Nigeria at 5% level of significance. The result established that road transport infrastructure does not have a significant effect on economic growth in Nigeria. This pointed to the low level of investment in transport infrastructure and poor state of road infrastructural facilities in Nigeria.

Recommendations

Following the empirical findings, the following recommendations are made for effective policy formulations.

- Government should increase its public funding and complete overhauling of the transportation system in the country
- The government should embark on development policies that will aim at strengthening the sub-sector of the economy so that it can operate in its full capacity and neutralise the decadence that is evident in the sector.
- There is the urgent need for private sector participation. Government should encourage public-private partnership option which can be adopted as panacea for revitalizing the transport system to enable it play its key development role in the Nigerian economy.

References

Agénor P.-R. & Moreno-Dodson, B. (2006). *Public Infrastructure and Growth*: New Channels and Policy Implications, World Bank Policy Research Working Paper 4064.

Aghion, P & Howitt, P. (1992). A Model of Growth Through Creative Destruction. *Econometrica*, Vol.60, No.2, pp. 323-351.

Akhmetzhanoy, B. A., & Lustoy, N. S. (2013). High speed mainlines and their contribution to regional development. *Problems of Economic Transtition*, 56(3), 44-48. Doi:10.2753/PET1061-1991560305.

Anyanwu, J.C; Oaikhena, H., Oyefusi, A. & Dimowo, F.A. (1997). *The Structure of the Nigerian Economy (1960-1977)* Onitsha, Nigeria: Joanne Educational Publishers Ltd.

Aschauer, D.A (1989). Is public expenditure productive? *Journal of Monetary Economics*, Vol.23, No.2, pp. 177-200.

Barro, R. & Sala-i-Martin X. (2005). *Growth Theory, 2nd Ed.*, MIT Press.

Calderon, Cesar, & Luis Serven (2010). Infrastructure in Latin America. *Policy Research Working Paper* 5317, World Bank, Washington, D.C.

Cheteni, P. (2013). Transport Infrastructure Investment and Transport Sector Productivity on Economic Growth in South Africa (1975-2011). *Mediterranean Journal of Social Sciences*, MCSER Publishing, Rome-Italy.

Domar, ED. (1947). Capital expansion, rate of growth and employment, *Econometrica*, Vol.14, No.2, pp.137-147.

Easterly, W. & S. Rebelo (1993). Fiscal policy and economic growth An empirical investigation. *Journal of Monetary Economics* 32: 417-458.

Grossman, GM. & Helpman, E. (1991). Quality ladders in the theory of growth. *The Review of Economic Studies*, Vol.58, No.1, pp.43-61. 201.

Harrod, RF. (1948). *Towards a dynamic economics*. London, UK: Macmillan.

Hassan K., Abdullah A. (2017). The role of public sector in economic growth evaluation for the impact of government expenditure in sectoral output: The case study of Sudan. Global Business and Management Research: *International Journal*. 2017; 9(1).

Hong J., Chu Z., Qiang W. (2011). *Transport infrastructure and regional economic growth*: Evidence from China. Transportation. 2011;38(5):737–752.

Ighodaro, A. U. (2008). Road Infrastructure and Economic Growth in Nigeria. Paper Presented at the First *International Conference on Transport* Infrastructure (ICTI 2008), Beijing, China, April 24th – 26th, 2008

Ijaiya GT., Akanbi SB. (2009). An empirical analysis of long run effect of infrastructure on industrialisation in Nigeria. *J.Int. Econ*. Rev., 2: 135-149.

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

Munnell, A. H. (1990). *Why Has Productivity Declined? Productivity and Public Investment*. Investment, Federal Reserve Bank of Boston. Boston.

Onakoya, O., Salisu, B. & Oseni, I., (2012) Infrastructure and economic growth in Nigeria: A multivariate approach. *Journal of Business Management and Accounting* Vol. 1(3), (030 – 039).

Osayomi, T. (2013). Regional determinant of road traffic accidents in Nigeria identifying risk areas in need of intervention. *African Geographical Review, 32(1)*, 88-99. Doi:10.1080/19376812.2012.750224.

Oyesiku K, Onakoya A. B. & Folawewo A. (2013). *An Empirical Analysis of Transport Infrastructure Investment and Economic Growth in Nigeria*. Social Sciences, Vol. 2, No. 6, 2013, pp. 179-188. doi: 10.11648/j.ss.20130206.12.

Pravakar, S. (2010). *Infrastructure Development and Economic Growth in China*. Institute of Developing Economies, JETRO.

Romer, P. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, Vol. 94, No.5, pp. 1002-1037.

Sahoo P., Dash R. K. (2012). Economic growth in South Asia: Role of infrastructure. *The Journal of International Trade & Economic Development*. 2012;21 (2):217–252.

Sahoo P., Dash RK., Nataraj G. (2010). Infrastructure development and economic growth in China. *IDE Discussion Paper*, No. 261,Institute of Developing Economics; 2010.

Sahoo, P, Dash, R.K & Nataraj, G. (2010). *Infrastructure Development an Economic growth in China*. IDE Discussion paper No. 261.

Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, Vol. 70, No. 1, pp. 65-94.

Srinivasu, B. & Rao, P.S. (2013). Infrastructure development and economic growth: prospects and perspective. *Journal of Business Management and Social Sciences Research* (JBM SSRN), Vol. 2, No. 1.

Sullivan, A. & Sheffrin, M. S. (2003). *Economics: Principles in action*. Upper Saddle River, New Jersey 07458: Pearson Prentice Hall.

Swan, T. (1956). Economic growth and capital accumulation. *Economic Record*, 32 (4): 334–361.

World Bank (2014). *Africa Development Indicators*. www.worldbank.org.