

THE IMPACT OF TRANSPORTATION ON ECONOMIC DEVELOPMENT IN NIGERIA

ADEYI EMMANUEL OLA (PhD)

Department of Economics, Gombe State University, Gombe State, Nigeria

Abstract

The link between transport and economic development has been debated over many years, but we still lack a generally applicable and clear relationship which can be use universally. Despite this, there is a popular view that transport is not only necessary for economic growth and development to take place; it is the major instigator of such growth and development. Since the desire of every nation including Nigeria is the attainment of economic growth and development. This paper examines the linkage between transportation and economic development. It also examined the supply and demand for transport and then described the foundations of the possible linkage between transport and economic development from historical and contemporary perspectives. The study used both theoretical models as econometrics model as the data were sourced from secondary sources to examine the impact of transportation on economic development. The paper observes that there is positive relationship between transportation and economic development. The study thereby recommends that there should be positive necessary market conditions as well as complementing and supportive policies well designed and enforced by the transport policymakers and government in addition to provision of necessary infrastructure facilities

Keywords: Transportation, Economic Development, Labour productivity. Ordinary Least Square' Transport supply and demand

1.0 INTRODUCTION

It is widely acknowledged that transport has crucial roles to play in economic development. In fact, like many economic activities that are intensive in infrastructures, the transport sector is an important component of the economy which impacts on development and welfare of the populace. In the case of developing countries in general and that of Nigeria in particular, the valuation of transportation as an important factor in the economic developing matrix of Nigeria presents an interesting story.

To put matter in perspective, there is a strong belief among decision makers, transportation planners, economists and historians that transportation plays a vital role in enhancing economic growth by stimulating investment and output and by improving productivity of labour and capital. Underlying this conviction is the assumption that the availability of fast, reliable and affordable transportation has historically been anchor on which cities and regions have developed and flourished. The ability to make people and goods move easily and economically is used to explain the relative economic advantage of region and cities. The reason is that when transport system are efficient and effective, they provide economic and social opportunities and benefits that result in positive multiplier effects such as better accessibility to the markets, employment and additional investments. On the other hand, when transport systems are deficient in terms of capacity or reliability, they can have an economic cost such as reduced or missed opportunities. Transport also carries an important social and environmental load, which cannot be neglected. Over the last four decades, Nigeria has witnessed rapid growth in the demand for public transport services due largely to urbanization, growth in population and economies activity. How this development in transportation establishes a correlation with the economic development is the main focus of this paper. In the different lines of statically or empirical research into the interaction between economic growth and transport development, economic theory is an important source of information and an aid to interpretation. The paper made use of the specification model of the institute fur Verkehreccenschaft at the University of Cologne in 1999 with slight modification.

2.0 HISTORICAL PERSPECTIVE OF TRANSPORTATION AND ECONOMIC GROWTH

Adam Smith in his classic, “Wealth of Nation”, clearly explicated the state’s responsibility for developing and maintaining that, in modern terms, is commonly called the civil infrastructure Adam Smith (1967). While Adam Smith did not explicitly assert that infrastructural development was the necessary condition for economic growth and development, the common perspective on the historical role of transportation was to be regarded as a major source of economic growth and productivity. Indeed, a plot of data from various countries showing infrastructure per capita VS GDP per capital in 1990 revealed a seemingly strong correlation between these variables World Bank (1994). As could be expected, poor countries were also characterized by low level of per capita infrastructure, whereas the opposite characteristics well developed economies. But what is

the cause and what is the effect? Does infrastructure development lead to enhanced growth (measure in terms of the rate of increase in GDP per capita), or does economic growth lead to increase in the stock of infrastructure capital?

In addressing this issue, we should note that the empirical historical research literature in the effect of transport development on growth and development is quite equivocal. Several major studies have shown that economic growth, which have been attributed to a specific transportation development, have many sources. One well known study was by Forgel (1964), he analyzed the impact of rail road development on American economic growth during the 19th century and concluded that, while rails ways has a primary impact on the costs of transport and that of social saving resulted from the movement of agricultural output by rail, no single innovation was vital for economic growth during the 19th century'

A different view was that of Rostow (1960); who argued that, historically, a reduction in transport costs through rail development has brought new areas and products in the market. He also asserted that transport investment has contributed to major new export sectors and was instrumental in the development of the coal, iron and engineering industries.

