COST EXPENDITURES ON QUARRYING WORKS AND TRANSPORTATION WORKS-ITS INFLUENCE ON GROSS FIXED CAPITAL FORMATION IN NIGERIA (1985-1999) AND (2000-2013)

BY

DR. UCHE AJATOR
DEPARTMENT OF QUANTITY SURVEYING, NNAMDIAZIKIWE UNIVERSITY, AWKA.

&

NSIKAK E. UDO
DEPARTMENT OF QUANTITY SURVEYING, AKWA IBOM STATE POLYTECHNIC,IKOT OSURUA, PMB 1200, IKOT EKPENE

Abstract

Since the mid 1980s, Nigeria has experienced a Gross Fixed Capital Formation (GFCF) of less than 20%; being the reason for the meager capital project as well as economic performance as such resulting in inflation, high interest rate, infrastructure and capital project neglect. Recurrent expenditures has 68% attention from government while capital projects has been allocated 32% revealing the deterioration of the neglect. The study seeks to examine the influence of cost expenditure of Quarrying and Mining works as well as transportation construction works on gross fixed capital formation in Nigeria for the period of(1985-1999) and (2000-2013). The study assumed that between the study period, there was political and social stability and fluctuation in exchange rate of naira/dollars have no effect on the study. Cost Expenditure on transportation construction works (roads,rails,water, air) had deviated following its weak level of significance of 0.39 and 0.15 for the two time period when compared with 0.05 (5%) level of significance tested. It is found that cost expenditure on quarrying works has high reliability and consistency due to its 0.00 and 0.03 level of significance over the years studied. The study concluded that cost expenditure on quarrying works has a highly positive significant influence on gross fixed capital formation while cost expenditure on transportation works has averagely contributed to GFCF; and the reason being that this sector suffered government neglect, fraud, embezzlement of funds, divergence, inadequate budget allocation, among others. The study recommend that more allocation should be channel toward infrastructure and capital project than on recurrent expenditure as such policy will help boost GFCF in Nigeria.

Keywords: **Expenditures, Gross fixed Capital Formation, Quarrying, Transportation Works,**

INTRODUCTION

A nation needs to meet her objectives of development needs, fixed capital formation (physical capital stock) or capital accumulation. However, these development may be measured through building of capital equipment on a sufficient scale to increase productivity in mining, infrastructural sector, industry, etc. while capital is required to construct schools, hospitals, roads, railways, airports, etc. (Jhingan, 2002). Gross fixed capital formation (formally gross domestic fixed investment) include land improvement (fences, ditches, drains, and so on); plant, machinery, equipment purchases; the construction of roads, railways and the likes, including schools, officers, hospitals residential, commercial and industrial buildings. In 1986, the government of Nigeria considered the need for improvement in capital formation thereby pursued an economic reform that shifted emphasis on private sector. The public sector reforms were expected to ensure that interest rates were positive and to encourage savings thereby ensuring that investment funds would be readily available at the real sector. Besides this, this reforms were expected to lead to efficiency, productivity in labour, efficient utilization of resources, increase aggregate of supply, generate low inflation rate, and promote growth (Bakare, 2011).

In his opinion Ainabor et al (2014) stated that the exchange rate fluctuation has worsened when recently there was a significant drop of crude oil prices in OPEC. In other words, Nigeria growth rate (GDP) has dropped from 7% to 4.2%. This has led to devaluation of currencies, deliberate attempt to make a mismatching of the unit of domestic deteriorating foreign exchange rate, increase in general price level, high interest rate, double digit inflation. In addition, inadequacy in economic infrastructure, deplorable roads, railways, airport facilities are equally responsible for the decline in gross fixed capital formation. The Nigerian economy is largely dependent on oil; non-oil minerals and infrastructure sector have relatively weak roles. However, the current global economic downturn, in particular oil prices volatility in international market alongside high exchange rate has compelled the government to pay considerable attention to solid minerals and infrastructural development in order to boost her gross fixed capital formation base which is a component of gross domestic product. This is the background in which this study is appraising for the past two decades.

