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Development and Contributions of Transport Sector to Nigeria Gross Domestic Product (GDP) Growth

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ABSTARCT: - The contributions of the transport sector to the growth of economy of developing country like Nigeria cannot be overemphasized. This research work of development and contribution of transport sector to Nigeria gross domestic product (GDP) from 1970 – 2018, seems the way forward towards a sustainable financial stability shows the relationship between transport sector and economic growth. The research employed regression analysis using OLS method in verifying the relationship that exist between transport sector and economic growth. The research made use of Solow growth model which was extended to include transport sector output along with gross fixed capital formation and labor force as the inputs of the function and the gross domestic product as the output. It was recommended by the researcher that the federal government should invest much more resources into the transportation sector and develop other means of transportation like railways and water transport infrastructure which would be more affordable and would ease the road and air transport in the transportation of freight and persons.

KEYWORDS: – Expenditure, Gross Fixed Capital Formation, Infrastructure, Nigeria, Transport System

I. INTRODUCTION

The transport sector plays a key role in the economic development of a region when the system is reliable and efficient. According to [1], it is historically noted that improvement in transport technology and transport networks, through effects on costs of transport, access and connectivity, have been major factors that serve as the basis for economic growth, and providing adequate access to isolated regions to persons and economic activities such as manufacturing, retail, labor and housing markets to operate efficiently. The transport sector is a wealth creating industry on its own. A good example of such is the People's Republic of China; CDTN (2016), apart from being known for her technology industry, China today has the world's busiest airport by passenger traffic (95, 786, 296), and also one of the busiest seaports in Dandong province popularly known as Port of Dandong. Revenue generated from these airports and seaport alone is unimaginable. All these wouldn't have been possible if the government of China did not invest in immensely in the transport sector. Same can be said of rail transport in China.

It is in view of this that the Nigeria government is being advised to invest in the transport sector such as investment in road creations and rehabilitations also rehabilitation of seaports and airports around the nation as well as re-awakening the rail system in Nigeria. This is because it has been connoted that inadequate transportation limits a nation's ability to utilize its natural resources, distribute food and other finished goods, integrate the manufacturing and agricultural sectors, and supply adequate education, medical services and other infrastructural facilities.

These direct and indirect contributions are reasons for the call for the maintenance and improvement of the existing transport systems and build new infrastructures for national wealth. The national wealth here is the real gross domestic product (GDP) which is an indicator for measuring economic growth.

Transportation infrastructure is essential to the sustenance of economic growth because people wish to improve their standards of living to actualize this, they view increased income as a way to achieve such goal. Nigeria is still a developing country with a developing transport system. The relative gains from advanced transport investment are likely to be smaller than in earlier years. According to Lucas [2], transportation system enhancement is, in turn, a means of maintaining or improving economic opportunities, quality of life and ultimate income for people in a particular region.

The transport sector is identified and recognized as an indispensable sector for sustained economic growth and the modernization of a nation. Aschauer [3], posit that the principal role of transport is to provide access between spatially separated locations for the business and household sectors, for both commodity (freight) and persons' movement. For the business sector, this involves connections between business and their

markets. For the household sector it provides people with access to workplaces and education facilities, shops, social, recreational, community and medical facilities.

It needs not be over-emphasized that various public sector actions aimed at reducing poverty cannot be successful without adequate transport infrastructure and services. It is difficult to visualize meeting the targets or universal education and healthcare for all without putting in place the transport facilities to access it first. Aschauer [3], posits that as an industry, transport does not exist for its own stake alone, as it serves as a vital means to achieve other objectives.