The land used transport link that underlie a significant part of the contemporary theoretically debate on the role of transport, were explicitly included in Von Thunen's classic study (1826) of the impact transport on pattern of agricultural development. As the quality (i.e speed of travel) of transport improves, the land devoted to agricultural production is extended and this, in turn, allows land values and land used to the reflected in the relative advantage to those locations served by the transport system.

Also, the influential research by Christaller (1933) in Southern Germany has demonstrated the links between transport cost and the spatial distribution of economic activities. He concluded that the improvement in transport infrastructure strengthened the accessibility and dominance of the central city. The basic assumption underlying much previous thinking is that transport and particularly transport infrastructure is growth enhancing. There is empirical support for this proposition: the last half of the twentieth century witnessed unprecedented level of growth in both transport and the economy in general. However, it is dangerous to assume that this is evidence of a causal link in a particular direction, is just a likely that economic growth induced by productivity growth. Historically low resources prices (especially of oil) and a world order which favoured rapid and stable growth of international trade fostered transport growth.

In the 90s however, while economic growth slowed down, transport growth has continued. Users found themselves increasingly constrained by high fuel coast and a less rapid expansion of infrastructure especially in the developing countries in general and in Nigeria in particular. The big debate of the 1990 was whether transport infrastructure acted as a form of neo-Keynesian public work to help kick start the aggregate economy, whilst also serving to enhance the microeconomic efficiency of the economy. The problem was that it was plausible, but highly over simplified account of the role of transport in the economy. It also presupposed a number of key assumptions. First, how adequate id GDP as a measure of economic growth; secondly, is

economic growth the same as economic development, thirdly, should mobility be viewed as an indicator of welfare and a goal of transport policy. It fails to incorporate a number of activities which are not traded. However for the purpose of this study, we assume that GDP as a measure of economic growth which transcend to economic development.

3.0 TRANSPORTATION AND ECONOMIC DEVELOPMENT

The key element that connects the transport sector with the overall economy is mobility. Interestingly, mobility is one of the cardinal features of economic activity as it underlines the basic need of economic agent moving from one location to another a need shared by critical factors in the production, consumption and distribution sphere of the economy: passengers, freight and indeed information. Mobility is therefore an important and reliable indicator of development.

Generally, in modern economy, provision of mobility is carried out by an industry that offers services to customers, employs people, pays wages and salaries invests capital and generates, income. In fact the economic importance of the transportation industry can be views from both macroeconomic and microeconomic perspectives. At the macroeconomic level, transportation and its component element of mobility is connected to a level of output, employment and income within a national economy. In many countries, transportation accounts between 6-12 percent of the gross domestic product. In the case of Nigeria, it accounted for between 3.4 percent and 5.9 percent within the periods of 1983-2006 CBN (2006). Transport is also a major activity in the informal non-manufacturing sector. A study estimated that about 150-794 establishment creating about N647, 112,550.19 a total salaries and wages annually CBN/FOS/NISER (2001).

At the microeconomic level, transportation is linked to producer, consumer and production costs. The importance of specific transport activities can best be appreciated when assessed for each sector of the economy. It has been suggested that transportation account on the average between 10 percent and 15 percent of household expenditures while at the same time representing about 4 percent of the cost of each unit of output in manufacturing Rodrigue (2007). Transport has equally played a catalytic role in major flows of national, regional and international migration, transforming the economic and social geography of many nation. For instance, transportation has been a tool of territorial control and exploitation in Nigeria especially during colonial era where resource based transport system (railways, inland waterways and roads) supported the extraction and evaluation of commodities from the hinterlands to major seaports for export to the imperial metropolis Hopkins (1985); Olaloku (1984); Akinwumi and Umaru (2006).