THEORETICAL FRAMEWORK

Gross Fixed Capital Formation refers to fixed assets accumulation such as Land improvement, equipment, machineries, construction of roads and railways, building of schools, etc.; required for augmenting country's economic productivity. (World Bank, 2014). This definition reiterates and captures the predictions of Romer (1986) Growth models which stipulates that growth rates can be achieved by increasing capital accumulation. Also the building of schools leads to improved educational enrolment rate which will enhance the quality of human capital. The improvement of human capital in this regards will ensure innovations, inventions and enhancement of productivity in the economy. Likewise, the investment in machinery and equipment will also increase the efficiency of labour productivity (Bakare, 2011).

CONCEPTUAL FRAMEWORK

In Nigeria, there has been a tremendous growth in the rate of gross fixed capital formation. At current price, the GFCF was N18.2bn in 1981. From 1982 to 1987, it declined until 1988 when it assumed an increased trend. The GFCF was N40.1bn in 1990, N141.9bn in 1995, N331bn in 2000, N804.4bn in 2005 and N1546.5bn in 2006. It came up to N2053 in 2008 and N4207.4bn in 2011

(Kanu, 2014). It is noteworthy that the increment in GFCF is observed as the years progresses. Gross Fixed capital formation in 2010 totaled N84.65, million. It grew marginally by N82, 547.66 or 0.10% in 2011 to N84.73 million and by a moderate N5.23 million or 6.18% to reach N89.97 million in 2012. The greatest of the three gross capital formation categories was Equipment in 2010, with N35.74 million or 42.22% of the total GCF for that year. It then increased by N1.69 million or 4.74% to reach N37.43 million or 44.17% of the total in 2011. In 2012 however it declined by N6.66 million or 17.80% to reach N30.77 million or 34.20% of the total; a decline of 9.98% points. The second greatest contributor was Transport, which at a value of N31.26 million took 36.93% of the total in 2010. However, it showed a rapid decline over the period; first by N8.82 million or 28.20% to reach N22.45 million in 2010 and then by a lesser N1.20 million or 5.33% to the N21.25 million recorded in 2012. These values represented 26.49% of the total in 2011 and 23.62% of the total in 2012, making it the smallest of the GCF sectors in each year.

The smallest of the sub-categories in 2010 was buildings, which had GCF valued at N17.65 million or 20.85% of the total. This then increased by N7.21 million or 40.82% to N24.86 million or 29.33% of the total in 2011 (NBS, 2014) GFCF increased by N3.66 million or 49.00% from N7.48 million in 2010 to N11.14 million in 2011. The Buildings category experienced even faster growth the following year, of N13.09 million or 52.68% to reach N37.95 million or 42.18% of the total in 2012, making it the largest of GCF categories in this year. This growth was again driven by non-residential buildings, which increased in GCF value by a further N6.33 million or 56.83% to N17.47 million.

Mining and Quarrying works in the Nigerian Economy Today

Mining industries have been viewed as key drivers of economic growth and the development process and as lead sectors that drive economic expansion which can lead to higher levels of social and economic well-being ((Bradshaw, 2005). Nigeria, together with Botswana, Angola, South Africa and Liberia, falls into the category of mineral economies: each of these countries have an extractive economy that is matured and which relies on mineral. Solid minerals in the Nigerian context include all minerals and metals, excluding oil and gas. These minerals, unlike oil, occur in all the different components of the Nigerian geology. Some of them are of commercial value, while others are small and unprofitable to exploit. Indeed, all the states of the federation have a share of the mineral inventory of the nation (Obaje, 2009). The Nigerian economy is largely dependent on oil; non-oil minerals have relatively weak roles. However, the current global economic downturn, in particular oil price volatility in the international market, has compelled the Nigerian government to reduce the risk of over-dependence on oil by paying considerable attention to solid mineral development. Nigerian mining has tremendous potential for economic development. Davenport (2010) reported that the expansion of mining has the potential to contribute 15 per cent to Nigeria's GDP by the year 2015 from the present one per cent. Again, excluding the Crude Petroleum and Natural Gas activity, Mining and quarrying, activities of Coal Mining, Metal Ores and Quarrying and Other Minerals jointly contributed about 0.09% to the national GDP in the period covering 2010-2012. It is observed that there was a steady rise over the period; from the N51,877.80 million recorded in 2010, output grew by N7,691.54 million or 14.83% in 2011 to reach N59,569.34 million that year. In 2012 it grew by N11,920.06 million or 20.01% to N71,489.39 million.

