Effect of Government Capital Expenditure on Manufacturing Sector Output in Nigeria

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Abstract

The study examined the effect of government capital expenditure on the Manufacturing Sector Output (MSO) in Nigeria from 1981 to 2020. The ex-post facto research design was adopted for the study because the data used were sourced from the Central bank of Nigeria (CBN) 2020 Statistical Bulletin and the World Bank data indicators. The MSO was used as the dependent variable while the government capital expenditure which was disaggregated into government capital expenditure on administrative services (GCEXA), government capital expenditure on economic services (GCEXE), government capital expenditure on social and community services (GCEXS) and government capital expenditure on transfers (GCEXT), were used as the explanatory variables. The Auto-Regressive Distributed Lag (ARDL) model method of analysis was employed for the study. The F-bound test revealed that there is a long-run equilibrium relationship amongst the variables; hence, the Error Correction Model (ECM) was further employed to ascertain the short-run relationships and the speed of adjustment should there be any disequilibrium in the model. The study found that the GCEXA and GCEXT have a long-run positive relationship with the MSO while the GCEXE and GCEXS have a long-run negative relationship with the MSO. Also, all the variables have significant effects on the MSO except the GCEXS which has an insignificant on the MSO. The study recommends that; Since the Nigerian government capital expenditure on administrative services, economic services and transfer services are have long run significantly effect on the manufacturing sector, the government is advised to increase its budgetary allocation on these components of the capital expenditure; while allocation of capital expenditure to social and community services should be reduced. By so doing, the aim of the capital expenditure which is economic growth will be achieved through the increase in the manufacturing output.

Keywords: Manufacturing, Output, Government, Capital, Expenditure

INTRODUCTION

Government expenditure refers to spending made by the government of a nation on assets that will be used for a long time in the provision of goods and services. Government expenditure came into prominent in the 1930s by Lord John Maynard Keynes. Prior to this period, was the doctrine of laisser-fair by the Classical which believed in leaving the activities of the economy in the hands of private individual. The debate on government expenditure came at a time when Europe and the United States were passing through the Great Depression, accompanied by sever fall in output, low aggregate demand; and high unemployment rate. The inability of the Classical to proffer solution to the Great Depression gave rise to the emergence of Keynes. Keynes argued in favor of the role of government intervention in an economy through government spending. According to him, when government spend, it leads to increase in aggregate demand, increase in output, increase in employment and consequently will lead to economic growth. The governments keyed into the doctrine of Keynes and consequently came out of the Great Depression. Since then, government expenditure has shown increasing trend in mostly all economy. Government expenditures are grouped into capital expenditure and the recurrent expenditure. Capital expenditure refers to government spending in the acquisition of fixed (productive) assets such as the development of machinery, building of roads, railways, health facilities, education and whose life extends beyond the fiscal year, as well as expenditures incurred in the upgrade of existing fixed assets as lands, building, roads etc (Aigheyisi, 2013). In other words, capital expenditure is associated with investment or development spending. While on the other hand, recurrent expenditure refers to government spending on activities that neither creates assets nor reduces liability of a government, such as payment of salaries, interest payment on past debt, payment of subsidies, pensions and so on (Aigheyisi, 2013). Recurrent expenditure is recurring in nature (IMF, 2010). However, based on the theme, the study will focus on capital expenditure and its effect on the manufacturing sector in Nigeria. According to CBN (2020), capital expenditure is disaggregated into expenditures on: administration, economic services, social community and transfers.

The manufacturing sector played a significant role in the transformation of an economy through increasing productivity related to import replacement and export expansion, creating foreign exchange earning capacity; and raising employment and per capital income which causes unique consumption patterns. The sector has the capability of accelerating the growth and development process of a nation due nature of its activities in the sector which is believed the size linkages throughout other sectors in terms of contribution to and from those sectors (Okigbo, 1993; Opaluwa, Umeh, and Ameh, 2010). The manufacturing sector is a path for trade increase and it is a vital source of innovation and competitiveness as it makes outsized contributions to exports and productivity growth; thus, providing a channel for stimulating the growth of other sectors. Ogwuma (1995) opines that the sector creates investment capital at a faster rate than any other sector of the economy while promoting wider and more effective linkages among different sectors. Thus, the Nigerian government has introduced various policies to bust the sector such as import substitution strategy, export promotion strategy, the introduction of bank of industry to induced credit facility to the sector, the National Economic Empowerment and Development Strategy (NEEDS) and most recently the National Development Plan 2021-2025 whose one of the main objective is to create 21 million full-time jobs and lift 35 million people out of poverty by 2025.