Much as transport impacts positively on economic and society, nevertheless, it has negative economic, social and environmental costs associated with it. Among the most important ones are mobility between different populations, cost difference, congestion, accidents, and the emission of pollutants with their wide range of environmental consequences which ultimately air quality, noise quality, water quality and land use.

There is also a tendency for transport investment to have declining marginal returns. While initial infrastructure investments tend to have high return since they provide new range of mobility options, the more the system is developed the more likely additional investment would result in lower returns. At some point, the marginal returns of transport investment from wealth production to wealth consumption. A common fallacy is assuming that additional transport investment will have a similar multiplying effect than the initial investment had, which can lead to capital misallocation. This means that the economic impacts of transport investment tend to be significant when infrastructures were previously in existent or deficient and marginal when an extensive network is already present.

It is important to know that the relationship between transportation and economic development is difficult to formally establish as it has been debated for many years. Its complexity lies in the variety of possible impacts:

Timing of the development varies as the impacts of transportation can precede, occur during or take place after economic development.

The lag concomitant and lead impacts make it difficult to separate the specific contribution of transport development.

Types of impacts vary considerably. The spectrum of impacts range from the positive through the permissive to the negative in some case transportation impacts can promote, in other they may hinder economic development in a region. In many case, few, if any direct linkages could be established.

4.0 DEFINING TRANSPORT SUPPLY AND DEMAND

Most economic system includes numerous activities located in different areas which require movement that must be supported by the transport system. Indeed the demand for transportation is a derived demand. Transportation is service that must be consumed immediately and thus cannot be stored. Mostly must occurs over transport infrastructure- without movement infrastructure would be useless and without infrastructure mobility could not occur or would not occur in a effective manner this interdependence is expressed in two related concept, transport supply and transport demand.

Transport supply according to Umar and Akpokodje (2007). Is the capacity of transport infrastructure and modes to provide transport services generally over a geographically defined transport system and for a specific period of time. It is expressed in term of infrastructure (capacity), service (frequency) and network. The number of passenger, volume (for liquid or containerized traffic), or mass (for freight) that can transport demand, on the other hand is the expression of the transport need supply. Transport demand on the other hand fully, partly or not at all. Like its supply irrespective of whether these needs are met fully, partly or not at all like its supply counterpart, is transport demand expression in terms of number of people, volume or tons per unit of time and space. Transport demand is generated by the economy which is composed of

person, institution and industries which generate movement of people and freight. When these movements are expressed in space they part a pattern which reflects mobility and accessibility

An important characteristic of urban public transport sector in Nigeria as in other developing country is its high growth rate in term of passenger carried, vehicles in use and route kilometers operated. In many cities and towns, conventional bus and taxi operators play the dominant role in the movement of passenger but are hardly able to satisfy the total demand of the travelling public. As a result, Para-transit, or immediate public transport (IPT) modes such as cycle or sector rickshaws, shared loan minibuses and even horse, oxen or donkey-drawn behinds (particularly in northern state of the federation) play an increasing part. Yet another characteristic of the urban public transport in these countries is its diversity, it is the case that in many smaller cities and town Para transit system has the dominant public transport role largely because they are better adapted to some of the difficult operating condition due to the unplanned of streets, or the slum-nature of most Nigeria cities and towns, rapid growth in population, limited financial resources available for investment of urban infrastructure as a result of reduced public spending and sheer disregard for standard codes in urban and regional planning.

Since the 1970 the demand for public transport in developing counties and Nigeria has been growing steadily due largely to the phenomenal rise in urban settlement and population in them Armstrong-Wright (1968): Mobogunja (1968). On the side of public transport supply, varieties of alternatives are provided in form of modes and services of public transportation, they are however forced to restrict their choice to a few due their inability to afford them. As a result, there is wide disparity in the supply of public transport between towns, cities and by international standard.

