



Energy Consumption, Institutional Quality and the Performance of the Manufacturing Sector in Nigeria (1999-2013)

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ABSTRACT

This study assessed the effect of energy consumption and institutional quality, on the performance of the manufacturing sector in Nigeria between 1999 and 2013 through the use of the ordinary least square technique. The study used three measures of institutional quality: Economic freedom index, corruption perception index and contract intensive money. On the other hand, the industrial sector consumption of electricity (*CSL*), the total consumption of gas (*GCS*) and the total consumption of petroleum (*PCN*) were used as proxies for the consumption of energy. The results of the study show that industrial sector consumption of electricity, petroleum and gas do not have a significant impact on manufacturing sector performance. The results also indicated that the level of corruption perception has a significant effect on the performance of the manufacturing sector. Based on this, the study makes several recommendations including: the improvement in the country's capacity to refine petroleum products; the maintenance of the current policy stand in the electricity industry by the new government; the removal of executive interference in the operations of the country's institutions.

Keywords: Energy Consumption, Institutional Quality, Ordinary Least Squares

JEL Classifications: E21, N60, Q14, Q20, Q40

1. INTRODUCTION

The consumption of energy and the quality of nation's domestic institutions are two of the most important indicators of economic growth and development (Gbadebo and Okonkwo, 2009; Iyoboyi and Latifah, 2014). This derives from the fact that a higher level of energy consumption implies a higher allocation of society's energy resources towards productive activities. On the other hand, the quality of domestic institutions is a reflection of the existence of an enabling business environment which is critical to increases in investment and output.

In recognition of the above and its bid to ensure the development of the key sub-sectors such as the manufacturing sector, the Nigerian government has in recent times expended a lot of effort and financial resources towards the provision of a stable and cheap sources of energy such as electricity, crude oil and natural gas. The efforts towards the increase in the supply of energy and consumption of energy in the country can be seen in terms of the various policies implemented in the electricity and petroleum sectors. Such efforts include: the promulgation of the electric

power rector freeform act in 2005 by the Obasanjo administration, and the recent implemented road map for the power sector which was implemented by the Goodluck Jonathan administration. The government has also tried to strengthen and improve the quality of the domestic institutions. Such efforts resulted in the setting up of the "Economic and Financial Crimes Commission (EFCC)," and the "Independent Corrupt Practices Commission" by the Olusegun Obasanjo led administration of 1999-2007. The need for the strengthening of domestic institutions and eradication of corruption has also been a major focus and "rally cry" for recent administrations.

However, in spite the aforementioned actions of the Nigerian government, key sectors such as the manufacturing sector are still not fully developed. While there has been an increase in the output of the sector within the period under consideration, available data from the Central Bank of Nigeria (2013) indicates that the capacity utilization rate in the sector has been consistently bellow the 60% level. This implies a huge loss in potential output and employment, and an inefficient use of investors' resources in the sector. This situation it has been pointed out is indicative of the fact that the

country's institutional capacity is weak and underdeveloped (Iyoboyi and Latifah, 2014). Furthermore, data from the Central Bank of Nigeria (2013) also reveals that the industrial sector accounts for <25% of the consumption of electricity in the country.

In general, while the effect of energy consumption on economic growth has been thoroughly investigated in Nigeria, very little has been done to examine the impact on individual sub-sectors. This study is carried out to fill this gap. The study also in view of the scope and measures of institutional quality used by some of the studies which are reviewed in the proceeding sections, this study fills a gap by focussing on the relationship between the relevant variables within the period 1999 and 2013. This will give a clear idea as to the nature of the relationships during the present democratic era.

2. REVIEW OF RELATED LITERATURE

Several studies have been carried out to examine the growth effect of energy consumption in Nigeria. The majority of such studies were based on the use of time series data between 1970 and 2010. These studies also used the consumption of electricity, coal and petroleum as measures of energy consumption. For instance, Gbadebo and Okonkwo (2009) studied the nexus between energy consumption and the performance of the Nigerian economy between 1970 and 2005. The results of the study indicated the existence of a positive link between the non-lagged consumption of energy and coal, and economic growth, while an inverse link exists between the lagged value consumption of crude oil and electricity, and economic growth.

Onakoya et al. (2013) found that the consumption of gas has a positive but insignificant impact on economic growth in Nigeria, while the consumption of electricity, petroleum and aggregate energy consumption have a positive and significant effect on economic growth. The consumption of coal was found to have a negative and significant growth impact. The results of similar study by Olusanya (2012) which covered the period 1985-2010 indicated that the consumption of petroleum and electricity have positive growth effects. On the other hand, the consumption of coal and gas were found to have negative growth effects.

Finally, Akpan and Akpan (2012) utilized a multivariate vector error correction model (VECM) in their investigation of the relationship between "electricity consumption, carbon emissions and economic growth in Nigeria" between 1970 and 2008. The study found no causality between economic growth and electricity utilization in Nigeria.