Since independence, Nigeria as a developing country has made various plans and programs aimed at improving the transport sector. The intents for this is majorly to actualize effective employment of idle resources and improvement in aggregate economic activity, which has been expected to result in economic advancement and welfare of the society. The first National Development plan of 1962 – 1968 incorporated the improvement of transportation and huge expenditure was incurred. Sum allocation of road development for all the region s (East, West, North and Federal) at the period was N 150.6 million. Onokoala [4] states that the percentage share of the transport sector in the first national development plan was 21%, this lead to improving some trunk A roads, construction of Niger bridge from Onitsha to Asaba, and Mainland bridge in Lagos, Similarly, with the intentions to support and motivate transport development, in the second national development plan 1970 – 1974, the government allocated N 485.189 million on transportation development, and percentage share of transport was 23.7%. Reasonable results were achieved. Asides other investment by the government, automobile industries were being established, such as Peugeot Automobile plant in Kaduna, Volkswagen assembly plant in Lagos came up mainly to make it easy to have vehicles required to enhance production in the country. In addition, there was road construction at the period. An example is the 22000 miles (3520 kilometers) of road was constructed; the Enugu Airport was constructed while contract was being awarded for the construction of Kano Airport, Lagos, Jos, Iiorin and that of Calabar. The entreats for balanced development compelled the pioneer leaders of the country to establish varieties of industries and improving the efficiency of public investment. Still in the efforts to reposition the transport sector in Nigeria, the third and fourth national development plan had a total percentage share of public expenditure of 22.5 and 15% respectively. Even in the rolling plans of 1990 – 1993, 1994 – 1996 and 1996 – 1998, transport share of public expenditure was respectively 11.6% 6.65% and 10.1%. [4, 5, 6].

The intent has been mainly to improve and advance economic development of the country. As a result, Nigerian transport system was one of the best in 1990 as it featured well designed highways, railway lines, waterways, airways and ports. The oil boom of the 1970s empowered the leaders to achieve a well-structured transport sector, but ill maintenance culture, over the years, have led to dilapidation of most of these constructed transport infrastructures. This circumstance resulted in making Nigerian roads a death trap ranging from automobile accidents to plane crash as witnessed since the early 2000s most especially. Given the above stated the main objective of this research work is to investigate the development and contributions of road, railways, air and water transport on economic development (proxy by real gross domestic product) in Nigeria.

II. RESEARCH METHOD

2.1 Research Design

This study adopts a quantitative method to evaluate the empirical evidence of the effect of the transport sector on economic growth in Nigeria. Thus, ex-post facto research design is used in this study. The method of analysis is an economic method using error correction model (ECM) technique to estimate a multiple regression model that is derived from the Solow growth model which is the economic theory that this study is based on.

2.2 Model Specification

In this section, the study postulates a model that seeks to examine the effects of some selected transport sub-sector indicators on economic growth in Nigeria. The specification of a growth model is routed through the Solow growth model emphasizing the significance of investment (i.e. capital) and labor effectiveness in promoting growth. The Solow growth model is symbolically represented below:

$$Q = f(K, L) \qquad 1$$

Where Q is the national output, K represents capital resources employed and L for unit of labor employed in the production process. For the purpose of this study, the capital component of the model is broken down into transport sub-sector's outputs in additions to public capital. It is understood that adequate investment in transportation sector has multiplier effect to increase effective transportation and improve mobility factors of production, resulting in the elevation of efficient resources allocation, augmented economic activity and positively impact on aggregate output of the country. The outputs of transport sub-sectors such as road transport (RT), railways (RW), airways (AT) and waterways (WT) will become robust and contribute significantly to the Real Gross Domestic Product (RGDP). Elevation in the employment of a country's resources due to improved transportation has the tendency to increase output, income and reduction of unemployment. Changes in

macroeconomic variables have the inherent capacity to reposition a rising economy to acquire new features indispensable for further improvement. In respect of this, we can establish the relationship thus: Real Gross Domestic Product (RGDP) is a function of output from road transport (RT), railways (RW), airways (AT), and waterways (WT) and other form of capital and labor. It can be mathematically stated as:

$$RGDP = f(RT, RW, AT, AT, WT, K, L) \quad 2$$

This is

$$RGDP = \beta_0 + \beta_1 RT + \beta_2 RW + \beta_3 AT + \beta_4 WT + \beta_5 K + \beta_6 L + \mu \quad 3$$

$$\Delta RGDP_1 = a_0 + a_1 \Delta RT_t + a_2 \Delta RW_1 + a_3 \Delta AT_1 + a_4 \Delta WT_1 + a_5 \Delta K + a_6 L + ECM_1 \quad 4$$

Where

RGDP = Real Gross Domestic Product

RT = Road transport output

RW = Railway transport output

AT = Airways transport output

WT = Waterway transport output

K = Capital measured by gross fixed capital formation (GFCF)

L = Labor force

β_0 is the intercept while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, and\ \beta_6$ are the coefficients of the independent variables μ is the stochastic error, while t is time trend, Δ is the first difference.