5.0 THE EFFECTS OF TRANSPORTATION ON ECONOMIC GROWTH AND DEVELOPMENT

Transport enables us to be linked with different places, improves the division of labour, raise the productivity of the factor of production labour and capital. The principal benefit of transportation is the growth in GDP, made possible by an increase in productivity. The productivity and growth effects of transport are the result of a great many individual factors, including.

- Lower cost and price for good and service
- Market expansion and economic of scale.
- New products and improved product quality
- Agglomeration economy

- New spatial structure, specialist land use, effective location
- Contribution to the formation of human capital
- Increase innovation and technical knowledge.

In fact, according to INFRAS (2000) the benefits can be divided up into benefit to the operator, the user, the third parties not involved in the market process and the general public as shown in table 5.1

Table 5.1 benefits of transport-overview

Operator	User	Third party not involved in the market process:	General public
<ul style="list-style-type: none"> - Producer's surplus Income - Income from face, user remuneration - Places of work - Relatively safe sales outlets - Wide market with many niches 	<ul style="list-style-type: none"> - Consumer's surplus - Greater accessibility - Time saving - Lower transport cost - Gain in productivity - Less warehousing - Lower priced goods - Extension of division of labour - Greater power to overcome distance - Opening up of greater markets - Economies of scale places of work 	<ul style="list-style-type: none"> Ground rent Lower priced consumer goods additional income stimulation of consumption Place of work 	<ul style="list-style-type: none"> - Network forming function - Creating ties between regions - Increased attractiveness of industrial sites Lower concentration in towns better spatial distribution of prosperity Raising the rate of innovation - Increasing competitiveness - Stimulation of consumption Places of work contribution to formation of human capital

			Fulfilling basic social needs
--	--	--	-------------------------------

Source: INFRAS, Nutzen des Verkehrs, information paper for the Workshop held on 29 June 2000 as part of the NFP (National Research Programme).

5.1 Methods for measuring the impact of transport on growth

To measure the impact of transport on growth macroeconomic and microeconomic approach can be adopted

- In macroeconomic models the benefits of transport result from increase attributable to mobility, in output, employment and across the national economic. A distinction must be between + supply model economic (connection between fall in cost due to transport and increase in GDP).

+ demand models (effects of change in transport demand on the national economy)

+ growth models (impact of transport on the productivity of the factors of production)and

+ input- output (illustration of input linkage in the national economy)

Macroeconomic models determine gross prosperity by adding up consumer surplus, producer supply and production cost. The benefit of transport is given by the area below the demand curve. Extensive result in this area may be obtained by the use of cost-benefit analysis. This is applied in the assessment of concrete infrastructure project.

However, for this study, the macroeconomic approach is used with the employment of growth model with help multiple regression ordinary least square

6.0 ANALYSIS OF THE EFFECT OF TRANSPORT ON GROWTH IN NIGERIA

The essential point here to determine the impact of transport and other determine on the aggregate productivity of labour in Nigeria using economic functional

Productivity of labour is defined as the ration of aggregate GDP to human resources used. The higher the productivity of labour, the higher GDP turn out be productivity of labour thus becomes the critical factors and driving force in the promotion of prosperity and higher income.

