Impact of Capital Expenditure on the Manufacturing Sector of the Nigerian Economy

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ABSTRACT: The importance of capital expenditure in an economy cannot be overemphasized. In Nigeria, capital expenditure has been given meager allocation, and the manufacturing sector has been experiencing poor growth. To this end, this study examines whether the low manufacturing sector's growth in Nigeria is as a result of the poor allocation to capital expenditure, also whether there is any causal relationship between capital expenditure and manufacturing sector's growth. In executing this study, the Error Correction Mechanism (ECM) is employed after Augmented Dickey Fuller (ADF) unit root test as well as Johansen Co-integration analysis have been applied to the variables in our model-Manufacturing Output in Nigeria; Capital Expenditure; Foreign Direct Investment; Interest Rate; and Exchange Rate. Granger causality test is employed to determine whether there is any causal relationship between capital expenditure and manufacturing sector's growth. The study finds that capital expenditure has significant impact on manufacturing sector's growth. It also finds that capital expenditure Granger causes manufacturing sector's growth in Nigeria. The study recommended imperative policy options which we believe that if implemented; there will be tremendous improvements in the manufacturing sector's growth in Nigeria.

Keywords: Manufacturing, Growth, Capital

1. INTRODUCTION

Capital expenditure is an amount spent to acquire or improve a long-term asset such as equipment or buildings. It is one of the two kinds of government expenditure of which the other is recurrent expenditure, which refers to an amount spent on the day-to day running of the state and on the payment of salaries within a period of 12 months or a financial year. Furthermore, capital expenditure refers to an outlay of cash for a project that is expected to produce a cash inflow over a period of time exceeding one year. It is used to provide infrastructure.

There is no doubt about the fact that capital expenditure plays an important role in the enhancement of an economy, as it provides the infrastructure that helps in the production of goods and services. Capital expenditures, particularly those used for non-military and productive purposes, such as construction of roads and bridges, dams, power and irrigation works, schools and hospitals, are generally desirable because of their high multiplier effect on the economy. They stimulate the growth and expansion of economic activities of the private sector and facilitate the integration of industries.

The notion is, if capital expenditure is judiciously applied, it has the capacity to open up vast opportunities, create employments, stimulate investments, etc and thereby generate positive multiplier effect on the economy (Agunuwa and Nomuoja, 2010). Capital expenditure on education can enhance the productivity of an economy, as Dornbusch et al (2011) noted, "productivity increases result from changes in knowledge as people learn to perform tasks better and as new inventions are introduced into the economy". Expenditure on electricity, water and sanitation, roads, rail and telecoms has played a major role in the growth of high-income countries. Much of the economic growth and productivity of the United States of America, in its 'golden period' in the mid-twentieth century was due to the growth in infrastructure (Hall, 2010).

Hall (2010), furthermore, asserts that the importance of public investment in infrastructure was demonstrated by the damaging effects of the structural adjustment programmes of the IMF-which insisted on cutbacks on public spending, which caused damaging falls in infrastructure in Latin America. In Latin America, government spending on human and physical capital in the 1980s and 1990s, dropped precipitously during the period when IMF imposed its structural adjustment policies, and led to a fall in economic growth. Coming to Nigeria, capital expenditure has not been given adequate allocation. In 1970, capital expenditure in Nigeria was 3.6 percent of the GDP, it declined to 2.6 percent in 1971, by 1980, it had risen to 20.5 percent, it dropped to 9 percent in 1990, and it declined further to 5.2 percent in 2000. It was 3 percent of the GDP in 2010 (CBN Statistical Bulletin, 2010). Could this be the cause of the pitiable state of infrastructure in Nigeria?