EMPIRICAL FRAMEWORK

The Impact of Transportation construction works

Few would dispute the fact that a good transportation network (road, rail, airways and seaways) is essential for economic growth (GDP) of a country. This is why road-building projects have always had a prominent place in development programmes. Good communication and linkages serves as a basic prerequisite for improving GFCF and hence economic growth. Great efficiency and value are obtained when long distances are involved and high value payloads are moved, although, the time and cost efficiencies obtained decreases as distances traveled is reduced. Adefolalu (1977) opined that air transportation has introduced the most effective method of overcoming the barrier imposed by physical distances and difficult topography and its speed is far superior to any other mode of transport. The analysis includes the traditional economic footprint of the industry, measured by aviation's contribution to gross domestic product (GDP), jobs, and the tax revenues generated by the sector and its supply chain. Isaac (2013) examined the role of airport infrastructural development on socio-economic development of Nigeria. The study utilized a descriptive survey method. The result reveals that, there is a correlation between airport infrastructure development and socio-economic development of the country. The study concluded that, for any proper achievements to be achieve in aviation sector, government must step up its contribution, regulation and due process must be followed in awarding of contract and making decision that relates to the development of aviation. Using OLS regression technique, he conducted a research on the impact of public sector investment in transport on economic growth. The data for the study spanned 1977 to 2009. The outcome of the estimated result showed that transportation impacted negatively on economic growth in Nigeria. Ikpechukwu and Urael (2012) investigated the impact of quality of transport infrastructure on the economy. They applied Pearson correlation coefficient (r) to test the hypothesis of the study. The study revealed a positive correlation quality of transport and economic growth in Nigeria. Ladan (2012) opined that Nigeria air transport is bedeviled by a coherent transport policy, bad management, decaying facilities, loose security, closure of airport, intermittent air crashes and a host of other factors.

Railway system plays a significant role in the development and overall growth of any economy. It is often regarded as the wheels of economic activity because of the crucial role it plays in providing the bulwark upon which production and distribution stand. Hilling (1996) also observed that rail transport provides the first alternative to human porterage and brought with them some economic advantage. Early rail lines were critical to the development of commerce, the expansion of commercial agriculture and the stimulation of settlement expansion. The rail lines became the zone of economic activity, and the rail heads were the focal points for the expansion of settlements and economic input and output. However, the contribution of rail transport to economic growth is not stable over time. There is an increase in rail output from 1970 to 1980 before the advent of crude oil. Thereafter, the country experiences a fall in rail output due to lack of sufficient budgetary provision by the Federal Government coupled with poor management by the Nigerian Railways Corporation (NRC) that is saddled with the responsibility of managing the subsector. Rail transport subsector hardly gets up to one-fifth of the allocation to the transport sector (CBN, 2011). Lack of necessary resources to keep tracks and maintain facilities in a good working condition is said to have produced a serious deterioration of the railway system. This decadence account for a sharp fall between 1990 and 1995. In addition, Ramirez (2001) studied the impact of rail transport on the Colombian's

economic development using panel data set for the period 1914-1980. The study adopted fixed effect model and found out that railroads did not play an overwhelming role in the Colombian economy, in contrast to other Latin American countries with similar rail transportation system such as Brazil and Mexico. In addition, the study found out that railroads caused expansions in coffee exports. Furthermore, Herranz-Loncán (2011) examined the role of railways in export-led growth of Uruguayan economy between 1870 and 1913 using OLS estimation. The results showed that Uruguayan railways did produce some positive effects. They helped to integrate the national market while also promoting the political and administrative unification of the country.