Over the years, the federal government of Nigeria has increased her capital expenditures in other to improve the growth of the economy through investment in the manufacturing sector. However, despite the huge spending in capital expenditures, the manufacturing sector output in Nigeria is not improving in commensurate to the spending, as evidence in the sector's outputs over time (Adeboye, 2010; Peter and Simon, 2011 and Loto, 2015). The graveness for imported goods and services by Nigerians has led to the gradual decline in the manufacturing sector output. Going by the trend for instance, from 1981 to 2005, the average contribution of manufacturing sector as percentage of our GDP was 17.54% while the average contribution of the manufacturing sector output to GDP from 2006 to 2020 is 8.90%. Conversely, the neglects of Nigeria made goods have led to increase in the demand for imported goods. Nigeria percentage of import to the GDP has continuously increased from 17.42% in 2010 to 19.80% in 2020. It is against this background that this study seeks to examine the effects of government capital expenditure on the manufacturing sector output in Nigeria. Several studies have been written by researchers on the effect of government expenditure on economic growth, but this study seeks to be specific by examining the effect of government capital expenditure on manufacturing sector output in Nigeria, by disaggregating government capital expenditure into expenditure on administration, economic services, social community and transfers. Based on the background of the study, the following hypothesis are fundamental to the study.

- **H0**₁: Government Capital Expenditure on Administrative has no Significant Effect on Manufacturing Sector Output in Nigeria.
- **H0**₂: Government Capital Expenditure on Economic Services has no Significant Effect on Manufacturing Sector Output in Nigeria.
- **H0**₃: Government Capital Expenditure on Social Community Services has no Significant Effect on the Manufacturing Sector Output in Nigeria.
- **H0**₄: Government Capital Expenditure on Transfers has no Significant Effect on the Manufacturing Sector Output in Nigeria.

LITERATURE REVIEW

Conceptual Framework

Government Capital Expenditure

Government capital expenditures are expenses incurred by the government of a nation on fixed assets and capital projects for the improvement of the economy. Government capital expenditures are usually directed at enhancing production; and also to influence the pattern of production and composition of output. Anyafu (1996) asserted that when suitable capital expenditure programme is designed by a government, it could result in the diversion of resources from undesirable areas to desirable ones. Furthermore, government capital expenditure helps in restoring funds taken from the circular flow through taxation into the flow. This is achieved through capital expenditures on transfer such as pensions, gratuity etc. Such funds are often spending back to the economy.

Government Capital Expenditure on Administration Services

These are funds budgeted annually for fixed assets and other major expenditures in the administration of the economy channeled on general administration, defense, internal security, capital projects, and national assembly.

Government Capital Expenditure on Economic Services

These are funds allocated for the procurement of fixed assets and other infrastructures in the agricultural sector, manufacturing sector, construction sectors, transport, mining and quarrying, and communication sector.

Government Capital Expenditure on Social and Community Services

These are government expenditures channeled on education sector, health sectors, housing and other social services.

Government Capital Expenditure on Transfers

These are expenditures allocated by the government for managing external obligations such as debt service. Other includes payment of pensions, gratuities, capital recovery and replacement, and contingencies and subventions.

Figure 1: Trend of MSO, GCEXA, GCEXE, GCEXS and GCEXT

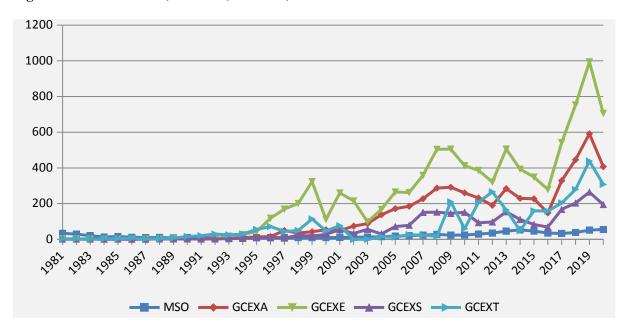


Figure one shows the trend of the variables in the model. The MSO was 33.33 in 1981 and kept on falling up to 5.1 in 1993. Afterwards, the MSO kept on increasing up to 23.16 in 2007 before the global financial meltdown which made the MSO to fall. Also the 2014/2015-2016 recession affected the MSO negatively due to difficult in accessing fund from the banks. Afterwards, the MSO starts increasing. In the same vein the GCEXA, GCEXE, GCEXS and GCEXT were rising and falling as indicated by the graph.