The apriri expectation is that $\beta_1, \beta_2, \beta_3$ and $\beta_4 > 0$. Thus, is based on the fact that if the products of these sub-sectors impact significantly and desirably on the economy, there will be a positive impact on real gross domestic product, which is the yardstick for measuring economic development.

2.3 Estimation Procedures

In drawing the empirical conclusion of this study, we approached the methodology in the following three stages:

1. Unit root test: We first examine the time series property of our data in order to know the unit root status. To achieve this, we use the Augmented Dickey-Fuller (ADF) unit root test, we also employ Philips-Perron (PP) unit root test which was introduced to [7, 8, 9] to confirm its reliability. Obed [10] notes that the ADF takes care of the autocorrelation of the first differences of series in a parametric fashion by estimating additional nuisance parameters.

While Philips-Perron (PP) unit root test applies non-parametric statistical methods that takes care of the serial correlation in the error terms without adding lagged difference terms [11]. The stationarity status of the variables is established by considering the order of integration of each variable in the estimated model.

2. Co-integration test: the long run relationship between the variables in the model has been tested using the Johansen co-integration test.

3. Regression analysis: the estimator will be Error Correction Mechanism (ECM) method. This choice is due to the advantages of OLS over the other estimator given its blue properties, implying that it is the best linear unbiased estimator.

2.4 Criteria for Data Analysis

The analysis of the empirical results shall proceed by using three criteria namely; the Economic a priori criteria, statistical criteria and Econometric criteria

i. Economic criteria: These are determined by the principle of economic theory and refer to the sign and size of the parameters of economic relationship [12]. In other words, the estimates must conform to the stated expected signs and size of the parameters as provided by economic theory. In any case, if the estimates of parameters turn up with signs and size not conforming the economic theory, they should be rejected unless there are good reasons to believe that in the particular case, the principles of economic theory should not hold.

ii. Statistical criteria: These are otherwise called the first order test. These are determined by statistical theory and aim at the evaluation of the statistical model passes the necessary statistical tests, then model becomes admissible and estimates can be regarded as statistically reliable and satisfactory. The measures used for the statistical test include the t-test, the f-ratio and the coefficient of multiple determinations (R2).

The R-squared is a measure of the goodness of fit of the estimated model. It measures the proportion of the total variation in the dependent variable that is explained by variations in the explanatory power of the model.

The F-ratio is used to test the overall statistical significance of the estimated equation. Essentially, it is used to test hypothesis that not all the parameters are equal to zero. A high value of f-ratio indicates a high degree of significance of the estimated model [13].

The t-statistic is used to test the statistically significant of each individual parameter estimate in the model. A high value of t-ratio, usually more than 2, indicates that the parameter in question is significantly different from zero, hence the associated independent variable actually affects the dependent variable.

iii. Econometric criteria: These are set by the theory of econometric and aim at the investigation of whether the assumption of the econometric method employed are satisfied or not in any particular case. For example, if the OLS method is used to obtain the estimates of model, the Durbi Wastson (D-W) test can be used to test for the absence of autocorrelation in the model. For this study the Durbin Watson (D-W) test is employed to test for the absence of serial correlation in the estimated model.

III. DATA AND SOURCES

This study is an explanatory research work, the research made use of time series data of some macroeconomic indicators which include: Gross Domestic Product (GDP), transport sector output from 1970 - 2018 period of time. The multiple regression models that used the ECM technique was employed to determine the contributions of each transport system's contribution in the sector to economic growth (when disaggregated) measured by Gross Domestic Product (GDP). The data for this research work is secondary time series data which is obtained from Central Bank of Nigeria Statistical Bulletin of 2018 and National Bureau of Statistics Annual report of 2018.