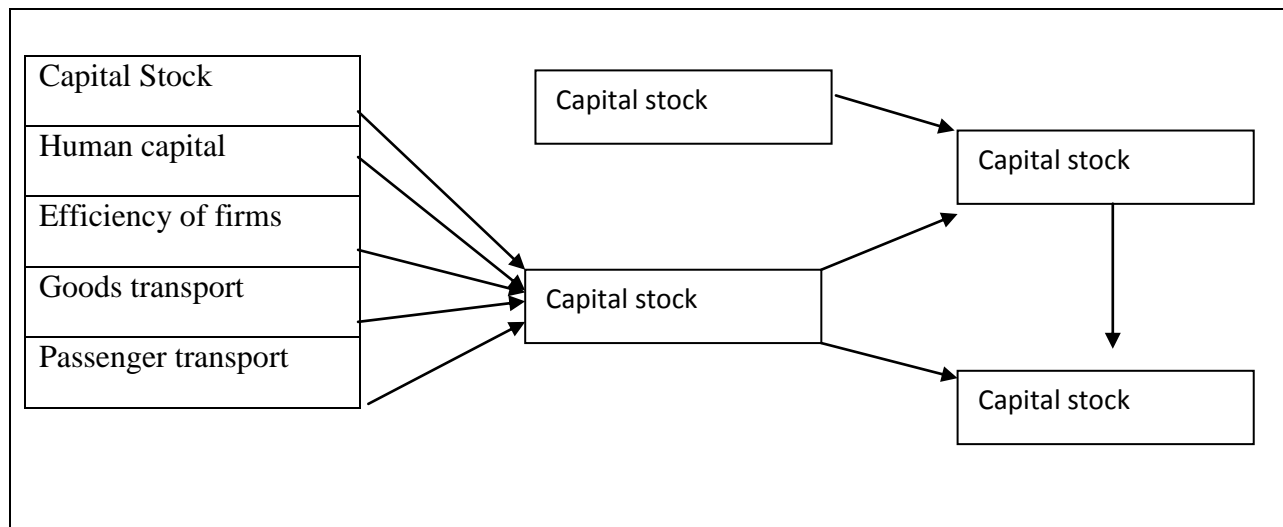
According to economic theory, the increase in the productivity of labour may be attributed to different factors. The more capital there is in a national economy the higher the productivity of labour will be.

The higher the level of education of the work force the higher productivity will be. This component relates to the quality of the human capital the productivity of labour will also be influenced by the efficiency of the enterprise and the work flow.

The mobility of person and goods also affect the productivity of labour it is central of the matter that concern us. Mobility means that person and capital can operate in accordance with division of labour.

The connection between transport performance productivity of labour employment and gross product is shown in figure 5.1 below.

Figure 5.1: determinant of the p productivity of labour and employment



Sources: authors Own presentation

1. The productivity of labour (PL) in the economy as a whole (not counting transport falls with the in transport performance) (TP)

$$PL = (TP)$$

2. The fall in productivity of labour can lead to raising unit costs (ULC).

Unit labour cost gravitates between two extremes.

Upper extreme if the wages remain constant unit wage increase and the productivity of labour decline.

Lower extreme if the Wage fall to the same extent as the productivity of labour unit wages cost remain constant

3. The unit wage cost have impact on the level of employment (EM)

$$EM=f(ULC)$$

For each of the two cases two variables are to be distinguished

- If the unit wage cost increase employment declines
- If the unit wage cost remain constant employment also remain constant
- 4. The fall in the productivity of labour and the potential decline in employment produce a lower GDP.

$$GDP=PL \times EM$$

- If employment remain constants, GDP equally in the same proportion as the productivity of labour.
- If the employment falls, GDP equally falls more sharply than the productivity of labour.

Regression analysis subsequently used to introduce empirical values in the model is used to establish the following relationships for Nigerian economy;

- Relationship between productivity of work and transport;
- Relationship between unit labour cost and productivity of labour;
- Relationship between employment and unit labour costs.

Therefore, with the aid of the models that have been developed, the impact of transport on employment and GDP can be determined.

6.0 MEASURE OF THE RELATIONSHIP BETWEEN TRANSPORT AND ECONOMIC DEVELOPMENT IN NIGERIAN USING REGRESSION ANALYSIS.

The productivity of human resources rises with the improvement in the quality of human capital, increase in fixed assets, improvement in company efficiency and greater mobility of human resources and input. It can therefore be established that there is functional relationship between these variables.

$$PL=f(K,QHC,TPGS,TPPS)$$

Where, PL, = Productivity of labour

K = Capital put

QHC = Quality of human capital

TPGS = Transport performance in the good sectors

TPPS = Transport performance in the passage sectors

The productivity of labour in the ration of production output on the input of labour. It is measured in GDP per number of workers in a year.

The quality of human capital is chiefly determined by the quality of education and state expenditure on education is taken as an editor. It must be assumed that there will be a delay between the raising of the higher education budget and the increase in the productivity of labour. This delay is estimated in 4 (four) years, with corresponded the average length of study in Nigeria.