Empirical Review

Onuarah (2018) examined the composition of sectoral expenditure allocation and the Nigeria economy. The study used total government expenditure on administration, economic service, social community service and transfer as the dependent variable, while real gross domestic product was used as proxy for economic growth. The OLS estimation technique was used to analyze the variables. The study found that the variables are directly related to the RGDP. Thus, the researcher recommended that government should channel its expenditure to the sectoral spending because it reduces the cost of government spending in public welfare. Nwanne (2018) investigated the effect of government capital expenditure on the manufacturing sector output in Nigeria. Quantitative time series data from the CBN was used and the multiple regression techniques in the analysis. Total capital expenditure on road infrastructure, health, and telecommunication were used as the independent variables while the manufacturing output was used as the dependent variable. The study revealed that capital expenditure on road infrastructure and also on telecommunication affects the manufacturing output in Nigeria significantly; while government capital expenditure on power has insignificant effect on manufacturing output. The study recommended the need for government to place more emphasis on capital expenditure so as to accelerate economic growth in Nigeria through the manufacturing output.

John (2017) examined the federal government capital expenditure on the growth of the Nigeria economy from 1985-2014, using federal government expenditure on administration, economic service, social and community service and transfer. The multiple regression estimation technique was used to analyze thye data. The study found that a positive federal government capital expenditure on administration and social community services had a positive relationship with GDP; while economic service and transfers have negative relationship with GDP. The study recommended more allocation of budgeted expenditure to the federal government capital expenditure in economic service, transfer, social and community service and administration. Muritala and Taiwo (2011) examined the trends and effects of government spending on the growth of real GDP in Nigeria between 1970 and 2008, using Ordinary Least Square technique. The findings revealed a positive relationship between real GDP and recurrent and capital expenditure. Adebiyi (2015) explored the impact of public expenditure on human capital in Nigeria considering government spending on both education and health. The study found that public expenditure such as defense spending and debt servicing reduces health expenditure in the short run. However, they increase education expenditure in the same period.

Theoretical Framework

The study based its theoretical framework on the work of Keynes which came up due to the Great Depression of the 1930s in Europe, associated with low aggregate demand. Keynes discussed the relationship between government expenditure and economic growth. Keynes advocated for increased in government expenditure and lower taxes to stimulate demand and pull the economy out of the depression. According to Keynes (1929), if aggregate demand falls, it will result to fall in production and workers will be layout thereby resulting to increase in unemployment decline in economic growth.

METHODOLOGY

This study adopts the ex-post facto research design. The Manufacturing Sector Outputs of Nigeria is used as the dependent variable, while the government capital expenditure on administration (GCEXA), government capital expenditure on economics service (GCEXE), government capital expenditure on social and community service (GCEXS) and government capital expenditure on transfer (GCEXT)s are used as the independent variables. The

model was estimated using Auto-Regressive Distributed Lag (ARDL) Model. A pre-diagnostic test of stationarity was carried out using Augmented Dicker-Fuller (ADF) to ascertain the robustness, reliability and healthiness of the data. Data are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, 2020 and the World Bank Data Indicators. The period of study covers from 1981 to 2020. After conducting the pre-diagnosis test, the variables were integrated of mixed order I(0) and I(1). Therefore, the Auto-Regressive Distributed Lag (ARDL) Model method of analysis was employed on the time-series data spanning from 1981 to 2020. The bound test was used to test for existence of long-run relationship among the variables. Discovering that a long run relationship exists among the variables, the Error Correction Model (ECM) was employed to test for the short-run relationship among the variables.

Model Specification

 $MSO = \beta_0 + \beta_1 GCEXA + \beta_2 GCEXE + \beta_3 GCEXS + \beta_4 GCEXT + \varepsilon(1)$

Where:

MSO = Manufacturing Sector Output.

GCEXA = Government Capital Expenditure on Administration Services.

GCEXE = Government Capital Expenditure on Economic Services.

GCEXS = Government Capital Expenditure on Social and Community Services.

GCEXT = Government Capital Expenditure on Transfers.