RESEARCH METHODOLOGY

Model specification

In order to realize the objective of this paper, an econometric diagnostic procedure is adopted to understand the trend as well as the influence of cost expenditure of quarrying and transportation works on gross fixed capital formation in Nigeria. The operationalized and analytical procedure is based on the following relationship model:

GFCF = F(QUAR, TRPORT .....(i) (functional model)

$\mathbf{GFCF_t = \beta_o + \beta_1 QUARt + \beta_2 TRPORT_t + \mu}$ .....(ii) (econometric model)

Where:

GFCF = Gross Fixed Capital Formation (Dependent Variables)

QUAR = Quarrying works (Independent Variables)

TRPORT = Transportation works (Independent variables)

β_o= constant; $\beta_1$and β_2 are the relative slope coefficients of the parameters

t = time series from 1985-2013

Sources of Data

The research was based on a quantitative approach using secondary sources of data collection based on the two major database of Bureau of Statistics (NBS) and Central Bank of Nigeria (CBN) bulletin 2014 for the period 1985 to 2013.

Research Design

The research adopts both historical and ex-post facto research design. The former seeks to study the chronological level of influence while the latter establish a cause and effect relationship among the variables that correlate (quarrying works and transportation works).

Data Analytical Technique

A simple linear regression model and empirical model was specified based on the objectives of the study using Statistical Package for Social Sciences (SPSS) software. It also employ the coefficients of determination (r^2) measures the percentage of variations in the dependent variables. **Decision Rule:** The (f_{tab}) tabulated value of F is obtained from F-distribution table while (f_{cal}) calculated value of F is obtained from the regression analysis using SPSS. If F-tabulated is greater than F-computed, accept $\mathbf{H_0}$ and reject $\mathbf{H_1}$**;** and vice versa.

Data Presentation and Analysis

Its aim is to interpret the results obtained from the hypothesis stated earlier:

Hypothesis 1a

$\mathbf{H_0}$: Cost expenditures on Mining and Quarrying (QUARR) has no significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 1985 to 1999.

H_1: Cost expenditures on Mining and Quarrying (QUARR) has a significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 1985 to 1999.

Hypothesis 1b

H_0: Cost expenditures on aggregate Transportation works (TRANSP) has no significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 1985 to 1999.

H_1: Cost expenditures on aggregate Transportation works (TRANSP) has a significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 1985 to 1999.

Hypothesis 2a

H_0: Cost expenditures on aggregate Transportation works (TRANSP) has no significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 2000 to 2013.

H_1: Cost expenditures on aggregate Transportation works (TRANSP) has a significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 2000 to 2013.

Hypothesis 2b

H_0: Cost expenditures on Mining and Quarrying (QUARR) has no significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 2000 to 2013.

H_1: Cost expenditures on Mining and Quarrying (QUARR) has a significant positive influence on Gross Fixed Capital Formation (GFCF) in Nigeria from 2000 to 2013.

Table 1:
Analysis of result for the relationship between gross fixed capital formation and quarrying/transportation construction works from 1985 to 1999.