Following the promising nature of the influence of capital expenditure on every sector of an economy, as noted above, it cannot be over-emphasized what capital expenditure can do to the sector that forms the topic of discourse in this work-the manufacturing sector, because of its huge potential of bridging the gap between the potential and actual manufacturing output, as well as encouraging manufacturing growth, due to its ability to deal with the obstacles confronting the sector, especially that of lack of infrastructure. The British Industrial Revolution has, since, ensured a paradigm shift

from conventional reliance on International Trade (Mercantilism) and Agriculture (Physiocracy) to a value-adding system of production, which is manufacturing (Nnaelue, 2013).

2. PROBLEM AND OBJECTIVE

Despite the fact that it has become clear to the developing countries of the world (including Nigeria), how important the manufacturing sector is to the development of any nation, the growth of the manufacturing sector and its contributions to the Nigerian GDP have not been impressive. The manufacturing sector's growth and contribution to the GDP between 2006 and 2010 were abysmal as a result of the decay in infrastructure. The manufacturing sector grew slightly from 9.39 percent in 2006 to 9.57 percent in 2007 and dropped to 8.89, 7.85 and 7.64 percent in 2008, 2009, and 2010, respectively, while there was no significant contribution of the manufacturing sector to GDP between 2006 and 2010 (NBS, 2010).

Capacity utilization in the manufacturing sector has not been impressive either. According to CBN (2000), the overall manufacturing capacity utilization fell from 70% in 1973 to 39% in 1986 and to about 27% in 1998. The manufacturing sector has been witnessing dearth of manufacturing firms with the number of registered firms with the Manufacturing Association of Nigeria (MAN) dropping from 4,850 in early 1980s to 2000 in 2010, indicating 58.76% decrease (Mike 2010). In recent times, manufacturing industries in Nigeria have been characterized by declining productivity rate, which is caused largely by inadequate electricity supply, smuggling of foreign products into the country, trade liberalization, globalization, high exchange rate and low government expenditure (Tomola, Adebisi and Olawale, 2012). According to the president of the Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture (NACCIMA), political and economic factors contribute to the decline in the manufacturing sector; poor infrastructure and epileptic power supply are also key impediments to the sector. He also said that firms in the manufacturing sector operates on more than 70 percent of energy it generates, using generator, and operating these generators greatly increases the cost of manufacturing in Nigeria.

According to the CBN (2011), recurrent expenditure exceeded capital expenditure by nearly seventy-two percent in the period 1984 to 2011. Specifically, the recurrent expenditure in the 1984-85, 87-95 and 2000-2011 periods was more than the capital expenditure in each year. The capital expenditure decreased nearly 60 percent in the period 1980-84. Meanwhile, from 1980 to 1983, capital expenditure was more than the recurrent expenditure. Apart from 1986 and 1996-2000 period, the federal government capital expenditure was less than the recurrent expenditure. Since 2000 to date, the share of recurrent expenditure has been more than that of capital expenditure.

This study, therefore, aims at assessing the potency of capital expenditure as a tool for the enhancement of the manufacturing sector's contribution to the real GDP of Nigeria from 1970 to 2012, which covers a period of 42 years. Researchers on this subject have not examined the causality between capital expenditure and manufacturing sector's growth in Nigeria. Consequently, this study intends to fill this knowledge gap by ascertaining the presence of causality between capital expenditure and manufacturing sector's growth in Nigeria.

3. LITERATURE REVIEW

Here, we selectively review the works of other authors to see their opinion on the impact of capital expenditure on the manufacturing sector of the Nigerian economy.

Oke and Awoyemi (2010) stress that to improve the manufacturing value added in Nigeria, revamping the nation's deteriorating infrastructural facilities is important. Between recurrent and capital expenditure, the latter is the one that can revamp the deteriorated infrastructural facilities. Therefore, Oke and Awoyemi (2010) are implicitly recommending that more should be allocated to capital expenditure, in order for the nation's manufacturing value added to be improved.