Capital input is ascertained from the level of fixed assets, which in return is reflected in the level of annual depreciation.

The increasing transport performance in the goods sectors also produce an increased productivity of labour. The assessment takes account of the transport performance (tone-kilometer) of different form of transport (railways, road haulage, air freight transport, inland water way transport).

The increase in transport in the passenger sectors produces a rise in the productivity of labour. The transport performance (passenger kilometer) of various form of transport network (railways, motorized private transport and air transport), are taken into account in assessing transport geared towards production.

The relationship between productivity of labour and the contributory factor cited is estimated for the period 1985 to 2010 by means of regression analysis. Since development in the productivity of work and the contributory factor are subject to trends. Growth rate (gr) will be used to examine the nature of the relationship that exist between these variables growth rate for each variables are calculated from data obtained from CBN statistical bulletin and Federal office of statistic.

The study adopts the specification model of the institute fur verkehrccenschaft at the University of Cologne in 1999 with slight modification. This model allows full unitization of ordinary and least square (OLS) of multiple regression so as measure the impact of transport and other determinants on the aggregate productivity of labour in Nigeria.

Thus, the econometric model is specified as

$$\text{grPL} = a_0 + a_1 \text{grTPGS} + a_2 \text{grTPPS} + a_3 \text{grQHC} + a_4 \text{grk} + U_i$$

Where

$$\text{grPL} = \text{growth rate of productivity of labour}$$

grTPGS = growth rate of transport performance in the good sector
grTPPS = growth rate of transport performance in the passenger sector
grQHC = growth rate of quality of human capital
grk = growth rate of capital input
a₀ = intercept
a₁ = slope/coefficient of explanatory variable grTpgs
a₂ = slope/coefficient of explanatory variable grTpps
a₃ = slope/coefficient of explanatory variable grQHC
a₄ = slope/coefficient of explanatory variable grk
U_i = stochastic random term that repentant other factors/variable that effect productivity of labour

grPL = 0195grTPGS +0.204grTPPS +0.008grQHC +0.108grk
t = (1.176) (3.718) (1.211) (1.334)
S.E= (0.0622) (0.0014) (0.0302)
R² = 0.8573
R⁻²= 0.8124
F = 71.8929
Dw= 1.5507

The result of the estimation show that the explanation variable accounts account for approximately 85.7 percent variation ion growth rate of labour productivity, and when it is adjusted, the result show that the explanation variables accounts for 81.2 percent variation in labour productivity.

The most interesting thing to note is that all the coefficients of explanatory variable conform with the apriority expectation indicating that all the potential determinants of transport sector have the positive relationship with economic growth indicated by the productivity of labour. The F-value of 71.8929 indicates that the explanatory variables are jointly significant and capable of explaining changes in the productivity of labour. The Durbin-Watson coefficient of 1.55 verifies that there is no autocorrelation of residues. Another important discovery from the estimation is that transport performance of the goods sector and that of passenger sector contribute more to the productivity of labour then other variables. For instance, from the estimation, a unit change in transport performance of goods sector (TPGS) will lead to 0.195 change in quality of human capital (QHC) will result to 0.008 changes in productivity of labour.

7.0 POLICY IMPLICATION OF FINDINGS AND RECOMMENDATION

The theoretical and empirical analysis has shown that there are strong correlation between economic development via economic growth and transport. Transport policy should take these relationship in to account in providing for mobility.

Firstly, greater economic prosperity is linked to an increase in transport. If society wants greater prosperity, growth and development of transport sector cannot be compromised. The damage transport development causes to the environment are unavoidable consequences. This relationship is applies to Nigeria which seeks to achieve more generalized prosperity and equitable distribution of income through the integration and cohesion of the economically weaker and stronger cities and towns.

