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Public Spending on Transport Infrastructure and Economic Growth in Nigeria, 1981-2010

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Abstract

Transport remains one of the major infrastructural facilities critical for sustainable economic growth and development of any nation including Nigeria. This paper examined public spending on transport infrastructure and economic growth in Nigeria. The study employed the Ordinary Least Square (OLS) regression method to analyze the data collected. The data analyzed show that public spending on transport infrastructure is negatively related to growth and insignificant. The study recommended that government must ensure adequate funding of transport sector. And that fiscal responsibility laws be properly implemented to ensure greater accountability and prudence in the funds allocated to transport sector. This would go a long way to boost employment, sustainable economic growth and development in Nigeria.

Key words: *Public Spending, Transport, Infrastructure, Economic Growth..*

1. INTRODUCTION

Transportation is the process of conveying or moving goods and people from one place to another. It occupies an important role in a country's commercial life, industry and in the overall economic growth and development of any given economy.

The potential significance of transport development for investment, trade, growth and poverty alleviation has long been recognized. Not only does transport infrastructure facilitate the direct provision of services to consumers, it also provides intermediate inputs that enter into the production of other sectors and raise factor productivity. By lowering the cost and reducing the time of moving goods and services to where they can be used more efficiently,

transport development adds value and spurs growth (Ighodaro, 2009).

Transport development can contribute to the economy directly through addition to capital stock via increase in transport infrastructure. Transport provides the arteries through which the economic life of the people, information and raw materials as well as finished products can be moved from one place to the other. Transport is the cornerstone of civilization. As the society and economic organizations become complex, the relevance of transport grows. Also, the demand for transport is a derived demand because it depends on the demand for the commodities carried or the benefit of personal travel across space and time.

According to Oni and Okanlawon (2010), Nigeria's economy suggests that transportation costs form significant proportion of the final price of most goods such as agricultural goods, manufactured goods, and mining products. They observed that on the average, transport accounts for more than 30% of the value of the delivered product. The high cost is attributable to the inadequacy and inefficiency in Nigeria's transport infrastructure.

Transport costs on the feeder roads to the trunk roads and the railway to the post often cost as much as between 55 and 60 percent of the receipts from these commodities. Also, the price elasticity of demand for transport is very high in Nigeria's transport system. The more efficient the transportation network is, the lower the transport costs. At present, large productions of the economically important goods are bulk low valued agricultural and mining products (Olanrewaju and Falola, 1986).

The fact remains that transport infrastructure needs cut across sectors and is central to economic growth and development. The state of infrastructure for economic development in the country is far from meeting the expectations of the average investor in the Nigerian economy. This inhibits investments and increases the cost of doing business.

In view of the foregoing, this paper examines the extent to which public spending on transport infrastructure has contributed to economic growth in Nigeria.

2. LITERATURE REVIEW

2.1 Theoretical Framework

The theoretical basis of this paper centers on the concept of unbalanced growth theory. The theory of unbalanced growth is associated with Hirschman (1958) Nurske (1961) also favoured the unbalanced growth theory. The theory is a direct opposite of the doctrine of balanced growth. According to Hirschman, "investment should be made in selected sectors rather than simultaneously in all sectors of the economy.

To Hirschman, "a deliberate unbalancing of the economy according to a pre-designed strategy, is the best way to achieve economic growth in an underdeveloped country. He noted that investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and so pave way to further economic development.

He noted that the unbalancing of the economy with social overhead capital (SOC) will encourage private investment later in directly productive activities. Social overhead capital comprises of the basic services without which primary, secondary and tertiary productive activities cannot function. Social overhead capital include: investment in education, public health, communications, transportation and conventional public utilities such as electricity,

water, irrigation and drainage schemes, etc.

The theory suggests that a large investment in SOC will bring about increase in private investment in the form of direct productive activities (DPA). For example, cheaper supply of electric power may encourage the establishment of small industries. SOC investments indirectly subsidize agriculture industry by cheapening various inputs which they use or by reducing costs. Unless SOC investments provide cheap or improved services, private investments in DPA will not be encouraged. Thus, the SOC approach to economic development is to unbalance the economy so that subsequently investments in DPA are stimulated.