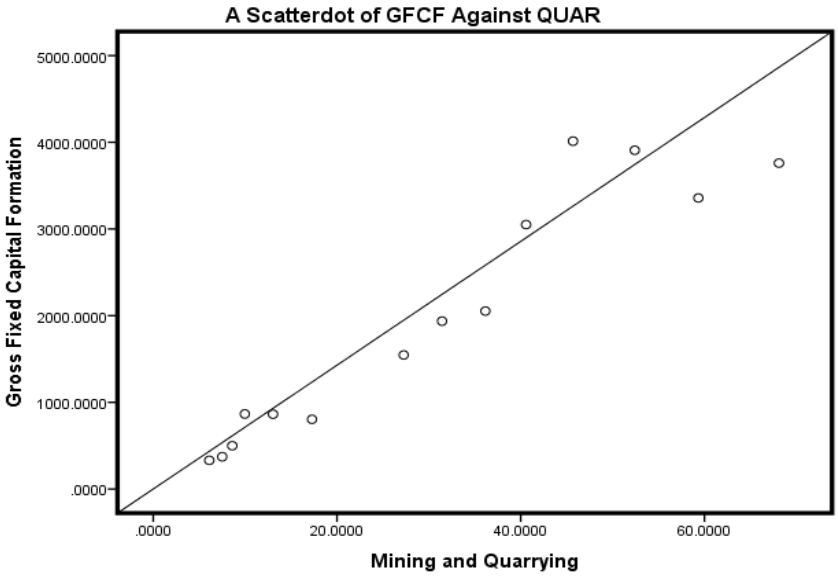
DEP. VARIABLES	IND. VARIABLES	TYPES OF ANALYSIS	REGRESSION EQUATION	R^2 %	Sig. F Of 0.05	F cal	CORR. RELATIONSHIP	STRENGTH OF RELATIONSHIP	REM
GFCF	QUARR	SIMPLE LINEAR REGRESSION	GFCF= -13.953 + 38.472QUARR	96.7	0.03	101.905	Very High	Very strong	Sig.
GFCF	TRANSP. WORKS	SIMPLE LINEAR REGRESSION	GFCF= -13.953 + 1.032TRANSP. WKS	95.2	0.39	101.905	Rel. high	Moderately strong	Less Sig.

Source: Statistical Package for Social Sciences (SPSS), version 18.

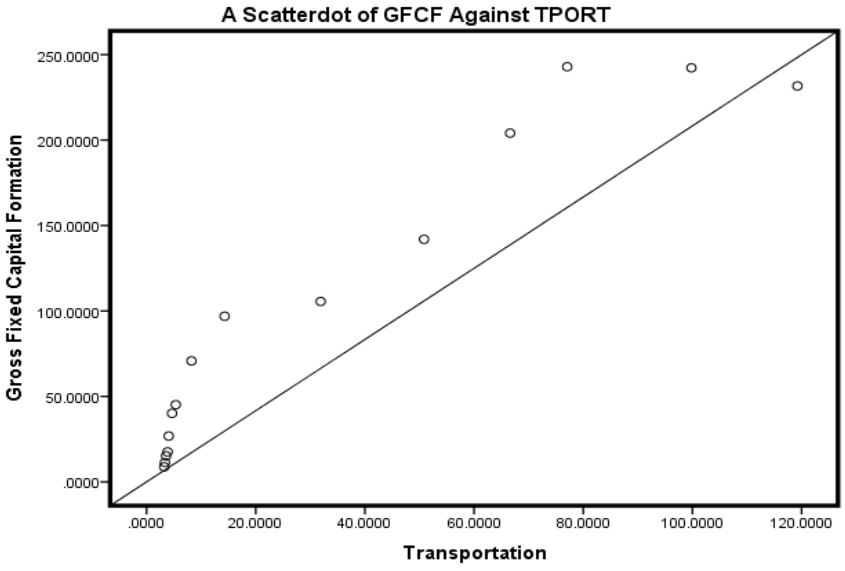
Table 2:
Analysis of result for the relationship between gross fixed capital formation and quarrying, transportation construction works from 2000 to 2013

DEP. VARIABLES	IND. VARIABLES	TYPES OF ANALYSIS	REGRESSION EQUATION	R^2 %	Sig. F Of 0.05	F cal	CORR. RELATIONSHIP	STRENGTH OF RELATIONSHIP	REM
GFCF	QUARR.	SIMPLE LINEAR REGRESSION	GFCF= -1953.116+ 76.228QUARR	95.4	0.01	53.675	Very High	Very strong	Sig.
GFCF	TRANSP. WORKS	SIMPLE LINEAR REGRESSION	GFCF= -1953.116+ -3.255TRANSP. WKS	89.9	0.15	53.675	Rel. high	Moderately weak	Less Sig.

