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Government Capital Expenditure and Manufacturing Sector Output in Nigeria

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ABSTRACT

The study explored the effect of government capital expenditure on manufacturing sector output in Nigeria using time series data from 1981 to 2018. The manufacturing sector output taken as the total volume of inflation-adjusted value of output produced by all the manufacturing industries was the dependent variable. The government capital expenditure was disaggregated into four functional expenses as capital expenditures on the road, health, communication, and power (electricity). The annual time series data employed were analysed for unit roots using the augmented Dickey-Fuller (ADF), and regression techniques based on the Autoregressive Distributive Lag (ARDL) to determine the relationships. The findings revealed that capital expenditure on road infrastructure has a short-run positive significant effect on manufacturing sector output, but an insignificant adverse impact on manufacturing sector output in Nigeria; capital expenditure on health has significant impacts on the manufacturing sector output in Nigeria driving at negative in the short run and then positive in the long run; capital expenditure on telecommunication has a significant positive impact on manufacturing sector output in Nigeria both in the long-run and short-run; whereas capital expenditure on the power supply has an insignificant negative effect in long and short periods. The study hence recommended increased expenditure on road, health, electricity and telecommunication to boost the manufacturing sector propensity for growth and productivity.

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INTRODUCTION

The role of government capital expenditure in the rapid economic development of a nation is crucial for any developing economy. The importance of capital expenditure in Nigeria lies in the fact that it is seen among other things as a catalyst for rapid industrialization of the economy. To do this effectively, the government should interfere in the economic life of the country by controlling and regulating the economic activities of the country. Economic activities in a growing economy as Nigeria is driven by a well-developed and dynamic manufacturing sector. In development literature, the manufacturing sector serves as a vehicle for the production of goods and services, generation of employment and enhancement of incomes (Olorunfemi, Tomola, Adekunjo, &Ogunleye, 2013).

This fact is supported by pieces of evidence from the developed countries of the world as virtually all of them are industrialized with the manufacturing sector leading the process (World Development Indicators, 2014).

The manufacturing sector refers to those industries and activities which are involved in the production and processing of items as well as either in the creation of new commodities or in value addition (Adebayo, 2011). Indeed, Mbelede (2012) opined that the manufacturing sector is involved in the process of adding value to raw materials by turning them into products. The final products can either serve as finished goods for sale to consumers for final use or as intermediate goods used in the production process. Activities in the manufacturing sector cover a broad spectrum which includes; agro-processing, metal/plastic, ICT/electrical, textile, clothing, footwear, cement, building material etc. These activities contribute to the economy as a whole in terms of output of goods and services; provide a means of reducing income disparities; develop a pool

of skilled and semi-skilled labour for the future industrial growth; improve forward and backward linkages within the value chain between socially and geographically diverse sectors of the country; offer an excellent breeding ground for entrepreneurial and managerial talent as well as serve as a source of foreign exchange for the economy (Imoughele&Ismaila, 2014). Apart from laying a solid foundation for the economy, it also serves as an import-substituting industry, provides a ready market for intermediate goods and contributes significantly to government revenue generation through tax (Aderibigbe, 2004).

Some studies have argued that an increase in government spending can be an effective tool to stimulate aggregate demand for a stagnant economy and to bring about crowd-in effects on the private sector. According to this view, the government could reverse economic downturns by borrowing from the private sector and then returning the funds to the private sector through various spending programs. High levels of government consumption are also likely to increase employment, profitability and investment via multiplier effects on aggregate demand (Chude&Chude, 2013). Be that as it may, there should be a direct link between sustained government capital expenditure on infrastructural development and productivity growth. Such investments in road, health scheme, telecommunication as well as power supply should be able not only to increase the productive capacity of the manufacturing sector but drastically reduce the overall cost of production as well.

A good road network is very essential in its ability to support the growth and development of other sectors in the economy such as agriculture, commerce and industry. In Sub-Saharan Africa, Heggie and John (1994) stated that road transport dominates other modes of transport as it carries over ninety per cent of passengers and provides the only form of access to most rural communities. In Nigeria, roads play a significant role in her social and economic life development and are seen as the centre of connectivity of all other modes of transport with an approximate total network of about 193,200kms. Nigerian road sector carries more passengers domestically, and the transport sector contributes about 2.4% to real Gross Domestic Product (GDP) with road transport accounting for about 86% of the transport sector output. Road network represents the arteries of the Nigerian economy through which the country's economic activities flow to local, state and national levels.

Indeed, labour and capital are very important factors of production among developing countries. The increase in the rate of non-healthy individuals in the community greatly increases workforce loss and reduces productivity in developing countries whose economic growth and economics are based on labour. Given this, the developing countries cannot fully take advantage of the cheap labour factor to the extent they require them. They fall largely behind advanced economies even more disadvantaged than an already disadvantageous situation. Therefore, the health of the country and the labour markets as well as capital expenditure on health, are very important for developing countries of the world especially our country Nigeria. Mayer, Mora, Cermeno, Barona and Duryeau (2001) in their empirical research concluded by emphasizing that the existence of a healthy population rather than education, may be more important for human capital in the long run.

It is a glaring fact that the telecommunications sector remains one of the strategic sectors that aid the realization of the macroeconomic objective of increase in national income through Manufacturing Sector Output in most developing economies in the world. Following this, several countries especially in Africa, over the last two decades have carried out institutional and regulatory reforms in their telecommunication sector. The general argument underlying these reforms lies in the fact that efficient institutions in the telecommunications sector spur the growth of the sector as well as generate externalities that trigger productivity growth in other sectors of the economy. This, in turn, propels economic performance (African Partnership Forum, 2008).

It is important to note that one of the essential requirements for a sustained increase in output growth in the manufacturing sector is an adequate electricity supply. According to Olayemi (2012), the power sector is a key source of electricity generation and supply, which energizes the machines and equipment for the production of various types of goods for consumers' wants. The importance of the power sector is emphasized by Hirschamn's in his theory of unbalanced growth when he proposed that investment in a strategically selected sector such as electricity is to boost and trigger investment in the manufacturing industries to pave way for economic development (Jhingan, 2008). Given this, the role of the manufacturing sector as a result-driven diversification strategy cannot be underestimated, as it has been recognized and advocated as one of the drivers of high economic performance in some rapidly growing countries of the world, most especially the Asian Tigers; Taiwan, Korea,

Malaysia, and Indonesia (Kniivila, 2008). Indeed, these countries have achieved this based on a strong power sector that supports a vibrant manufacturing sector, thereby making it capable to generate employment opportunities, reducing the poverty rate and helping these nations to possess high growth statistics (Ellahi, 2011).

Various studies from researchers across the world, Nigeria inclusive, have tried to unravel the relationship between total public capital expenditure and its effect on the performance of the manufacturing sector output and economic growth with conflicting results and findings. Many of those researchers such as Melissa & Dean (2013); Mwafaq (2011); Ajayi (2011); Aladejare (2013); Foster &Henrekson (2001), etc, have used different research designs and methods; various techniques and statistical sets of data that altogether ended in a year, not beyond 2014 to examine the nature of the relationship between total government capital expenditure profile and its effect on the manufacturing sector output of the national economy.