Devarajan, Swaroop, and Zou (1996) stress that the stock of infrastructural capital resulting from capital expenditure would complement private-sector productivity. And it is mostly the private sector that engage in manufacturing, for example, in Nigeria, we have private individuals like Dangote, Innoson, Ibeto, etc, who own manufacturing firms, but we rarely see any functional manufacturing firm that is owned by the government. Soderbom and Teal (2002) find that there is a positive relationship between capital stock and manufacturing value added.

Kessides (1993) examines a wide range of evidences on the impact of infrastructure on an economy, and concluded that infrastructure, which is provided through capital expenditure, reduces costs of production, provides access to the use of modern technology, and raises economic returns to labour. He further stressed that infrastructure, which is made available by capital expenditure, contributes to raising the quality of life by creating amenities, providing consumable goods and contributing to macroeconomic stability. When the cost of production is reduced, more will be produced by the manufacturing firms.

Monadjemi (1995) asserts that government expenditure such as expenditure on infrastructure (for example, roads and electricity), education, and research, may increase the productivity of the private sector, which has the bulk of manufacturing firms. Suarez (2011) finds that there is a positive relationship between public capital expenditure and private output.

Dadgoster and Mirabelli (1998) find that private sector investment, which also includes private real investment, is positively affected by public sector investment. Boskins (1987) finds that an increase in public capital stock increases private sector efficiency, and as a consequence, private investment (including private real investment) rises.

Aschauer (1988a) stressed that private sector investment spending is enhanced by expected increases in government infrastructural spending. Aschauer (1988b) also finds a remarkable positive correlation between the net nonmilitary public capital stock particularly, core infrastructure of highways, water and sewer system, mass transit and airports and various measures of private sector productivity.

4. RESEARCH METHODOLOGY

This study efficiently explains the impact of capital expenditure on the manufacturing sector of the Nigerian economy using the Ordinary Least Squares (OLS) technique to estimate the parameters of our regression model, combined with Augmented Dickey Fuller (ADF) unit root test to guard against spurious regression, Johansen Co-integration technique to confirm the long-run relationship among the variables (dependent and independent) of the model, the Error Correction Mechanism and heteroscedasticity test. The study also uses the Granger causality test to establish the causality between capital expenditure and manufacturing sector's growth in Nigeria.

In this section, therefore, the model with which to estimate and test the significance of the relationship of our interest is estimated. Likewise, the model to be used in testing the causality between capital expenditure and manufacturing sector's growth is estimated. Thus, our first model examines and tests the significance of the relationship between manufacturing sector's growth, proxied by Manufacturing Share of the Real Gross Domestic Product (MRGDP) - the dependent variable and Capital Expenditure, Foreign Direct Investment (FDI), Interest Rates (INTR), and Exchange Rate (EXCH) - the explanatory variables. Our second model tests the causuality between capital expenditure and manufacturing sector's growth proxied by Manufacturing Share of the Real Gross Domestic Product.

Model 1
The first model is specified as follows:

$$MRGDP = \beta_0 + \beta_1 CEXP + \beta_2 FDI + \beta_3 INTR + \beta_4 EXCH + \mu \ldots\ldots\ldots 1$$

However, given that we intend to standardize all the variables (dependent and independent alike) and interpret the resulting partial slope coefficient as elasticities, the structural form of the equation above is rewritten in log form as follows:

$$LnMRGDP = \beta_0 + \beta_1 LnCEXP + \beta_2 LnFDI + \beta_3 LnINTR + \beta_4 LnEXCH + \mu \ldots\ldots\ldots.2$$

Model 2
To determine whether there is any causal relationship between capital expenditure and manufacturing sector's growth in Nigeria, we use the following models:

$$MRGDP = \Sigma \alpha_i CEXP_{t-I} + \Sigma \beta_i MRGDP_{t-I} + \mu_{1t}$$

$$CEXP = \Sigma \alpha_i CEXP_{t-I} + \Sigma \beta_i MRGDP_{t-I} + \mu_{2t}$$

5. A PRIORI EXPECTATIONS

This tells us whether or not the explanatory variables conform to the postulations of economic theory in terms of their signs and magnitudes. According to economic theory, capital expenditure, exchange rate and foreign direct investment have a positive relationship with manufacturing real gross domestic product, the reverse is the case for interest rate which has a negative relationship with manufacturing

real gross domestic product. If the estimates do not conform to what we have above, then they must be rejected unless there are strong reason that will lead to their acceptance.