The doctrine of the unbalanced growth, have been regarded as a heroic attempt at explaining how to accelerate economic development for underdeveloped countries. It is realistic and takes into accounts, almost all aspects of development planning.

This theoretical position was followed by Nurudeen and Usman (2010), and Ogundipe and Aworinde (2011) in their separate analysis of the impact of public spending on infrastructure on economic growth in Nigeria. There is the believe that following this line of thought offers appropriate analysis of the relationship between public spending on transport infrastructure and economic growth in Nigeria, hence, the adoption of this model.

2.2 Empirical Studies

The attempt to measure empirical relationship between growth in infrastructure and total economic growth using macroeconomic model started with Mera (1973), Ratner (1983) and Biehi (1986). Though the early analytical explorations of the contributions of public infrastructure to economic productivity can be traced to scholars mentioned above, it was the study carried out by Aschauer (1989) on the economic contribution of public investment, of which transport capital forms part for the G7 countries using panel data for the period 1966-1985 that drew the attention of mainstream economists and policy personnel. Following the seminal work of Aschauer (1989), interest in the relationship between economic growth and infrastructure had been rekindled and as a consequence, a large body of mainly empirical studies to support the conclusion that infrastructure is important to the economy emerged.

Many of these studies, based on the production function approach assume public capital as one of the direct input factors. Pereira (2000) cited in Zou et al., (2008), applied sophisticated production function on time series data of the US in 1970-1983. His finding is that among core infrastructure, the investment return on electricity and transport is the highest, 16.1% and 9.7% respectively; both are higher than that of education and Medicare.

In another study, Canning and Bennathan (2000) cited in Boopen (2006) estimated Cobb-Douglass production function for a panel set of 89 countries; using annual cross country data for the period of 1960-1990 and reported a positive rates for the case of paved roads.

In his contribution to empirical analysis of transport-economy linkage, Zhu (2009), applied production function approach on panel data covering the period between 1992 and 2004 to compare transport-economy linkage of developed countries and developing countries. His results indicate that physical units of transport infrastructure are positively and

significantly related to economic growth and the output elasticity with respect to physical units for developed countries is higher than developing countries.

Boopen (2006), analyzed the contribution of transport capital to growth for a sample of Sub Saharan African (SSA) and a sample of Small Island Developing States (SIDS), using both cross sectional and panel data analysis. In both cases, the analysis concluded that transport capital has been a contributor to the economic progress of these countries. Analysis further revealed that in SSA case, the productivity of transport capital stock is superior as compared to that of over all capital while such is not the case for the SIDS where transport capital is seen to have the average productivity level of over-all capital stock.

In a research of transport investment and growth in developing economies, Demurger (2001) cited in Zou (2008) examined data of 24 provinces of China in 1985-1998 and points out that the inequality of transport infrastructure is one of the main factors leading to growth inequality across provinces. Using a time series analysis for the investment into road infrastructure and economic growth in South Africa, Fedderke et al (2006) cited in Moctezuma (2008) find that road infrastructure does indeed lead to economic growth in South Africa both by boosting GDP directly and by raising the marginal products of other productive factors.

Some researchers explored the impact of public capital on the growth rate of output. Canning et al (2004) cited in Zhu, (2009) used physical measures like kilometers of paved road to investigate "the long run consequences of infrastructure provision on per capita income in a panel data" covering the period between 1950 and 1992. His estimated results suggested that for paved road the sign of the impact of an increase in provision on GDP per capita varies across countries.

Other studies reported that the importance of infrastructure to economic development has been over emphasized. For instance, Tatom (1991) confirmed that public sector capital investment has no significant effect on output of the private sector and investment.