Adolf Wagner (1958) on whose work this study is anchored, postulated that public expenditure which has a long-run effect on the manufacturing sector is an endogenous factor that is determined by the level of the national income. Hence, it is the level of the national income that enhances public expenditure and the longer these are made by the government, the greater the effect on the manufacturing sector. However, Keynes' model which is structured into this research as a result of its increase in government intervention, is relevant to some extent in the short – run in this study.

Therefore, on the relationship between total government capital expenditure and manufacturing sector output, some researchers such as Nwanne (2015), Melissa

and Dean (2013), Mwafaq (2011), Chikelu and Okoro (2016), Emmanuel and Oladiran (2015), Falade and Olagbaju (2015), Njoku, Okezie and Idika (2014), Eze and Ogiji (2013) as well as Ishola (2012) concluded that government capital expenditure has a significant positive effect on manufacturing sector output, while others like Aladejare (2013), Ajayi (2011), as well as Ekesiobi, Dimnwobi, Ifebi and Ibekilo (2016) found out that government capital expenditure has not been effective in the area of promoting manufacturing sector development and sustainable economic growth in Nigeria.On the relationship between capital expenditureon Road infrastructure and manufacturing sector output in Nigeria, some researchers such as Babatunde, Afees and Olasunkanmi (2012), Nworji and Oluwalaiye (2012), Kessides (1996), Soderbom and Teal (2002) conclude that there is a significant positive effect of the above capital expenditure on the manufacturing sector output while Folster and Henrekson (2001) and Ajayi (2011) reported negatively.On the relationship between capital expenditureon Health sector and manufacturing sector output in Nigeria, Kurt (2015), Olowolaju and Oluwasesin (2016), Akwe (2014) also conclude, that, there is a positive impact of the above capital expenditure on the manufacturing sector output in Nigeria while Gyimah- Brempong and Wilson (2004) as well as Taban (2006) concluded negatively.

Again, on the relationship between capital expenditure on Telecommunication and manufacturing sector output in Nigeria, Onakoya, Tella and Osoba (2012), Akanbi, Adebayo and Olomola (2014) as well as Nwanne (2015) indicate that there is a significant positive relationship between the above capital expenditure on Telecommunication and manufacturing sector output while Onakoya (2013) and Ajayi (2011) reported negatively. Finally, on the relationship between government capital expenditure on power and manufacturing sector output, Akiri, Ijuo and Apochi (2015), Riker (2012) as well as Nwankwo and Njogo (2013) also conclude that government capital expenditure on power has a significant positive impact on the manufacturing sector output while Ellahi (2011), Olayemi (2012) and Busani (2012) reported negatively on the above relationship.

These conflicting findings show that the impact of government capital expenditure on the manufacturing sector is not yet resolved. Given this, we investigated the impact of government capital expenditure on manufacturing sector output in Nigeria as a result of its low contribution to the growth of the national economy and attempt to narrow the above existing gap. This study, however, employed manufacturing sector output as the dependent variable, while total road infrastructural capital expenditure, total health sector capital expenditure, total capital expenditure on telecommunication and power supply served as the explanatory variables of the model covering the period 1981-2016. It is important to note that the gap in terms of the period covered in this study is also one of the main contributory factors in this research.

It is against this background that this study investigated the effect of government capital expenditures on the manufacturing sector output in Nigeria by looking at its short and long-run effects, to provide a better insight on prudent and efficient allocation of public funds to bring about a sustained rapid economic growth and diversification of the

national economy through manufacturing sector output in Nigeria. The broad objective of the study is to ascertain the impact of government capital expenditure on the manufacturing sector output in Nigeria. However, the specific objectives are to:

1. Examine the impact of capital expenditure on road infrastructure on manufacturing sector output in Nigeria.
2. Investigate the impact of capital expenditure on health sector on manufacturing sector output in Nigeria.
3. Determine the impact of capital expenditure on telecommunication on manufacturing sector output in Nigeria.
4. Ascertain the impact of capital expenditure on power on manufacturing sector output in Nigeria.

THEORETICAL FRAMEWORK

The theoretical framework for this study is based on Adolf Wagner (1958) and John M. Keynes (1936) whose postulations on endogenous and exogenous growth models respectively provide the researcher with a very good platform for this study.

Adolf Wagner Theory

Wagner's Theory of Increasing State Activities: Wagner's theory is a principle named after a German Economist known as Adolf Wagner (1958). According to him, he postulated an endogenous growth theory which stated that sustained public expenditures generate growth of the national income. Wagner advanced his 'Theory of Rising Public Expenditures by analyzing trends in the growth of public expenditures and in the size of public sector. His theory is both endogenic and organic in nature. This came into the lime-light during the West European Industrial Revolution of the 19th and 20th centuries in the Western Europe. Further development of this theory which made it possible to withstand the test of time as an alternative approach in the 1980s and beyond were made possible by Arrow (1962), Lucas (1988) and Romer (1990). These were great followers of Adolf Wagner's endogenous growth theory. Several empirical researches have been carried out based on the above theory and the most noted were those done by Matteo and Sunde (2009), Aghion, Howith and Murtin (2011) among others who applied this endogenous growth model in their various empirical studies.

Both Arrow (1962), Lucas (1988) and Romer (1990) who are great followers of Adolf Wagner (1958), played very vital roles in the development of modern Endogenous Growth Model as an alternative approach in the 1980s. Matteo and Sunde (2009), for instance, studied the casual effect of life expectancy on economic growth. The result reveals that high life expectancy is the cause of sustainable revenue growth. Aghion, et al., (2011) investigated the relationship between health and productivity growth in the light of endogenous growth theory also. Their empirical result reveals that a better life expectancy greatly increases growth. When similar study was carried out on life expectancy at various ages in the Organization for Economic Co-operation and Development (OECD) Countries, the decline in mortality rates under 40 years was observed to have a positive significant increased growth rate among OECD Countries.

The Keynesian Theory

Keynes' theory of increasing state activities strongly shares the same view with Wagner on the same subject matter of Government intervention but largely varies from the cause of such state intervention. While Wagner's view was based on endogenous factor, Keynes' on the other hand, was predicated on exogenous factors. John Keynes exogenous theory of increasing state activity was brought to bear during the great global depression of the 1930s. He called for increased Government interventions that would bring back life to economic activities across the nations of the world and which would translate into increased investment income and savings with multiplier effect on aggregate demands.

Among the economists who discussed extensively on the relationship between public expenditures and economic growth through industrial sector output, Keynes stood out as one of the most noted. Keynes regards the cause of public expenditures as an exogenous factor which can be utilized as a policy instrument to promote economic growth. From the Keynesian's view point, public expenditure can contribute positively to economic growth. Hence, increase in the government consumption is likely to lead to an increase in employment, profitability and investment through multiplier effects on aggregate demands. As a result, government expenditures bring about increase in income, savings and investments with strong effect on aggregate demands that provoke optimal production. Keynesian economics was very influential for several decades and dominated public policy from the 1930s during the great global depression to the 1970s. The theory has since fallen out of favour. But, it still influences policy discussions, particularly on whether or not changes in government spending have transitory economic effects. Some policymakers, for instance, still use Keynesian analysis to argue that higher or lower level of government spending will stimulate or dampen economic growth. It is on the strength of these two

theories that this study is strongly anchored, as a result of their effects on the short to long-run equilibrium relationship between Government capital expenditure and manufacturing sector output in Nigeria.