6. DATA AND SOURCE

Secondary time series data obtained from Central Bank of Nigeria (CBN) Statistical Bulletin, Economic Journals and National Bureau of Statistics (NBS) publications were used in this research work.

7. RESULTS

The Augmented Dickey-Fuller unit root test shows that apart from the ECM term, none of the variables is stationary at level. Manufacturing gross domestic product, capital expenditure, foreign direct investment, interest rate, and exchange rate are stationary at order 1. This, therefore, shows that there is a need for cointegration analysis, since the variables are nonstationary at level form. From the cointegration analysis, the trace test indicates the existence of one cointegrating equation at 5% level of significance. The implication of this result is the possibility of a long run relationship between manufacturing real gross domestic product (proxy for manufacturing sector's growth) and the macroeconomic variables used in the model. Having confirmed the existence of long run relationship among the variables in our model, the first and second model are subjected to Error Correction Mechanism with the Newey-West method and Granger causality test respectively. The results are as follows:

Model 1

Table I: Summary of Regression Result

Dependent Variable: LNMRGDP

Variable	Coefficient	Std. Error	T-statistic	Probability
C	-0.496309	0.317526	-1.563053	0.1266
LNCEXP	0.477090	0.102290	4.664109	0.0000
LNFDI	0.468988	0.054380	8.624328	0.0000
LNINTR	0.544212	0.206969	2.629442	0.0124
LNEXCH	0.135082	0.128981	1.047297	0.3018
ECM	0.576187	0.364892	1.579063	0.1228

Coefficient of determination (R^2): 0.999788

Adjusted coefficient of determination ($\hat{R}^2$): 0.999759
F-statistic: 34855.31
Prob(F-statistic): 0.000000
Durbin-Watson statistic: 2.475930
The estimated model is expressed as follows:
MRGDP=0.496309+0.477090CEXP+0.468988FDI+0.544212INTR +0.135082EXCH+0.576187 ECM

The coefficient of determination (R^2) in the estimated regression result is 0.999788, implying that variations in the independent variables - capital expenditure, foreign direct investment, interest rate and exchange rate, explain 99.9788 percent variations in manufacturing sector's growth in Nigeria. This means that other determinants of manufacturing sector's growth not captured in the model only explain 0.0002 percent of the variations in manufacturing sector's growth in Nigeria. The F-statistic is used to verify the overall significance of an estimated model.

The F-statistic of our estimated model is 34855.31 and the probability of the F-statistic is 0.000000, since the critical F-value ($F_{0.05\ (5,37)}$) is 2.53, which is less than the F-statistic, we conclude that the explanatory variables put together have significant impact on the manufacturing sector's growth in Nigeria. The value of the probability being less than 0.05 further validates our conclusion.

We also used the T-test to check the individual significance of the variables in our model by comparing the absolute value of the t-statistic for each coefficient with the critical t-value, 1.96. If the absolute value of the t-statistic is greater than 1.96, such coefficient possessing the t-value is accepted to be statistically significant and fit to be used for statistical inference and possibly for forecasting. Capital expenditure with a t-value of approximately 4.66, is significant, foreign direct investment and interest rate with t-values of approximately 8.62 and 2.63 respectively, are also significant. Exchange rate and the ECM term, which have t-values of approximately 1.05 and 1.58 respectively, are nonsignificant. Capital expenditure, foreign direct investment and interest rate being significant means they have significant impact on the manufacturing sector's growth in Nigeria. The ECM term being nonsignificant further buttresses the point that there is no adjustment to equilibrium in the model.