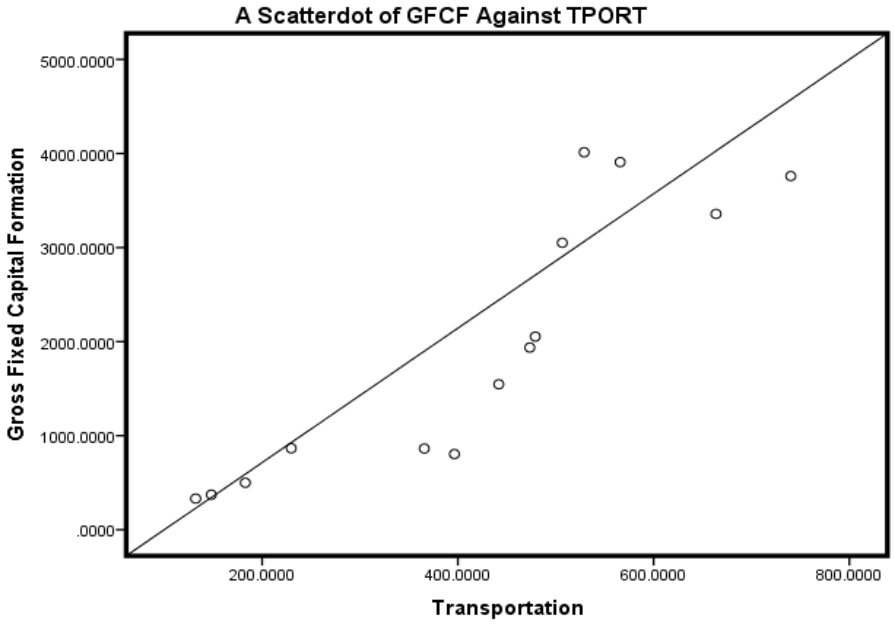
Source: Statistical Package for Social Sciences (SPSS), version 18.



A Timeseries Analysis from 2000-2013



A Timeseries Analysis from 1985-1999



A Timeseries Analysis from 2000-2013

Observation, Interpretation and Conclusion

From the pilot survey one conducted from 1985-1999 above, it shows that, Gross Fixed Capital formation (GFCF) has a high degree of positive correlation and influence on the average with quarrying, transportation works as shown on their coefficient of determination R^2 ranging from 96.7% and 95.2% which is highly above 50% level of significance. As the signs and magnitude of each variables coefficient is evaluated against theoretical expectations; it shows that Cost expenditure on quarrying and transportation works has a **significantly** positive influence on GFCF. From the survey, a constant term is estimated at -13.953, as such if independent variables is zero, then GFCF would be 13.953. As observed, a unit increase in mining/quarrying will lead to 38.472 increase in GFCF; transportation will lead to a 1.032 increase in GFCF. Following the decision rule on the collective impact of these variables over the period 1985-1999, fcal is greater than the absolute ftab value of 3.39, hence we accept H_1 and reject H_0.

From the scatter plotted graph shown above, it is seen that the scatter dots spreads closely around the regression line from left to right. This signifies a more positive relationship between mining/quarrying and GFCF; that is, a unit increase in cost expenditure on mining/quarrying will influence an increase in Nigerian GFCF. It is observed that the scatter dots are spread less closely around the regression line; still, depicting a less positive influence and correlation between of cost expenditures of transportation constructions works on GFCF.

From the survey of 2000-2013, the constant term estimated at -1953.116 would be 1953.116 for GFCF if the independent variable is zero. A unit expenditure on mining/quarrying will lead to a 76.228 increase in GFCF on the average; transportation works will lead to a 3.225 decrease in GFCF on the average while a 22.216 increase in exchange rate will lead to an increase in GFCF on the average. Collectively, the Fcal-statistics yielded 53.675 values greater than absolute tabulated value (Ftab) of 3.39, then we can accept H_1 and reject H_o in this collective survey. From the scatter plots graph, it is observed that the dots are closely scattered around the regression line signifying the high

positive cost influence and correlation impacted on GFCF by the contribution of mining and quarrying over the years studied. It is a prove that concentration has been given to these sector by the government in order to boost the GFCF.The scatter plot survey also shows a close relationship of transportation works on GFCF. At some point it tends to become loosely scattered showing inconsistency level of its positive contribution to GFCF. A decline in the trend of the dots prove that this given period of time experienced neglect from government on construction of railways, roads, seaport, airfield, etc.