EMPIRICAL REVIEW

Author(s) / Years	Scope	Research Topic	Variables of the Model	Method of Analysis	Findings
Nwanne (2015)	Nigeria, 1990-2012	Implications of Government Capital Expenditure on the Manufacturing Sector in Nigeria	Manufacturing Sector Output/GDP Road Infrastructural Capital Expenditure (CEXR), Health Sector Capital Expenditure (CEXH) and Capital Expenditure on Telecommunication (CEXT)	Co-integration Test and Ordinary Least Square (OLS)	Long run relationship exists CEXR and CEXT has positive effects on manufacturing sector output in Nigeria CEXH has insignificant
Melissa & Dean (2013)	USA, 1980-2010	Is Public Expenditure Productive? Evidence from the Manufacturing Sector in U.S. Cities	Value added, public expenditure, ethnic fragmentation, private capital, city population, city size and real wage	Simple Cobb-Douglas production function model	Strong significant positive relationship on private capital and labour productivity
Mwafaq (2011)	Jordan, 1990-2006	Government Expenditures and Economic Growth in Jordan	GPD, recurring expenditures, capital expenditures, transfer payment and interest payment	-	government expenditure at the aggregate level has positive impact on the growth of GDP
Aladejare (2013)	Nigeria, 1963 to 2010	Governing Spending and Economic Growth.	-	Vector Error correction mechanism and Granger causality models	Significant negative
Babatunde, Afees&Olasunkanmi (2012)	Nigeria, 1970 to 2010	Infrastructure and economic growth in Nigeria: Amultivariate Approach	Manufacturing, agriculture, services, export, import and services	Three-stage least squares	Infrastructural investment has significant impact on output via direct impact on *industrial output and indirect effect from* output of other sectors as manufacturing, oil and other services.
Nworji& Oluwalaiye (2012)	Nigeria, 1980-2009	Government Spending on Road Infrastructure and Its Impact on the Growth of Nigerian Economy	GDP, defence expenditure, expenditure on transport and communication by the federal government and inflation Rate	Ordinary Least Square (OLS) technique	Transport and communication, including defence, individually exerted statistically significant impact on the growth

Foster &Henrekson (2001)	1970-1995	Growth effect of Government Expenditure and Taxation in Rich Countries.	Total capital expenditure, total recurrent expenditure, transport and communication, education and health.	Co-integration error correction mechanism etc.	Government capital expenditure has negative impact on economic growth
Kurt (2015)	Turkey, 2006:M01 - 2013:M10 period	Government Health Expenditures and Economic Growth: A Feder-Ram Approach for the Case of Turkey	Health output and the rest of output (non-health sector), Labor and capital are homogeneous in both of the sectors	Feder-Ram Model.	Direct impact of government health expenditures on economic growth in Turkey is positive and significant
Olowolaju &Oluwasesin (2016)	Nigeria , 2005-2014	Effect of Human Capital Expenditure on the Profitability of Quoted Manufacturing Companies inNigeria	Profit before tax, Salaries and Wages, Training, Contributory Pension and Health	Descriptive statistics	positive relationship between expenditure on human capital in general and the profitability of the selected firms
Akwe (2014)	Nigeria, 1990 – 2009	The Relationship between Public Social Expenditure and Economic Growth in Nigeria: An Empirical Analysis	Administrative expenditures, economic services expenditures, social and community services expenditures, Transfers expenditures, productive expenditures, protective expenditures, capital expenditures and recurrent expenditures	Vector Error Correction (VEC) Model Based Causality	Unidirectional causality from economic growth to health expenditure, which supports the Wagner's Law. Causality from economic growth to education and aggregate social expenditure. Public social expenditure amplify economic growth at bivariate (aggregated) levels
Taban (2006)	Turkey	The causality – relationship between health and economic growth in Turkey	Life expectancy at birth bed numbers of medical institutions, Number of medical institutions, number of persons per medical staff.	Augumented Dickey Fuller (ADF) Test and Causality Test	No causality between the health institutions and the GDP.
Onakoy, Tella and Osoba (2012)	Nigeria, 1986 – 2010	Investment in Telecommunications Infrastructure and Economic Growth in Nigeria: A Multivariate Approach	Output of infrastructure, Output of manufacturing, Output of Agriculture, Output of Service and Output of Oil	Multivariate Approach	telecommunication infrastructural investment has a significant impact on output of the economy

Akanbi, Adebayo and Olomola (2014)	Nigeria, 1986 – 2010	Analysis of Economic Liberalization and Telecommunication Sector Performance in Nigeria	Penetration rate, Employee per telecom subscribers, Total Population, Urban Population, Dummy for Liberalization	Dynamic Ordinary Least Square (DOLS) technique	a positive and significant relationship exists between telecommunication sector performances.
Onakoya (2013)	Nigeria, 1985 - 2003	Impact of Economic Reform on the Nigerian Telecommunications Sector	Teledensity (number of Telephone connections for every 100 individuals) and Gross Domestic Product	OLS	Telecommunications sector is statistically insignificant in explaining the GDP.
Akiri, Ijuo&Apochi(2015)	Nigeria, 1980-2012	Electricity Supply and the Manufacturing Productivity in Nigeria	Manufacturing productivity index (as dependent variable) while electricity generation, capacity utilization rate, government capital expenditure on infrastructures and exchange rate (represent the explanatory variables)	OLS	Electricity generation and supply in Nigeria under the viewed periods impacted positively on the manufacturing productivity growth
Riker (2012)	U.S.A, 2002 – 2006	Impact of Energy price on Non-Petroleum Manufacturing Exports in USA	-	Descriptive analysis	prices of energy have significant impact on U.S manufacturing sector
Ellahi (2011)	Pakistan, 1980-2009	Testing the relationship between electricity supply, development of industrial sector and economic growth: An empirical analysis using time series data for Pakistan	Real GDP, Share of Investment in GDP, Labor Force, industrial Value and dummy variable for electricity shortage	Auto Regressive Distributed Lag(ARDL)approach	productivity level of the industrial sector in Pakistan is declining as a result of power shortage
Falade&Olagbaju (2015)	Nigeria, 1970 to 2013	effect of government expenditure on manufacturing sector output	manufacturing sector output, capital and recurrent expenditure, nominal and real Gross Domestic Product (GDP), exchange rate and interest rate	Johansen cointegration approach and ECM	government capital expenditure has positive relationship with manufacturing sector output
Olayemi (2012)	Nigeria, 1980-2008	Electricity Crisis and Manufacturing Productivity in	Manufacturing productivity index, Electricity Generation, Capacity Utilisation	OLS	Electricity generation and supply have negative impact on productivity growth of