 β_0 = Intercept

 $\beta_1, \beta_2, \beta_1, \beta_3, \beta_4$ = parameters for estimating the exogenous variables.

RESULT AND DISCUSSION

Table 1: Descriptive Statistics

	MSO	GCEXA	GCEXE	GCEXS	GCEXT
Mean	21.37150	127.5413	232.9768	61.91890	80.06821
Median	15.17000	51.41425	185.2375	28.99886	30.10575
Maximum	54.76000	591.2642	994.1862	264.6905	438.8550
Minimum	5.100000	0.262700	0.656300	0.237600	0.010000
Std. Dev.	14.34481	148.7001	245.0476	71.80461	105.0303
Skewness	0.933442	1.170605	1.089941	1.027901	1.628036
Kurtosis	2.697672	3.819699	3.847463	3.034968	5.068959
Jarque-Bera	5.961096	10.25528	9.116800	7.045901	24.80433
Probability	0.050765	0.005931	0.010479	0.029512	0.000004
Sum	854.8600	5101.653	9319.071	2476.756	3202.729
Sum Sq Dev.	8025.166	862357.0	2341885.	201080.2	430222.9
Observations	40	40	40	40	

Source: Author's Computations using E-view 10 output.

The descriptive statistics from table 1 revealed that MSO has a mean value of 21.37150 while GCEXA, GCEXE, GCEXS and GCEXT have a mean value of 127.5413, 232.9768, 61.91890 and 80.06821, respectively. Note that the mean describes the average value of each of the series in the model. The GCEXE has the highest Std. Dev with the value 245.0476. This implies that the GCEXE is the most volatile variable in the model as it has the highest percentage of dispersion from the mean. In terms of skewness, the variables are all skewed to the right because they are all positive.

Kurtosis measures the peak or flatness of the distribution of a series. The kurtosis of a normal distribution is 3. If it exceeds 3 it means the distribution is peaked or leptokurtic relative to the normal distribution. On the other hand, if less than 3, it indicates the distribution is flat of platykurtic relative to the normal distribution. From table 1, the GCEXA is platykurtic with its value of 2.697672 less than 3, while

GCEXE, GCEXS and GCEXT are leptokurtic because their values of 4.437047, 3.2622774 and 5.259144 are more than 3 respectively. Jarque-Bera (JB) tests whether the series is normally distributed or not. The test statistics measures the difference of the skewness and the kurtosis of the series with those from a normal distribution. In JB statistics, the Null Hypothesis which states that the distribution is normally distributed is rejected at 5% level of significance. From the result of table 1, all the variables are not normally distributed because their probability values of 0.050765, 0.005931, 0.010479, 0.029512 and 0.000004 are less than 5% level of significance. The 40 number of observations depict that duration of the study.

Unit Root

Augmented Dicker-Fuller (ADF) unit root test is used to conduct a pre-diagnostic test to ascertain the underling properties of the time series variables. This test is important because estimating a model in the presence of non-stationary time series variable usually leads to spurious (meaningless, nonsensical) regression output with biased and inconsistent estimates of the standard errors of the coefficients, which could lead to misleading inference. Table 4.2 shows the summary of the computed Augmented Dicker Fuller Unit Root test for each of the variables.

Table 2: Summary of Augmented Dicker Fuller Stationarity Test

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Variable	ADF Test	Critical Value @	Probability	Order of	
	Statistics	5%	Value	Integration	
MSO	-5.620873	-3.540328	0.0003	I(1)	
GCEXA	-5.295682	-3.562882	0.0008	I(1)	
GCEXE	-3.790165	-3.536601	0.0284	I(0)	
GCEXS	-6.291391	-3.533083	0.0000	I(1)	
GCEXT	-8.776093	-3.533083	0.0000	I(1)	

Source: Authors Computation using E-view 10

From the summary of table 2, it could be seen that GCEXE is stationary at level while MSO, GCEXA, GCEXS and GCEXT are stationary at first difference. Based on the mixed order of integration I(0) and I(1), without any variable integrated at I(2), we shall proceed to estimate the variables using the Auto-Regressive Distributive Lag (ARDL) model which is best suited for the analyses.

The ARDL Bound Test

The ARDL Bound test shows the long run relationship between the dependent variable and the independent variables. The criteria is that if the value of the F-statistics is lower than the value of the lower and upper bound, we cannot reject the null hypothesis but; if it the value of the F-statistics is greater than the lower and the upper bound, we can reject the null and accept the alternate there is a long run relationship amongst the variables.