Duranton and Turner (2008) estimated the effects on major cities roads and public transits on the growth of major cities in the US between 1980 and 2000 and found that a 10 percent increase in city's stock of roads causes about a 2 percent increase in its population and employment and a small decrease in its share of poor households. Zou, et al (2008) in their own study of transport infrastructure, growth, and poverty alleviation in East and central China with panel data of 1994 to 2002 and a time series data of 1978-2002 reported a higher growth level from better transportation.

3. Model Specification and Analytical Procedure

3.1 Model Specification

The model specified to measure the extent to which public spending on transport infrastructure has affected economic growth in Nigeria is derived from the recent empirical work of Ogundipe and Aworinde (2011) on sectoral analysis of the impact of public investment on economic growth in Nigeria, 1970-2008. The consideration of Ogundipe and Aworinde (2011), lies on the fact that their work has a link with this particular study. Ogundipe and Aworinde model is thus presented:

GDP = U(L,K,KAGEXP, KEDUEXP, KTCEXP, KHEXP, KISEXP, KDEXP, SA)… (i)

where: GDP = Gross Domestic Product
L = Labour Force
K = Private Capital
KAGEXP = Government Spending on agricultural sector
KEDUEXP = Government Spending on education sector
KTCEXP = Government Spending on trans and comm. sector
KHEXP = Government Spending on health sector
KISEXP = Government Spending on internal security sector
KDEXP = Government Spending on defence sector
SA = Structural Adjustment Programme as a dummy variable

In line with this, the study adopts core infrastructure spending model in equation (ii) thus:

$GDP_R = f(TRC_{Ps}, RDC_{Ps}, OES_{Ps}, EDU_{Ps}, HT_{Ps})$ ……. (ii)

Where:

GDP_R = real gross domestic product
TRC_{Ps} = public spending on transport and communication
RDC_{Ps} = public sending on roads and construction
OES_{Ps} = public spending on the other economic services (electricity and water supply)
EDU_{Ps} = public spending on education
HT_{Ps} = public spending on health

The OLS form of the equation is written thus:

$$GDP_R = a_0 + a_1TRC_{Ps} + a_2RDC_{Ps} + a_3OES_{Ps} + a_4EDU_{Ps} + a_5HT_{Ps} + U \text{ …… (iii)}$$

$a_1 > 0; a_2 > 0; a_3 > 0; a_4 > 0; a_5 > 0$

The above mathematical notation of apriori expectations show that the dependent variable (GDP) should be positively related with the independent variables (TRC_{Ps}, RDC_{Ps}, OES_{Ps}, EDU_{Ps}, HT_{Ps}).

3.2 Analytical Techniques

The study conducted preliminary tests such as unit root using ADF test, cointegration using Johanson test, error correction mechanism.

The ordinary least square (OLS) technique of multiple regressions was employed to estimate the relationship between public spending on transport infrastructure and economic growth in Nigeria. Other tests of significance conducted include: R^2 and Adjusted R^2 tests, t-test, f-statistics and D-W statistics.

4. Results and Discussion of Findings

4.3 Unit Root Test

The Augmented Dickey-Fuller (ADF) test was employed to test for stationarity or non-stationarity of the time series data. The results of ADF test are presented in the table below:

Table 4.1: Result of Unit Root Tests

Variables	ADF-Statistics	1% critical value	5% critical value	Order of integration
RGDP	- 3.691345	- 2.6560	- 1.9546	1(2)
TRCPs	- 4.594087	- 2.6522	- 1.9540	1(1)
RDCPs	- 3.724536	- 2.6522	- 1.9540	1(1)
OESPs	- 4.860036	- 2.6522	- 1.9540	1(1)
EDUPs	- 2. 469217	- 2.6522	- 1.9540	1(1)
HPs	- 4.168669	- 2.6522	- 1.9540	1(1)

Source: E-views computation

As shown in the ADF test statistics above, public spending on transport and communication, roads and construction, other economic services (electricity and water supply), education and health were stationary at first difference or in the order of one i.e 1(1). On the other hand, real gross domestic product (RGDP) was stationary in the order of two. i.e 1(2).