		Nigeria	and Government Capital Expenditure		manufacturing sector
Loto (2011)	Nigeria, 1980 to 2008	Effect of government capital expenditure on economic growth	education, health, national security, transportation and communication and agriculture and GDP	Johansen co-integration and Error correction test	Agriculture and education are negatively related to economic growth; while health, national security, transportation and communication were positively related to economic growth.
Nworji, Okwu, Obiwuru and Nworji (2012)	Nigeria, 1970 – 2009	Effect of government capital expenditure on economic growth	Gross domestic product (GDP), and Capital and recurrent expenditure on economic services, transfers, social and community services.	OLS multiple regression models	Capital expenditure on transfers; capital and recurrent expenditures on social and community services and recurrent expenditure on transfers were found to have positive effect on economic growth.
Adewara and Oloni (2012)	Nigeria11 960 to 2008	Effect of government capital expenditure on economic growth	public expenditure on health, agriculture water and education, GDP	vector Autoregressive models (VAR)	Expenditure on education do not enhance economic growth; expenditure on health and agriculture have positive contributions to growth; expenditure on water and education are negatively related to growth.
Njoku, Okezie and Idika, (2014)	Nigeria, 1971-2012	Effect of government capital expenditure on economic growth	Manufacturing Gross domestic product; and exchange rate, interest rate, political stability, recurrent expenditure, money supply, interest rate, index of energy consumption, credit to private sector, degree of openness and rate of growth of GDP	Ordinary Least Square method	positive relation between rate of growth of GDP, capital expenditure, money supply, openness of the economy, recurrent expenditure and manufacturing output in the country

METHODOLOGY

The study employed the ex-post-facto design which is suitable when the data for study is basically secondary in nature and the researcher does not intend to manipulate the data as obtained from the sources. The major sources of data were from the publications of authorized and designated authorities such as the CBN Statistical Bulletin, and Bureau of Statistics. The key variables for the study are manufacturing sector output as a dependent variable, and total road infrastructural capital expenditure, total health sector capital expenditure, total capital expenditure on telecommunication and power supply as explanatory variables of the model for the analysis. These were sourced within the period 1981 – 2018.

Model Specification

The assumption of this study is that infrastructural development is essential for the manufacturing sector activities. Hence government capital expenditure is enabler of infrastructures in road, health, telecommunication,

electricity (power) needed to facilitate manufacturing activity as taken as drivers of manufacturing sector growth. This is anchored on the Adolf Wagner's theory of increasing state activities and Keynesian theory of positive infrastructural effect on growth. The growth nexus is derived from the work of Nwanne (2015) where the variables used as explanatory to capital expenditure include total government capital expenditures on Total Road Infrastructure capital expenditure (TRIE), Total Health Sector Capital Expenditure (THSEX), and Total Capital Expenditure on Telecommunication (TEXC) covering a period of 1990-2012. However, the dependent variables was the index of manufacturing sector output production measured as Manufacturing Sector Output/GDP X 100/1 (MOP/GDP). Nwanne's model 2015 is as given as:
MOP/GDP= f (TRIE, THSEX, TEXC)

The modified form of the model gave rise to the present model adopted in this study as:
MSO=*f*(TRICE, THSCE, TCET, CEPS) ---------- 1

In econometrics, equation (1) above is insufficient resulting from absence of error term. Hence, we express the above equation in a functional relationship using linear regression model by introducing constant and error term, hence we have;
$MSO = \beta_0 + \beta_1 TRICE + \beta_2 THSCE + \beta_3 TCET + \beta_4 CEPS + \mu$ ----------2

Where;
MSO =Manufacturing Sector Output
TRICE = Total Road Infrastructural Capital Expenditure
THSCE = Total Health Sector Capital Expenditure
TCET = Total Capital Expenditure on Telecommunication
CEPS = Total capital expenditure on power supply (electricity)
$\beta_0$as the intercept
$\beta_1$to β_4 represents the slope coefficients
μ is the stochastic term or the error term.
The *a'priori* expectation is thus: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$,

Description of the Variables

Manufacturing Sector Output*: Manufacturing output refers to the total volume of inflation-adjusted value of output produced by all the manufacturing industries annually by manufacturers. Announcements of manufacturing output include month-over month and year-over-year changes in manufacturing production. According to Central Bank of Nigeria (2011), manufacturing sector is categorized into engineering sector, construction sector, electronics sector, chemical sector, energy sector, food and beverages sector, metal-working sector, plastic sector, transport and telecommunication sector. This accounts for almost 80% of total Industrial Production and tends to have a big impact on market behaviour. It is a leading indicator of economic health as manufacturing output reacts quickly to ups and downs in the business cycle.*

Road Expenditure: Government expenditure on road refers to its capital expenditure on infrastructural development which optimally impacts on the productive capacity of the manufacturing sector by drastically reducing the cost of production that greatly increases the growth of the national economy through the manufacturing industry.

Health Expenditure: Government health expenditure consists of recurrent and capital spending from government (central, state and local) budgets, external borrowings and grants (including donations from international agencies and non-governmental organizations) and social (or compulsory) health insurance funds. Total health expenditure is the sum of public and private health expenditures. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation.

Communication Expenditure: Expenditure on telecommunication as a proportion of total consumption expenditure, varies according to household structure. However, telecommunication expenditure accounted for the largest proportion of communication expenditures in Nigeria. This was because it was a rapidly growing sector that created new activities by itself, contributed substantially to the economic growth, employment generation, great private returns to capital etc Jacobson (2003).

Power (Electricity or Energy) Expenditure: This referred to the electricity generated and supplied to the aggregate amount of power generated and supplied by differently located Electricity Distribution Companies which are connected to the national grid across this country to all the manufacturing industries' sector. One of

these distributing companies in Nigeria is known as Enugu Electricity Distribution Company (EEDC). For the developing nations, the growth in the utilization of energy was directly and closely related to the expansion in industrialization World Bank (2005). However, electricity generation and supply (distribution) in Nigeria have not really expanded industrialization as perceived by the World Bank.

Methods of Data Analysis

The model was analysed based on multiple regression technique. The estimated regression results are based on the ARDL co-integration approach developed by Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001). It has three advantages in comparison with other previous and traditional co-integration methods. The first one is that the ARDL does not need that all the variables under study must be integrated of the same order and it can be applied when the under-lying variables are integrated of order one, order zero or fractionally integrated. The second advantage is that the ARDL test is relatively more efficient in the case of small and finite sample data sizes. The last and third advantage is that by applying the ARDL technique we obtain unbiased estimates of the long-run model (Harris &Sollis, 2003). More importantly, to determine the reliability of the ARDL results, the serial correlation, heteroskedasticity and normality of the ARDL model need to be checked. Additionally, the stability of the model is determined using the cumulative sum of recursive residuals test based on the cumulative sum of the recursive residuals is conducted (CUSUM).

DATA ANALYSIS AND DISCUSSION OF FINDINGS

Presentation of Data and Trend Analyses

The data were used in their levels for the analyses since all of them have similar characteristics. The data were reported in billions of Naira. These variables included the dependent variable as manufacturing sector output, while the explanatory variables were Total Road Infrastructural Capital Expenditure (TRICE), Total Health Sector Capital Expenditure (THSCE), Total Capital Expenditure on Telecommunication (TCET) and Total capital expenditure on power supply (electricity) (CEPS).