IV. ANALYSIS OF RESULT

Table 1: Unit Root Test Result

VAR	ADF	1%	5%	10%		PP	1%	5%	10%	
AT	4.840375	-3.577723	-2.925169	-2.600658	I (0)	4.840375	-3.577723	-2.925169	-2.600658	I (0)
GDP	-3.610058	-3.581152	-2.926622	-2.601424	I (1)	-3.615685	-3.581152	-2.926622	-2.601424	I (1)
K	-7.505072	-3.581152	-2.926622	-2.601424	I (1)	-9.990581	-3.581152	-2.926622	-2.601424	I (1)
L	-6.736669	-3.581152	-2.926622	-2.601424	I (1)	-6.736669	-3.581152	-2.926622	-2.601424	I (1)
RT	-6.986839	-3.581152	-2.926622	-2.601424	I (1)	-6.986839	-3.581152	-2.926622	-2.601424	I (1)
RW	-2.687844	-3.577723	-2.925169	-2.601424	I (0)	-2.731264	-3.577723	-2.925169	-2.600658	I (0)
WT	-8.040138	-3.581152	-2.926622	-2.601424	I (1)	-8.451450	-3.581152	-2.926622	-2.601424	I (1)

From table 1, the unit root test results indicate that all the macroeconomic variables in the estimated model are not integrated at the same order using both Augmented Dickey Fuller (ADF) and Philip-Perron (PP) techniques. Because of this result, it is therefore pertinent to note that Johnson co-integration method is not suitable here, rather, Engel Granger two stage procedures is used. This because when the variables are integrated at different level of integration, then using Johnson co-integration is wrong. Thus, this study adopts the Engel Granger two stage procedures to test if there is any long run relationship between macroeconomic variables in the estimated model. Table 2, shows the result of this analysis.

Table 2 Co-integration result (Engel Granger two stage procedure)

Variable	ADF	Level	PP	Level
ECM	-4.040430	I (0)	-4.097453	I (0)
	Critical Value		Critical Value	
	1%	-3.577723	1%	-3.577723
	5%	-2.925169	5%	-2.925169
	10%	-2.600658	10%	-2.600658

From the result of co-integration analysis shown in table 2, we discover that the residual obtained frpm the OLS estimated model of equation 3 is integrated at level using both Augmented Dickey Fuller (ADF) and Philip-Perron (PP) test. This implies that there exists long run relationship between the variables in the estimated model. Hence, the variables in the estimated model are co-integrated. The next anlalysis is the estimation of the regression model that will test the research hypothesis of this study. In doing so, the study adopts the error correction mechanism (ECM) to analyze the macroeconomic data. Table 3 depicts the results of this analysis.

Table 3 Error correction model result Dependent variable: Gross Domestic Product (GDP)
Method: ECM
Sample: 1970 – 2018

Variables	Coefficient	Standard Error	T-Statistic
C	7.904293	2.516460	3.141036
Log (AT)	0.026936	0.031130	0.865274
Log (A)	0.047353	0.004009	11.81192
Log (L)	1.232161	0.143559	8.582942
Log (RT)	0.0.37334	0.014938	2.499333
Log (RW)	0.060795	0.009662	0.009662
Log (WT)	0.109791	0.016466	6.667841
ECM (-1)	-0.518222	0.151533	-3.419866
R-Squared 0.9834	Adj. R-Squared 0.9804	Durbin-Watson 1.9449	F-Statistic 330.28

V. DISCUSSION

5.1 Unit Root Result

The stationary status of the series is established by considering the order of integration of each series using the Augmented Dickey Fuller (ADF) and Philip-Perron (PP). The test for unit root among the variables employed in the regression equations are shown in table 1. First, economic growth (GDP) at level has a unit root at 1%, 5% and 10% level of significant, but stationary at first difference. The alternative Philip-Person (PP) result still exhibits the same properties. We use the PP approach to test for stationary of the variables because PP test statistic, which is a modification of the ADF, takes into account the less restrictive nature of the error process. Moreover, this replace the use of lags in the ADF test, which has been criticized as being arbitrary [14]. Both the ADF and the PP tests strongly support the hypothesis that all the variable used are non-stationary at level except transport subsectors like airway and railway. Thus, the hypothesis of stationarity is rejected for them. However, the results show that these variables are integrated of order one and become stationary after first difference. We thus conclude that they have unit root. The results also show that only airway transportation (AT) and railway transportation (RW) are stationary at level. This means that all the explanatory variable in the models do not have the same order of integration.