Secondly, given the relatively greater values of the contribution of transport performance of both the goods sector and the passenger sector of transportation, the policy makers should note that the growth in transport infrastructure is very low, especially in the areas of road and railways transport which happen to be the major means of mobility for both goods and passenger in the country as a result of many factors, but principally among this factors is poverty.

Thirdly, transport policy can contribute to the process of decoupling by promoting a higher degree of efficiency in the flow of transport or better ways of organizing it. However, importance must also be attached to the impact of other policies outside the field of transport like education policy, which happens to be determinant quality of human capital.

Fourthly, structural change in the economic will certainly lead to a falling off in the growth of transport in Nigeria. However, the problem of transport growth will not be solved in this way. Rather, the trend towards growth in road transport will continue, even under the different structural conditions. The share of high value goods in the production structure as well as the share of individual services will increase. The policy makers and government should therefore formulate and implement policies that will turn the road transport from its present state to amore better state so as to enjoy the benefit of transport as a sector in Nigeria.

Fifthly, mobility and transport are important requirements for economic prosperity. The mobility of people and goods provide more enhanced division of labour, increased productivity, structural change, greater competitiveness, growth in incomes and higher employment. Economic activity, in this chain of cause and effect, a policy of transport avoidance as government of Nigeria has bend risk to further progress in productivity and growth which retards economic development in setting targets for prosperity, what matter most is to make the transport processes more cost effective and more efficient. The government and policy makers should gear their policy towards achieving these.

8.0 An attempt has been made to examine the relationship between transport and economic development in Nigeria by employing both qualitative and quantitative techniques through the use of theoretical and empirical model. It was shown that transport sector contributes positively to economic growth and development. The study evaluated the review of the subject matter of the paper in form of historical perspective. Definition of transport supply and demand was established after which the paper touched the influence of transportation (mobility) on economic growth and employment.

Attempt was also made on the analysis of the effects of transport on growth in Nigeria economy, and then the measurement of the relationship between transport and economic development using multiple regression analysis and Nigeria data.

In all, study showed that there was positive correlation between transportation and economic development. However, determining the overall impact of transport especially that of infrastructure investment remains fraught with uncertainty. Despite the progress that has been made in the evaluation of potential impact of transportation on economy, the models, and thus the assumption used, remain open to challenge. In addition, there are weakness in the method used to assess overall economic impacts, notably in terms of non-inclusion of other factors that may affect the productivity of labour, although economically that has been taken care with the introduction of stochastic random term (U_i).

References

- Akinwumi, O and I Umaru (2006) history in cash; A Study of Nigeria currency (1950-2006). Faculty of Art Monograph series No.1 Nassarawa state University, Keffi-Nigeria.
- Central bank of Nigeria, (CBN) statistical Bulletin, Vol..122 December 2009-Abuja
- Christaller, W (1933); Die Zentralen Orte in suddeutschland (Cento Places in Southern Germany). Translated by baskin, C/.W. 1966 Engle Wood chiffs; Prentice Hall.
- Fogel R.W. (1964) Railroads and American Economic Growth, Essays in Econometric history, Baltimore.
- Hopkins. A.G. (1985); an Economic history of West Afric. Essex; longman Group
- Olaloku. F.A Fajana. F.O Tomory. S and Uxpong, I.I (1984) structure of the Nigeria economy; Lagos Macmillan publishers/University of Lagos press.
- Rodique, J.P (2007); Transport and Economic Development [hppt//pople.hofstra-edu/geotrans.eng.chten.conten.ch&.html.12/80/09](http://pople.hofstra.edu/geotrans.eng.chten.conten.ch&.html.12/80/09)
- Rostow, W.W (1960), The Stages of Economic Growth, London, Cambridge University Press.
- Smith, A. (1967), Wealth of Nations, University of Chicago Press, volume 2 Book V. part 3.
- Von Thnen J.H (1826), der Isolierte stoat in Beziehung out Landwirtschaft urd National Economic, Humbury. Translated by Wattenberg, C M. (1966), oxford; Pergamum Press.
- World Bank, (1964) World Development Report 1994; infrastructure and Development, oxford University Press.

Appendix 1