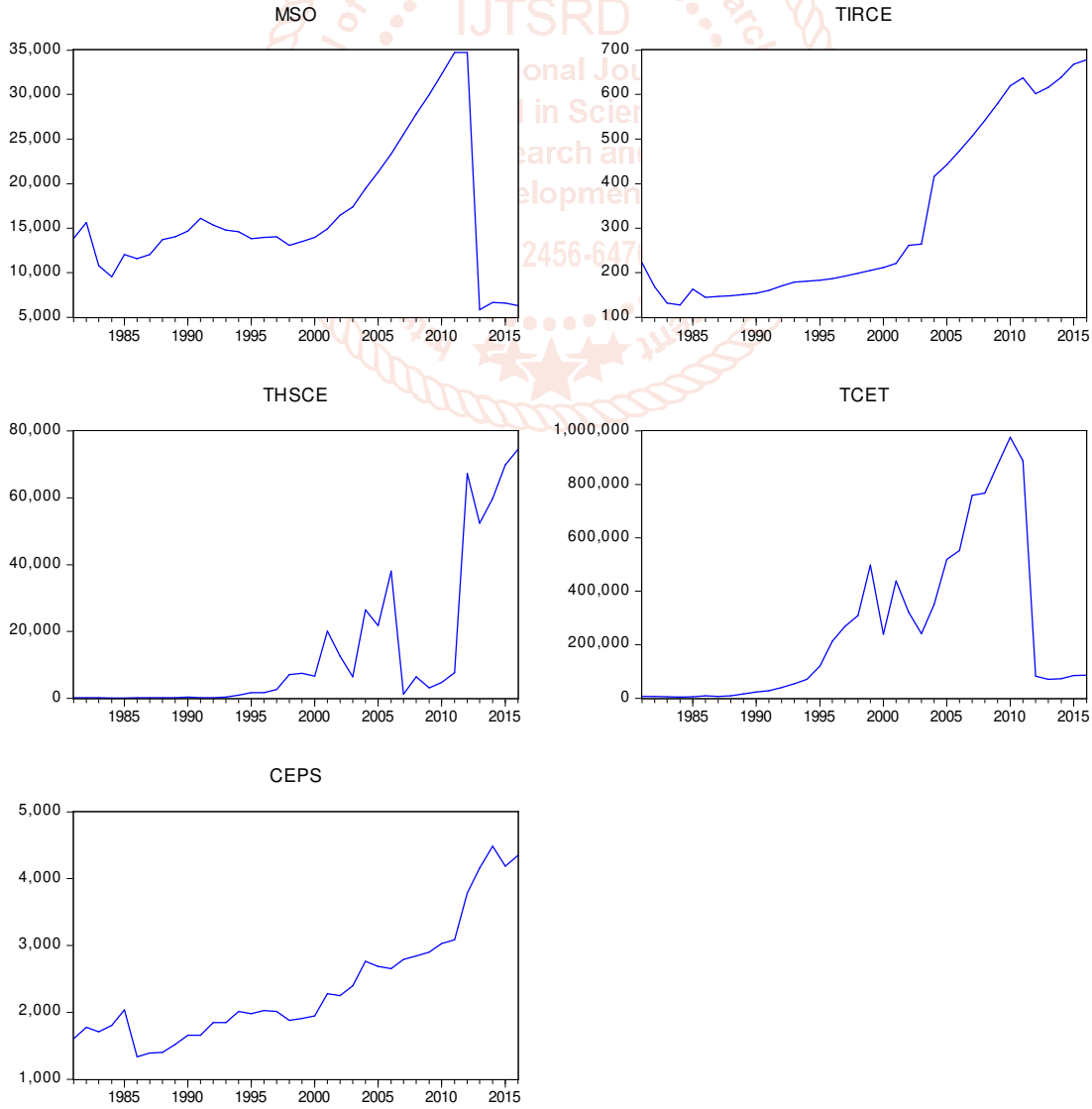

Figure 1: Trend of government capital expenditure in Nigeria, 1981-2018.

The trends in the variables were shown on Figure 1. The trend showed a relatively stable movement in MSO between 1981 and 2000 where the MSO fluctuated between 10,000 and 15,000 billion naira. The period from 2001 to 2010 showed a rising growth of MSO to the extent that it moved from about 15,000 in 2001 to hit about 35,000 in 2010. Other periods till 2018 displayed a heavy crash in the manufacturing sector output (MSO) in Nigeria. The trends for the components of capital government expenditure (TRICE, THSCE, CEPS, and TCEP) did not follow similar trend. This explained that government capital budgets differed in various sectors of the economy. Like the growth of the MSO, TCET met with snowball after 2010, while other sector capital expenditure TRICE, THSCE and CEPS got heavy and rising support.

Descriptive Properties of the Variables

The descriptive properties of the variables were summarized in Table 1. The descriptive properties of the variables were highlighted based on the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera, p-value and number of observations. The table showed that 36-year annual time series variables are used in the study.

Table 4.1: Descriptive statistics of the variables employed in the study

	MSO	TRICE	THSCE	TCET	CEPS
Mean	16505.78	322.0119	13944.62	250613.0	2388.424
Median	14301.45	208.1650	2876.720	85547.90	2019.300
Maximum	34711.30	678.3100	74522.50	975998.4	4485.470
Minimum	5826.360	127.5400	51.10000	4100.100	1331.800
Std. Dev.	7601.378	198.5294	22538.42	294686.8	879.4613
Skewness	1.043571	0.694882	1.695876	1.155765	1.068665
Kurtosis	3.418125	1.754927	4.426180	3.100768	3.157170
Jarque-Bera	6.796481	5.222472	20.30695	8.029981	6.889319
Probability	0.033432	0.073444	0.000039	0.018043	0.031916
Sum	594208.0	11592.43	502006.4	9022068.	85983.25
Sum Sq. Dev.	2.02E+09	1379487.	1.78E+10	3.04E+12	27070829
Observations	36	36	36	36	36

The mean and standard deviation of the variables for MSO were16505.78 and 7601.378. This indicated that there was an average of ₦16,505,780,000 worth of output from the manufacturing sector in Nigeria annually. The standard deviation showed that there was ₦ 7,601,378,000 variation in annual production. Among components of government expenditure, it can be seen that TRICE, THSCE, TCET and CEPTS have means larger than their respective standard deviations. This indicated that there were less variations over the years under study. However, the test of normality using the Jarque-Bera statistics showed that all the variables (except TRICE with probability values greater than 0.05) appeared to lack normal distribution as an individual variable.

Diagnostic Test

The results of the diagnostics were the test of reliability of the models employed in the analyses and results obtained. These tests were obtained after the analyses had been concluded. However, it was presented before the model analyses so that we could appreciate the robustness of the models and reliability of the expected results.

Table 2: Test of Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.639914	Prob. F(2,24)	0.5361
Obs*R-squared	1.771925	Prob. Chi-Square(2)	0.4123

In order to ensure that the model of the study was not encumbered by autocorrelation issue, the serial correlation LM tests were determined for all the models and the results summarized in Table 2 above. The serial correlation was determined based on the Breusch-Godfrey Serial Correlation LM Test which provided an evidence on whether or not the variables in the models were serially correlated. The null hypothesis is: There is no serial correlation in the residual.

Decision Rule: Reject the Ho, if the p.value is less than 0.05.

From the results on Table 2, the F-statistics is 0.639914 with p.values of 0.5361. Since the p.values (p. > 0.05) are greater than 0.05, we cannot reject the null hypothesis. Thus we conclude that there is no serial correlation from the residuals in the model of our study.

Table 3: Test of heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.296204	Prob. F(7,19)	0.3046
Obs*R-squared	8.726493	Prob. Chi-Square(7)	0.2729
Scaled explained SS	3.363548	Prob. Chi-Square(7)	0.8495
Source: Author's Compilation Using E-views 9 Output			

The problem of heteroskedasticity was gotten rid of by the conduct of the Breusch-Pagan-Godfrey Heteroskedasticitytest which the results from the model indicated that heteroskedasticitywas not detected in the model. The probability of the Chq. Statistic from the model was insignificant at 5% level of significance.