Table 3: ARDL Bound Test

Test Statistics	Value	Significance	I(0)	I (1)	
F-statistic	8.406420	10%	2.45	3.52	
K	4	5%	2.86	4.01	
		1%	3.74	5.06	

Sources: Authors Computations using E-views 10

ARDL Hypothesis

 H_0 : $\beta_{1i} + \beta_{2i} + \beta_{3i} + \beta_{4i} = 0$ (No Cointegration relationship)

 H_1 : $\beta_{1i} + \beta_{2i} + \beta_{3i} + \beta_{4i} \neq 0$ (there is Cointegration relationship)

In table 3, the bounds test value of the F-statistics which is 8.406420 is greater that the values of the upper I(I) and lower I(0) bound limit which are 4.01 and 2.86 at 5% critical level of significance. This means

that there is co-integration between the dependent variable (MSO) and the independent variables (GCEXA, GCEXE, GCEXS and GCEXT). Therefore, there exist a long-run relationship between the manufacturing sector output and the government capital expenditure.

ARDL Long Run Form

This shows the long run equilibrium relationship among the individual explanatory variable and the dependent variable. Table 4.4 shows the summary of the ARDL Long run relationship between the dependent variable and the independent variables.

Table 4: ARDL Long-run Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GCEXA	0.140415	0.056185	2.499137	0.0186
GCEXE	-0.056534	0.027639	-2.045445	0.0503
GCEXS	-0.007393	0.102064	-0.072434	0.9428
GCEXT	0.121968	0.033258	3.667290	0.0010

Sources: Authors Computations using E-views 10

In table 4, the coefficient value of the GCEXA is 0.140415, indicating that there is a positive long run equilibrium relationship between the GCEXA and the MSO in Nigeria during the period under review. If the GCEXA increases by 1 percent will lead to increase in the MSO by approximately 14 Billion naira. The GCEXA probability value of 0.0186 shows that in the long run, the GCEXA has a significant effect on the MSO in Nigeria because its probability value is less than 5%. Also, the GCEXT has a positive long run equilibrium relationship with the MSO. A percentage increase in the GCEXT will lead to increase in the MSO by approximately 12 Billion naira. It's probability value of 0.0010 shows that GCEXT has a significant effect on the MSO during the period under review. Furthermore, the coefficient value of GCEXE which is shows -0.056534 shows that there is a negative long run relationship between the GCEXE and the MSO. If the GCEXE increases by 1 %, the MSO will decrease by approximately 5.6 Billion naira. The probability value of GCEXE which is -0.007393, shows that it has a significant effect on the MSO. Also, the coefficient of GCEXS which is -0.007393, shows that the relationship between GCEXS and the MSO is negative. When GCEXS increases by 1 %, the MSO will decrease by approximately 0.7 Billion naira. The corresponding probability value of 0.9428 indicates that GCEXS has an insignificant effect on the MSO in Nigeria during the period under review.

ARDL-Error Correction Model (ECM)

In our Cointegration analysis, the results showed that the F statistics value is greater than the upper and the lower bound limit, thus indicates that the variables are co-integrated. Consequently, we shall proceed to test for our ECM which shows the short run relationship among the variables and also the overall significance of the model. The Error Correction Model (ECM) shows the short run relationships between the dependent and the independent variables. It is expected that the Error Correction Term (ECT) must be negative and less than 1 and should be statistically significant. Table 4.5 shows the summary of the ECM.

Table 5: Error Correction Model Regression

Variable Coefficient		Std. Error	t-Statistic	Prob.	
С	2.789892	0.581772	4.795511	0.0000	
D(MSO(-1))	0.352295	0.092990	3.788538	0.0007	
D(GCEXE)	-0.006211	0.005774	-1.075627	0.2913	
D(GCEXT)	-0.008300	0.006764	-1.227139	0.2300	
D(GCEXT(-1))	-0.026925	0.008243	-3.266454	0.0029	
CointEq(-1)*	-0.335804	0.048451	-6.930850	0.0000	
R-Square 0.771234					
F-statistic 21.57623					

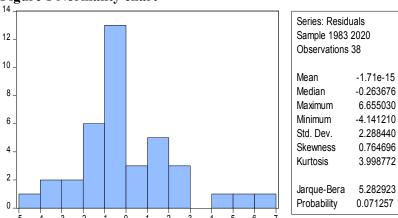
Prob(F-statistic) 0.000000 Durbin-Watson Stat 2.169804