Conclusions

The study has revealed that government expenditures on quarrying works and transportation construction works including infrastructure development such as roads, rail lines, air terminals and waterways has tremendous positive influence as well as significance on gross fixed capital formation base of the nation. This is evident when budgetary allocation on capital expenditure is given priority over recurrent expenditure. It has shown that a unit increase in such cost expenditure would produce optimal dividend in terms of economic growth of the nation

Recommendations

The following recommendations are made based on the results of our findings:

i. More of government expenditures should be focused on capital project in order to boost Gross fixed capital formation base of the nation.
ii. Efforts should be geared towards a reduction in exchange rate distortion, volatility and general mismanagement.
iii. Policy formulators in Nigeria need to enact some investor friendly policies that will encourage, promote and attract more capital inflows (be it official or private inflows) and to provide a conducive and enabling environment for gross fixed capital formation to thrive.
iv. There is need to play down on speculative businesses and to invest into the real sectors of the economy.

REFERENCES

Adefolalu, A. (1977). *The Role of Transport In Nigeria and Nigeria National Development*. Ibadan. NISER.

Ainabor, A. E., Shuaib, I. M., & Kadiri, A. K., (2014). Impact of Capital Formation on Growth of Nigerian Economy, 1960-2010: Vector Error Correction Model (VECM), School *of Business Studies, Readings; In Management and Social Studies*, Vol 1(1); 132-154.

Bakare, A. S. (2011). The Impact of Capital Formation on The Growth of Nigerian Economy: Causality Approach, *For East Journal of Psychology & Business*. Vol. 13(1), pp. 2-13.

Bradshaw, M. J. (2005). Population, Resources, Development And The Environment,. In Daniels, P. et al, edns. *An Introduction To Human Geography: Issues for the 21st Century*. 2nd edn. (Section 2).

Central Bank of Nigeria, (2014). CBN Statistical Bulletin, Abuja.

Davenport, J. (2010). *Nigeria Aiming To Grow Mining's GDP Contribution To 15% BS 2015*. Mining Weekly, March 15, 2010.

Henanz-Loncan, A. (2011). The Role of Railways In Export-Led Growth: The Case of Uruguay, 1870-1913. *Economic History of Development Region,* 26(2). Pp 1-32.

Hilling, D. (1996). Transport & Developing Countries. Routledge (London), ISBN

Ikpechukwu, N. & Ureal, N. (2012). 'The Impact of The Quality of Transport Infrastructure on The Nigerian Economy'. *Journal of Economic & sustainable Development*. Vol 3, no 10. Pp 174-180

Isaac, I. A. (2013). Airport Development & socio-economic Development of Nigeria. *Journal of Research In National Development.* Vol. 11. No 1, pp 196-205

Jhingan M. I. (2002). Macro-Economic Theory, Vrinda Publication, Delhi, India

Kanu, S. I. (2014). Examining The Relationship Between Federal Government of Nigeria's Revenue And Expenditure Profiles. *Journal of Economics And Sustainable Development (IISTE).*vol 3 pp 2

Ladan, S. I. (2012). 'An Analysis of Air Transportation In Nigeria'. *Journal of Research In National Development*. Vol 10 (2), pp 230-237

National Bureau of Statistics, (2014), NBS, Abuja.

Obaje, N. (2009). Geology And Mineral Resources of Nigeria. London: Springer.

Ramirez, M. T. (2001). *History of Economic Growth*. Cambridge, Unipress, pp 14-16

Romer, P. M. (1987). Crazy Explanations for Productivity Slowdown''. In S. Fisher edn; NBER, *Macroeconomics Annual, MIT Press, Cambridge* pp. 163-202.

World Bank. (2014). *Statistical Bulletin*, Federal Government Printers, Abuja.