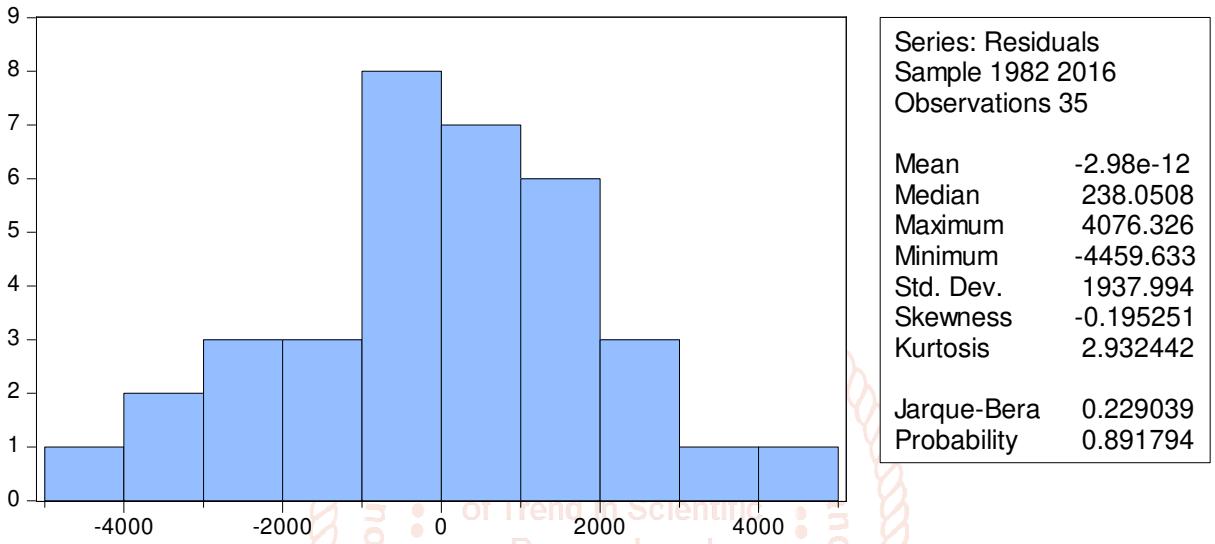

Figure 4: Normality test for the model

The normality of the variables in the model is examined using the Residual. The result on Figure 2 showed the normality statistics of the model. The JargueBera statistics of the model is 0. 229039 with p.value of 0.891794. Since the p.value is greater than 0.05, we do not reject the null hypothesis since the model is normally distributed.

Unit Root Test

The recent developments in economic literature has shown that ordinary least square (OLS) method cannot be applied unless it is established that the variables in the model are stationary and to avoid spurious regression, it becomes imperative to determine the stationarity of the variables used in this study since unit root problem is a common feature of time series. This was conducted using Augmented Dickey-Fuller (ADF) test and the result was presented in Table 4 below:

Table 5: Augmented Dickey-Fuller (ADF) unit root test

Variables	ADF-Statistic	Critical Value			Order of Integration
		1%	5%	10%	
MSO	-5.634596	-3.639407	-2.951125	-2.614300	1(1)
TRICE	-5.026910	-3.639407	-2.951125	-2.614300	1(1)
THSCE	-7.953259	-3.639407	-2.951125	-2.614300	1(1)
TCET	-6.942636	-3.724070	-2.986225	-2.632604	1(0)
CEPS	-5.845482	-3.639407	-2.951125	-2.614300	1(1)

The results of ADF in table 4 showed that manufacturing sector output (MSO), capital expenditure on road infrastructure (TRICE), capital expenditure on health (THSCE) and capital expenditure on power supply (CEPS) were found to be non-stationary at level but on first differencing, they turn out to be stationary that is order 1(1) while the capital expenditure on telecommunication (TCET) was found stationary at Level, that is order 1(0). This showed the possibility of the existence of long run relationship between the variables. Thus, we thereafter proceeded to the second stage of testing for the long run relationship among the chosen variables.

Determination of Lag Length

Having determined stationarity of the variables, it was necessary to equally determine the lag at which the long run co-integration test could be carried out. Since the study involved time series analyses, it was necessary to include vector auto regression of the dependent variable. This will enable us to include the lagged values of the dependent variable as part of the independent variables so as to determine the time period it will take for it to influence itself.

Table 6: Results of Lag Length Selection Test

Endogenous variables: MSO, TRICE, THSCE, TCET, CEPS						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1620.580	NA	2.32e+35	95.62238	95.84684	95.69893
1	-1492.249	211.3694*	5.42e+32*	89.54406	90.89085*	90.00335*
2	-1466.867	34.33998	5.87e+32	89.52160*	91.99072	90.36364
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

From the result above, majority of the criteria (FPE, SC, and HQ) indicated lag lengths at 1 while others including AIC has its lag length option at 2. Following the majority results, the study accept the optimum lag length for the study as 1. Thus the econometric regression are performed at lag 1 for the model.

Co-integration Test for ARDL Bounds Test

Table 6: Results of Bound F-test for Co-integration

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	22.58001	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

The second step is to test the presence of the long run relationship between the government capital expenditure on manufacturing sector output. Since the variables in the model are integrated in orders of 1(0) and 1(1), the bounds test approach is taken as the most appropriate. The results of the bound F-test for co-integration together with the asymptotic critical values are reported in Table 6.

From the result of the ARDL bounds approach where MSO is the dependent variable, the computed F-statisticis above the upper bound and lower bound of the critical values. The calculated F-statisticis22.58001 while the upper critical bound is at 1% significance level and lower bound is3.74 and upper bound is5.06. This implies that there is long run relationship among MSO, TRICE, THSCE, TCET, and CEPS over the period of 1981 – 2016 in Nigeria. This means that there is a long run relationship between government capital expenditure and manufacturing sector output in Nigeria.

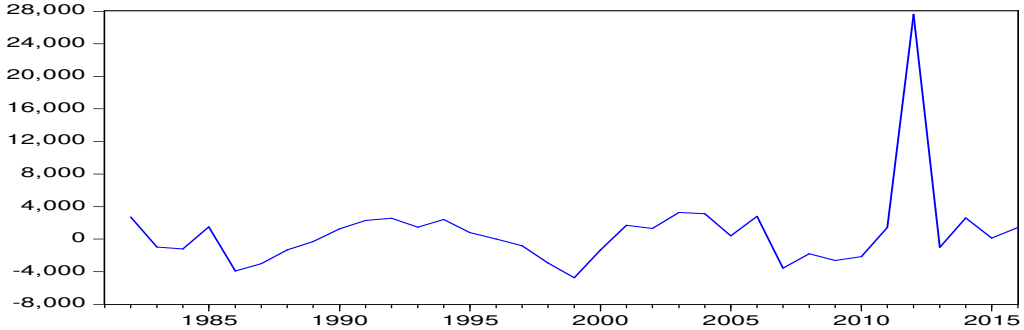

Figure 3: Graph of the long run relationship

The trend of the long run relationship is capture on Figure 3 above. The Figure showed a continuous trends (without breaks). From the Figure, it can be seen that the relationship between government capital expenditure and manufacturing sector output follows an oscillatory trend. This is an indication that manufacturing sector output and government capital expenditure in Nigeria has a high level of instability.