Source: Author's computation using E-view 10

The error correction term (ECT) shows the speed of adjustment from a disequilibrium states. As earlier mentioned, the rule is that the value of the ECT must be negative, less than 1 and be statistically significant (less that 5%). From table 4.5, the value of the ECT is -0.335804 which indicates that it is negative, less than 1 and statistically significant. By interpretation, it means that if there is any disequilibrium, it will take approximately 33.6% speed of adjustment for the model to adjust from the short run to the long run within a year. The adjustment rate is considerable ok. The R-Square value of 0.771234 indicates that GCEXA, GCEXE, GCEXS and GCEXT accounted for about 77% of variation or changes in the MSO, while the remaining 23 percent are accounted for by other factors outside the model. The probability value of 0.000000 of the F-statistics shows that GCEXA, GCEXE, GCEXS and GCEXT are jointly significant in explaining the MSO during the period under review.

Normality Test

Figure 1 Normality chart



The normality test is conducted to ascertain if the error term in this study are normally distributed. Observing from the normality diagram in figure 1, the Jarque-Bera value of 5.282923 and its corresponding p-value of 7 % which is greater than 5 % significant level, confirms that the error term is normally distributed.

Test for serial correlation

Table 7: Serial correlation

Breusch-Godfrey Serial Correlation LM Test						
F-statistics	0.431570 Pro	b. F(2,26)	0.6541			
Obs*R-square	1.220978	Prob. Chi-S	Square(2)	0.5431		

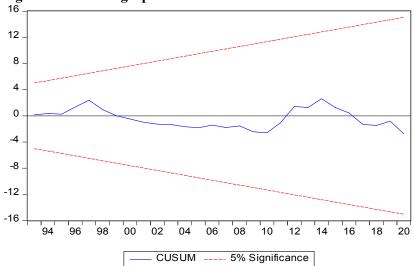
Source: Author's computation using E-view 10

In line with the rule, the Breusch-Godfrey Serial Correlation LM Test in table 7, it shows that the probability values of 0.6541 and 0.5431 for both F-statistic and Obs*R-squared are statistically insignificant at 5% level of significance. Hence, the null hypothesis that there is serial correlation in the model is rejected. Thus, the model is said to be free from serial correlation.

Stability Diagnostic Test

A CUSUM test assesses the stability of coefficients whether there is a stability in a model or not. The blue line represents the Cumulative Sum of the recursive residuals and the red dotted lines represent the confidence intervals at 95%. The null hypothesis for CUSUM test states that the parameters are stable while the alternate hypothesis states that the parameters are not stable.

Figure 2: CUSUM graph



The guideline is that, if the blue line lies within the red line, we accept the null hypothesis that the parameters are stable. On the other hand, if the blue line crosses the red line, we reject the null and accept the alternative hypothesis that the parameters are not stable. From figure 4.8, it could be seen that the CUSUM series lies between the upper and the lower critical boundaries of 5%. This is an indication that the estimated model is stable. So, it can be concluded that the model is stable and the estimated results are reliable, and can therefore be used for further analysis and prediction.

CONCLUSION AND RECOMMENDATION

The study examined the effect of Government capital expenditure on the Manufacturing Sector Output (MSO) in Nigeria from 1981 to 2020. The ex-post facto research design was adopted for the study. The MSO was used as the dependent variable while the GCEXA, GCEXE, GCEXS and GCEXT which were the components of the government capital expenditure were used as the independent variables. The ARDL and ECM method of analysis was employed for the study. The study found that the GCEXA and GCEXT have a long-run positive relationship with the MSO while the GCEXE and GCEXS have a long-run negative relationship with the MSO. Also, all the variables have significant effects on the MSO except the GCEXS which has an insignificant on the MSO. Hence, the study concluded that the government capital expenditure has a long-run effect on the manufacturing sector outputs in Nigeria fro the period under review.

Based on the finding of the study, the following recommendations were made; Since the Nigerian government capital expenditure on administrative services, economic services and transfer services are have long run significantly effect on the manufacturing sector, the government is advised to increase its budgetary allocation on these components of the capital expenditure; while allocation of capital expenditure to social and community services should be reduced. By so doing, the aim of the capital expenditure which is economic growth will be achieved through the increase in the manufacturing output.

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