4.2 Cointegration Test

The study adopted Johanson tests of cointegration to determine whether a long run equilibrium relationship exist between the dependent variable (RGDP) and the explanatory variables (TRCPs, RDCPs, OESPs, EDUPs and HPs). The results of Johanson tests are as follows:

Table 4:2 Result of cointegration tests

Eigan value	Likelihood ratio	5% critical value	1% critical value	Hypothesized No. of CE(S)
0.999985	676.7381	94.15	103.18	None **
0.997270	377.1863	68.52	76.07	At most 1**
0.989495	217.7960	47.21	54.46	At most 2**
0.943935	94.78548	29.68	35.65	At most 3**
0.421869	16.99185	15.41	20.04	At most 4**
0.078150	2.197073	3.76	6.65	At most 5

Source: E-views computation

*(**) Denotes rejection of the hypothesis at 5% (1%) levels of significance.

From the results above, likelihood Ratio (L.R) indicates five (5) cointegrating equations at 5% level of significance. This shows that a long run equilibrium relationship exist between the dependent variable (RGDP) and the explanatory variables (TRCPs, RDCPs, OESPs, EDUPs and HPs).

4.3 Estimated Model Results

Table 4.3: Regression Results

Variables	Coefficient	t-statistics	Prob.
C	223067.9	16.68592	0.0000
TRCPs	- 0.835812	- 1.326717	0.1971
RDCPs	0.474187	0.770829	0.4483
OESPs	1.311431	2.293247	0.0309
EDUPs	1.363833	1.407407	0.1721
HPs	1.907781	1.780874	0.0876
Ecm(-1)	- 0.150793	- 1.594487	0.1251
R^2 = 0.921194, Adjusted R^2 = 0.904776, F-statistics = 56.10888, DW-Statistics = 1.228111			

Source: E-views computation

The results of the estimated model indicate that R^2 is 0.921194. This shows that about 92% of the variation in the real gross domestic products of Nigeria is caused by the explanatory variables such as: public spending on transport and communication, roads and construction, other economic services (electricity and water supply), education and health infrastructures respectively. The remaining 8% may be attributed to the variables not included in the model.

The f-statistics of 56.10888 indicates that the overall model is statistically. The t-statistics shows that only public spending on other economic infrastructure (electricity and water supply) was statistically significant. However, public spending on transport and communication, roads and construction, education and health infrastructures were statistically insignificant.

On apriori grounds, public spending on transport and communication did not conform to economic theory. i.e a negative relationship exist between public spending on transport and communication infrastructure, and real gross domestic product (economic growth) in Nigeria. Public spending on roads and construction, other economic infrastructure education and health have positive relationship with real gross domestic product (economic growth) in Nigeria. Our findings lend credence to the earlier findings of Moctezuma (2008), but disagree with the work of Boopen (2006), and Zhu (2009).

The result of DW-Statistics shows absence of antocorrelation and that our estimates based on OLS posses the properties of minimum variance, efficiency and unbiasedness. Also, the error correction variable indicates a negative and insignificant relationship between public spending on transport infrastructure and real gross domestic product in the short run. The ECM(-1) of -0.150793 indicates the speed of adjustment to equilibrium relationship.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Transport remains one of the major infrastructural facilities which are critical for sustainable economic growth and development of any nation including Nigeria. This paper examined public spending on transport infrastructure and economic growth in Nigeria.

The data analyzed show that public spending on transport infrastructure is negatively related to economic growth and statistically insignificant.

5.2 Policy Recommendations

Based on the conclusion and analysis carried out in this paper, the following recommendations are imperative for improvement in the transport sector in Nigeria:

i. the government must ensure that the transport sector is adequately funded;
ii. there must be regular monitoring and evaluation of MDA's on performance in terms of use of funds allocated to the sector.
iii. there should be proper implementation of the fiscal responsibility laws to ensure greater accountability, fiscal discipline and prudence in the use of funds allocated to transport infrastructure. This would not only improve the transport sector, but also boost economic growth and development in Nigeria.

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