It becomes imperative to estimate and the coefficients to establish the long-run and the short-run relationships in the model.

Estimated long-run Co-efficient Based on ARDL approach

Table 7: Estimated Long-run Co-efficient using ARDL approach

Cointeq = MSO - (46.5776*TRICE -0.1564*THSCE + 0.0118*TCET -8.2061*CEPS + 19597.4076)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TIRCE	-46.5776	10.5057	-4.4335	0.0001
THSCE	0.1563	0.0660	2.3688	0.0256
TCET	0.0118	0.0032	3.6437	0.0012
CEPS	-8.2061	2.6691	-3.0744	0.0049
C	19597.4076	3510.7794	5.5820	0.0000

Source: Author's compilation with E-view 9 output

Owing to the fact that a co-integration relationship between the variables has been detected, Autoregressive Distribution Lag (ARDL) model is established to determine the long-run relationship between government capital expenditure and manufacturing sector output in Nigeria, the result of ARDL test. Table 7 presented the results of the estimated long run coefficient using ARDL approach.The results showed the long-run impact of the explanatory variables on the manufacturing sector output in Nigeria. The coefficients of capital expenditure on health (THSCE) and capital expenditure on telecommunication (TCET) have long-run positive significant impact on manufacturing sector output in Nigeria such that increase in THSCE and TCET by one percent (1%) will lead to an increase in the manufacturing sector output by about 15.6% and 1.18% respectively in the long-run.

An increase in capital expenditure on road infrastructure (TRICE) and capital expenditure on power supply (electricity) (CEPS) by one percent will lead to decrease in the manufacturing sector output by about 4657.8% and 820.6% respectively in the long-run. In other words, capital expenditure on road infrastructure and capital expenditure on power supply (electricity) have long-run negative impact on manufacturing sector output in Nigeria.

A consideration of the strength of impact, using the t-statistic in table 7 above, revealed that capital expenditure on health (THSCE) and capital expenditure on telecommunication (TCET) have long-run positive significant impact on manufacturing sector output in Nigeria. While the capital expenditure on road infrastructure (TRICE) has long – run negative and insignificant impact on manufacturing sector output in Nigeria. Furthermore, the capital expenditure on power supply (CEPS) also has negative and insignificant impact on the manufacturing sector output in the long-run.

It is imperative to relate the above discussion to the specific objectives of this study. The first objective is to examine the impact of capital expenditure on road infrastructure on manufacturing sector output in Nigeria. According to these results, capital expenditure on road infrastructure has long – run negative insignificant relationship with manufacturing sector output in Nigeria. The second objective is to investigate the impact of capital expenditure on health sector on the manufacturing sector output in Nigeria. The results show that individually, capital expenditure on health has a long-run positive significant relationship with manufacturing sector output in Nigeria. The third objective is to determine the impact of capital expenditure on telecommunication on manufacturing sector output in Nigeria. The result indicates that capital expenditure on telecommunication also has a long-run positive significant relationship with manufacturing sector output in Nigeria. Finally, the fourth objective of this study is to ascertain the impact of capital expenditure on power supply on manufacturing sector output in Nigeria. The result concludes that capital expenditure on power supply (electricity) has a negative insignificant impact on the manufacturing sector output in the long-run.

The implication of these results is that any long-run policy targeted at these variables is expected to yield the desired outcome on manufacturing sector output in Nigeria. Thus, we proceeded to estimate the Error Correction

Model (ECM) so as to reconcile the short-run dynamics with long-run disequilibrium of the variables. The Error Correction Model results are presented in table 4.8 below.

Test of Short-run Dynamism

Since the variables are co-integrated, the error correction model is required to construct the dynamic relationship of the model. The purpose of the error correlation model is to indicate the speed of adjustment from short run dynamic to the long run equilibrium state.

Table 4.8: Error Correction Model Results

Dependent Variable: D(MSO) Method: Least Squares Sample (adjusted): 1983 2018 Included observations: 34 after adjustments				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-281.8666	417.3402	-0.675388	0.5050
D(TRICE(-1))	35.40709	13.21936	2.678427	0.0122
D(THSCE(-1))	-0.111371	0.038676	-2.879561	0.0076
D(TCET(-1))	0.010599	0.003705	2.860556	0.0079
D(CEPS(-1))	-2.093167	2.190393	-0.955613	0.3474
ECM(-1)	-0.344847	0.149132	-2.312360	0.0283
R-Squared: 0.856751; Adjusted R-squared: 0.831171; F-statistic: 33.49278; Prob(F-statistic): 0.000000;; Durbin-Watson Stat: 2.296931				

The results presented above were analyzed using three criteria: economic a'priori criteria, statistical criteria, and econometric criteria. With respect to the coefficients, the constant (C) has a value of -281.8666 and the implication is that if all the explanatory variables are held constant or pegged at zero (0), the explained variable – manufacturing sector output will decline by 28186.66 units. This shows that regardless of any change on the explanatory variables, manufacturing sector output will be decreased in the short – run.

The variable –capital expenditure on health sector (THSCE) and capital expenditure on power supply (CEPS) shows negative coefficient of -0.111371 and -2.093167 respectively, implying that where other predictor variables are held constant, a one unit change in the THSCE and CEPS will precipitate a 11.1% and 209.3% decline of manufacturing sector output in Nigeria in the short – run.

On the other hand, the capital expenditure on road infrastructure (TRICE) and capital expenditure on telecommunication (TCET) show a positive direction as they possess coefficients of 35.40709 and 0.010599 respectively indicating that where other variables are held at zero, a unit increase in TRICE and TCET will boost manufacturing sector output by 3540.7% and 1.0599% respectively in the short – run.

Thus, the result of the error correction model indicates that the error correction term ECM (-1) is well specified and the diagnostic statistics are good. The ECM (-1) variable has the correct sign and is statistically significant. The speed of adjustment of -0.344847 shows a low level of convergence. In particular, about 34.48% of disequilibrium or deviation from long run of manufacturing sector output in the previous period is corrected in the current year in the short – run.

On consideration of the strength of impact, the result shows that capital expenditure on road infrastructure (TRICE) and capital expenditure on telecommunication (TCET) reveals positive significant relationship with manufacturing sector output in the short run given its probability of 0.0122 and 0.0079 respectively which is below 0.05% significant margin. Again, the capital expenditure on health sector (THSCE) reveals negative but significant impact on manufacturing sector output in Nigeria in the short – run given its probability of 0.0076 which is below 0.05% significant margin. Furthermore, the capital expenditure on power supply (CEPS) indicates negative insignificant impact with the predictor variable –manufacturing sector output in Nigeria in the short – run given its probability of 0.3474 which is greater than 0.05% significant margin.

The statistical evidence emanating from the study of coefficient of determination, R^2 shows that the endogenous variables jointly explained 85.67% of the total variation in the dependent variable – manufacturing sector output in Nigeria. This is also used for measuring the goodness of fit and adequacy of the regression line to the observed sample's values of the variables if its value is greater than 50%. Since R^2 observed value is 0.856751 from the above table

4.8, this confirms that the model is of good-fit and adequate when the value is converted into ratio percentage of 85.68%. The value of the adjusted R^2 (0.831171) which is 83% re-affirms the goodness of fit of the regression remained high after adjusting for the degree of freedom. The *f*-statistic shows a probability of 0.0000 which is below 0.05 significance level and thus shows that the probability is significant and the model successful. In other words, it indicates that the model is of good-fit, adequate and significant. It also implies that the power of the explanatory model is high. The short-run dynamics adjusts to the long-run equilibrium.