In testing for autocorrelation in the model, the Durbin-Watson statistic is used. From our regression result, the Durbin-Watson statistic is 2.476, which is approximately equal to two, showing that there is no autocorrelation. Therefore, the error terms in the model are not correlated.

According to Gujarati (2009), the clearest sign of multicollinearity is when R^2 is very high but none of the regression coefficients is statistically significant on the basis of the conventional t –test. From our regression result, it can be seen that the R^2 is as high as 0.999788 and three of the coefficients are statistically significant, which tells us that there is no multicollinearity in our estimated model.

Model 2: Summary of Granger Causality Test

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Null Hypothesis	Obs	F-statistic	Probability
CEXP does not Granger cause MRGDP	42	4.19024	0.0474
MRGDP does not Granger cause CEXP		2.06729	0.1585
FDI does not Granger cause MRGDP	42	1.26137	0.2683
MRGDP does not Granger cause FDI		3.17749	0.0824
INTR does not Granger cause MRGDP	42	0.52526	0.4729
MRGDP does not Granger cause INTR		2.23947	0.1426
EXCH does not Granger cause MRGDP	42	4.65454	0.0372
MRGDP does not Granger EXCH		0.31423	0.5783

Granger Causality Test

In Granger causality test, we reject the null hypothesis, if the calculated F-value is greater than the table F-value, or if the probability of the F-statistic is less than the chosen 0.05 level of significance, we accept, otherwise. From the Granger causality test result in the table above, we observe that only the probabilities of the F-statistic of the null hypothesis that capital expenditure does not Granger cause manufacturing sector's growth and that of the null hypothesis that exchange rate does not Granger cause manufacturing sector's growth in Nigeria, are less than 0.05, with their values equal 0.0474 and 0.0372 respectively, which leads us to reject the null hypotheses, and conclude that capital expenditure and exchange rate Granger cause manufacturing sector's growth. The probabilities of the F-statistic of the other null hypotheses are greater than 0.05, which leads us to accept the null hypotheses.

8. CONCLUSION

The study was basically undertaken to examine the impact of capital expenditure on the manufacturing sector's growth in Nigeria and to verify whether there is any causal relationship between

capital expenditure and manufacturing sector's growth in Nigeria. Given the findings of the study, the following recommendations were reached.

The study recommends that the government should allocate more to capital expenditure. It should increase its allocation to capital expenditure from the relatively meager 23.4% (2014 allocation), if it wants to enhance the manufacturing sector's growth in Nigeria. However, it is only when accountability and transparency in public spending is ensured, that increase in allocation to capital expenditure will bring about an enhancement in the manufacturing sector's growth in Nigeria. Therefore, the government should ensure that the Fiscal Responsibility Act is adhered to.

The government should provide adequate infrastructures in order to attract foreign investors to the country. Infrastructure refers to the technical structures that support a society, such as roads, bridges, electrical grids, telecommunications, etc. Infrastructure facilitates the production of goods and services. Therefore, the government should provide the necessary infrastructures, if it wants to enhance manufacturing sector's growth. Adequate electricity should be provided in order to save manufacturers the cost of producing with generators.

So much dependence on imported goods is one of the reasons for the poor performance of the manufacturing sector in Nigeria. The government should encourage the consumption of domestic goods, by levying substantial import duties on imported goods that are also manufactured in the country. Levying import duties on imported goods will increase the price of imported goods, which will give competitive advantage to goods produced in the country, and this will enhance the manufacturing sector's growth.

An overvalued currency discourages exportation of domestically produced goods because the domestic goods will be costly for foreigners to buy, and a decrease in export decreases economic activities including manufacturing activities. The study therefore recommends that the Central Bank of Nigeria should use its monetary policies to maintain exchange rate stability in order to avoid having an overvalued currency.

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