5.2 Regression Result

From table 3, the model estimated to test the effect of transportation sector on economic growth in Nigeria shows that airway subsector positively affects the level of economic growth in Nigeria. This indicates that an increase in the activities of airway transportation will cause an elastic increase of 0.026 to the economic growth in Nigeria. For domestic capital which is proxied by gross fixed capital formation, it shows a direct relationship with economic growth in the estimated model. This means that an increase in the level of domestic capital will cause an elastic increase of 0.47 to the economic growth in Nigeria. Also, labor force in the estimated model shows that there is a direct relationship between labor force in Nigeria and economic growth. Implying that increase in labor force in the country will increase the rate of economic growth by 1.23. In the estimated model road transport (RT) sub sector positively affect the rate of economic growth in Nigeria. This is also applicable to railway transport sub sector in the country. Water ways is not left behind as this has a positive relationship with economic growth in Nigeria. The ECM, which shows the long equilibrium period or speed of adjustment, indicates that in case of disequilibrium, 51.8% of this will be corrected in the next year. This shows a high speed of adjustment and is statistically significant in the estimated model with its expected negative sign. From the coefficient of multiple determination (adjusted R-squared), it shows that 98% of variations in the economy is explained in the model while only 2% of the changes is cause by variables outside the estimated model (i.e. error term). It shows that the model has a high explanatory power and fit into the Nigerian economy.

5.3 Economic Criteria (A priori expectation)

From the result of the estimated model, the a priori expectation of the macroeconomic variables in the model are met. For instance, according to the Solow growth theory capital and labor in the production function should be positively related to the total output. The result is in line with postulation for all the explanatory variables and hence, they meet the a priori expectation. In summary, all the endogenous variables in the model are positively related with the exogenous variable.

5.4 Statistically Criteria

This has to do with the statistically significant of the macroeconomic variable as well as the entire model. From the estimated result, using the rule of thumb method of the t-statistics values, two exogenous variables in the model are not statistically significant since their t-statistic value are not greater than 2. These are railway and airways transportation. The rest of the variables are statistically significant as their t-statistic values are greater than 2. The last column in table 3 depicts these facts. For the entire model, from F-statistic result of 330.28 this figure is very high and higher than the tabulated F-statistic at 5% level of significance.

5.5 Econometrics Criteria

The econometrics criteria for the evaluation or validity of the estimated model as to do with the autocorrelation test of the model. This is done using the Durbin-Watson statistics result in the model. From the estimated model the Durbin-Watson result is 1.9449, using the indirect test method of d = 2, this study concludes that there is no autocorrelation in the estimated model since the Durbin-Watson result in the model is very close to 2 i.e approximately 2.

VI. CONCLUSION

This research has specified and estimated a model on the empirical evaluation of the transport sector on the development of the Nigerian GDP growth. The model was specified to capture the impact of transport sector on the economic development of Nigeria.

The model used Gross Domestic Product as the depend variable while the transport sector output, air transport, water transport, railway transport, road transport, gross fixed capital formation (GCFC) and labor force were the independent variables used.

The result shows the contribution by transport sector and labor force has a positive impact on the economy development of Nigeria. ECM technique was used in estimating the model and Eview 9 software package was used in the regression analysis. The results found that the independent variables all exhibited positive relationship with the GDP and shows that the Nigerian transport sector has contributed significantly on the economic development of Nigeria within the time period under consideration.

It is observed from this study that the government positively affected the transport sector through its investments and in return, the transport sector has impacted positively on the economic development of the country by providing employment for the teaming population of the country and also securing the citizens, ensuring movement of freight and persons from one place to another. Also, improvements in the transport sector has opened up access to regions of the country where natural resources can be obtained which can invariably generate to the nation's income. The manufacturing output of real sector has benefited positively from the development of the transport sector of the country. Generally, transport sector has a positive impact on economic growth and development of Nigeria.

VII. RECOMMENDATIONS

1. To enable the transport sector operate effectively and efficiently, the government should provide funding inform of government expenditure on transport sector infrastructure.
2. Government should raise development policies that will aim at strengthening the transport sub-sector of the economy so that it can operate in its full capacity and neutralize the decadence that is evident in the transport sector.
3. Government should provide training and manpower development so as to achieve effective performance and overall efficiency depending greatly on the quality of staff controlling the transport output.
4. Government should invest in affordable transport infrastructure such as light rails (monorail), rail, water transport and other forms of mass transit schemes.
5. Government should setup transport equipment workshops and workshops to minimize maintenance cost.

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