Discussion of Findings

Objective one revealed that capital expenditure on road infrastructure has positive significant impact on manufacturing sector output in Nigeria in the short – run while in the long – run it has negative and insignificant impact on manufacturing sector output in Nigeria. This indicates that the manufacturing sector productivity boosts within a short-term period as roads are constructed but declines over time in the long run. This implies that newly developed or reconstructed road is a means to enhancing economic growth of the country through manufacturing sector. However, such improvement in production from road construction is not sustainable. Thus the findings tend to suggest that Nigeria cannot attain economic sustainability through improved road networks. In Sub-Saharan Africa, the use of road transport dominates other modes of transport (Heggie& John, 1994), wherein roads play significant role in social and economic life in the development of Nigeria, connecting the country with approximately total road network of about 193,200kms. As seen in the Review of related Literature, "Nigeria's road sector carries more passengers domestically and the transport sector contributes about 2.4% to real Gross Domestic Product (GDP) with road transport accounting for about 86% of the transport sector output". It therefore beclouds common sense to think that road construction does not contribute positively to the growth of the manufacturing sector in the long run. This is not out of place as empirical studies from developed countries also posit that government capital expenditure on road can have negative effect on growth (Folster&Henrekson, 2001). This is equally supported by empirical study in Nigeria (Ajayi, 2011). This implies that road network is not a major enhancing factor to manufacturing sector productivity in Nigeria. However, some studies in Nigeria contradict the negative postulations to claim that road infrastructure has positive and significant impact on growth (Babatunde, Afees&Olasunkanmi, 2012; Nworji&Olawalaiye, 2012).

Secondly, findings from objective two showed that government capital expenditure on health has positive significant impact on manufacturing sector output in Nigeria in the long-run while in the short–run; it has negative but significant impact on manufacturing sector output in Nigeria. These indicate that health sector capital expenditure is such that its investments weaken economic productivity in the manufacturing sector in its initial periods but however, blossoms the economic outputs from manufacturing sector in latter years over a long period of time. This suggests that improvement in health supports sustainable economic productivity. This is in line with Adolf Wagner's endogenous growth theory that postulated that sustained public expenditures generate growth of the national income. It is expected that healthy individuals in the community greatly increase workforce gain and should also increase productivity in developing countries whose economic growth and economics are based on labour. In a developing economy like Nigeria, with relative labour intensive production lines, health and labour productivity is congruent. Therefore sustainable growth in Nigeria can be influenced by increased human capital stock that comes from higher level of Health and the new learning –techniques and application processes (Lopez- Casanovas, Rivera, &Currais, 2005). Giving more credence to health, Mayer, Mora, Cermeno, Barona and Duryeau (2001) averred that the existence of a healthy population rather than education, may be more important for human capital in the long-run. Like the present study, other previous studies that employed the modern developed endogenous growth model proved that health has a positive effect on growth of an economy (Matteo &Sunde, 2009; Aghion, Howitt&Murtin, 2011). Further to this, all the empirical studies in Nigeria supported a positive relationship that existed between health sector capital expenditure and manufacturing sector output (Akwe, 2014; Kurt, 2015; Olowolaju&Oluisesin, 2016). This implies that healthy citizens are necessary for Nigeria's rapid economic growth and development.

On the third objective, the findings reveal that capital expenditure on telecommunication has positive significant impact on manufacturing sector output in Nigeria both in the long-run and short –run. Further to this, manufacturing output has bidirectional causal impact with capital expenditure on telecommunication. These indicate that government capital expenditure on telecommunication is a veritable means to boosting the manufacturing sector productivity. This outcome also is in line with the joint theoretical frameworks of this study that posit sustained public expenditures on telecommunication generate growth of the national income. There is no

gainsaying that telecommunication remains one of the strategic sectors that aids the realization of the macroeconomic objective of increased national income through Manufacturing Sector Output in most developing economies in the world. This follows the African Partnership Forum's (2008) support for the neoclassical literature by positing that investment flows into the telecommunication sector lead directly to economic performance. For the developing economies like Nigeria, enhanced telecommunications sector is a precondition for market competiveness, hence it is an avenue for attracting foreign investors into the sector.Like the findings of this study, previous studies from Onakoya, Tella and Osoba (2012), Akanbi, Adebayo and Olomola (2014) as well as Nwanne (2015) indicate that there is a significant positive relationship between capital expenditure on Telecommunication and manufacturing sector output. This gives a collective voice to the fact that investment in telecommunication is a panacea to Nigeria's economic growth challenges.

The last objective indicates that capital expenditure on power supply has a negative and an insignificant impact on manufacturing sector output in Nigeria both in the long-run and short-run. This completely negated the joint theoretical framework upon which this study is anchored by its failure to influence growth of the national income through Manufacturing Sector Output. Capital investments in the power sector of Nigeria have counterproductive effect on the manufacturing sector. The higher the level of government capital investment in power, the less the output of the manufacturing sector. This reflects the deteriorating and epileptic syndrome in the power sector of Nigeria. The manufacturing sub-sector of the economy does not rely on the national grid for electricity. The cost of running plants is increasingly high with the rising cost of crude oil products in Nigeria. Thus, despite the level of government investment in power, it does not have positive effect on the cost of manufacturing sector production and thence no positive effect on its productivity. The result of this study did not support economic theories such as Keynes (1936) and Adolf Wagna (1958) on growth which expect that electricity supply should be essential requirements for output growth in the manufacturing sector (Olayemi, 2012), energizing the machines and equipment for production of various types of goods for consumers' wants. These principles have been utilized by Asian countries such as Taiwan, Korea, Malaysia, and Indonesia to grow their economies (Kniivila, 2008). It becomes paradoxical that electricity investment has negative effect on the manufacturing sector in Nigeria. This is like saying that water does not support the life of fishes that live in it. In line with this view point, empirical research from advanced economy (Riker, 2012) shared the same position while here in Nigeria, Akiri, Ijuo and Apochi (2015) as well as Nwankwo and Njogo (2013) lent their support. Government should therefore fix power supply in our country if it hopes to realize sustainable rapid economic growth and diversification of the national economy through manufacturing sector in Nigeria.

Conclusion and Recommendations

This study have explored the impact of government capital expenditure on manufacturing sector output in Nigeria from 1981 to 2018 using the functional public capital expenditure. Government capital expenditure has been identified has a sound development strategy to boosting the manufacturing sector growth in Nigeria. It is thus advocated that government capital expenditures be allocated optimally so as to stimulate and create conducive environment to involve the private sector led economic development and rectify market failures in Nigeria.

On the basis of the results obtained, the following recommendations are made:

1. Government should increase capital expenditure on road infrastructure in Nigeria.
2. Higher government capital expenditures on health should be sustained so as to increase productive capacity of the manufacturing sector output in Nigeria.
3. Government should also sustain higher capital expenditures on telecommunication so as to decrease the cost of production.
4. Serious effort should be made to fix power sector in order to accelerate rapid economic growth and diversification of the national economy through manufacturing sector.

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