In general, the consumption of electricity is not the only indicator, and necessitating factor for economic growth. In this regard, it has been argued that there is an increasing acceptance of the fact that the quality of a country's domestic institutions are just as important to a country's growth process as factors such as technological skills and natural resources (Omojimate, 2012). Valeriani and Peluso (2011) pointed out the fact that institutions have increasing been recognized by researchers as the answer to the challenges associated with the determination of the cause of economic growth

and the possible growth inducing policies, as well as the reasons for variations in GDP between countries.

Empirical evidence of the importance of institutions to the growth process can be found in the results of Valeriani and Peluso (2011) from their investigation of the "impact of institutional quality on economic growth and development" using institutional indicators such as civil liberties, number of veto players and quality of government. The study used the ordinary least squares (OLS) method. The results indicated that all three indicators have a major effect on economic growth. However, differences were found to exist in terms of the size of such impacts in developed and developing countries. In particular, improvements in civil liberties was found to have a greater growth impact in developing countries, while the number of veto players had a more significant growth impact in developed countries.

Okoh and Ebi (2013) investigated the impact of the nexus between the investment in infrastructure and institutional quality-captured using corruption and the enforcement of contracts-, and economic growth in Nigeria. The study found that corruption had a negative and significant growth effect, while investment in infrastructure had a positive and significant growth impact. On the other hand, the institutional quality-infrastructure investment nexus had an insignificant growth impact. In a similar vein, Ologunla et al. (2014) examined the nexus institutions-resources curse nexus in Nigeria between 1986 and 2012, using the Granger causality test. The study used economic freedom (*ECF*) of the world as a proxy for institutional quality. The results of the study indicated the existence of a negative correlation between the presence of strong institutions and resource curse in Nigeria.

The growth impact of institutions has been investigated by Emmanuel and Ebi (2013) who examined the relationship between "institutional quality, petroleum resources and economic growth" in Nigeria, Brazil and Canada between 2000 and 2010 using a difference-in-differences approach. The study found that there were differences in the rate of economic growth between Nigeria and Canada on the one hand, and Nigeria and Brazil, and that such differences in the observed rate of economic growth between is due to differences in the level of corruption between the countries. Furthermore, it was observed that there exist bidirectional causality between the differences in the level of corruption and the differences in government effectiveness. In a related study, Iyoboyi and Latifah (2014) examined the link between "institutional capacity and macroeconomic performance" in Nigeria between 1961 and 2011 using the VECM model. The result of the impulse response function indicated that a one standard deviation innovation on institutional capacity has a negative impact on the performance of the Nigerian economy in the short, medium and long-term. On the other hand, the results of the variance decomposition revealed that significant amount of the changes in the macroeconomic performance in the country is not attributable to changes in the capacity of institutions.

Finally, a study by Omojimate (2012) assessed the link between "institutions, macroeconomic policy and the growth of the agricultural sector in Nigeria". The findings of the study revealed

that institutional reforms (captured using a dummy) had a positive and significant impact on innovations in agricultural output in Nigeria.

3. EMPIRICAL MODEL AND METHOD OF ESTIMATION

This study uses three measures of institutional quality: Contract intensive money (*CIM*); the corruption perception index (*CPI*); the *ECF* index. On the other hand, the consumption of electricity, petroleum and gas are used to capture the consumption of energy. The data for the study is derived from several sources including: the Central Bank of Nigeria, Transparency International; the Fraser Institute; and Open Data for Africa which is published by the African Development Bank Group. In view of its scope, the study utilizes the ordinary least squares (OLS) method in the estimation of the model upon which it is anchored. The model is specified as follows:

$$MAO = \beta_0 + \beta_1 CSL + \beta_2 PCN + \beta_3 GCS + \beta_4 CIM + \beta_5 CPI + \beta_6 ECF + U$$

Where,

MAO = Contribution of the manufacturing sector to the GDP

CSL = Industrial sector consumption of electricity

PCN = Total consumption of petroleum

GCS = Total consumption of gas

CIM = Contract intensive money

CPI = Corruption perception index

ECF = Economic freedom index

U = Stochastic error term

Where,

$$\beta_0 > 0, \beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 < 0 \text{ and } \beta_6 > 0$$

4. EMPIRICAL RESULTS

The results presented in Table 1 indicate that there is a positive link between the industrial sector consumption of electricity, total consumption of petroleum products, and the performance of the manufacturing sector in Nigeria. Both variables are however not statistically significant. On the other hand, there is an inverse relationship between the consumption of gas and the performance of the manufacturing sector. Like the other variables, the consumption of gas is not statistically significant.

With respect to the indicators of institutional quality, the results reveal that there is a positive relationship between *CIM*, which

was used to capture the quality of the monetary institutions, and the index of *ECF* which was used to capture the ease of doing business in Nigeria, and the performance of the manufacturing sector in Nigeria. Both variables are however not statistically significant. The results also indicate a positive relationship between the *CPI* used to capture the quality of the legal institutions, and manufacturing sector performance in Nigeria. The variable is statistically significant.

Furthermore, the results also indicate that 91.8% of the variation in the performance of the manufacturing sector is due to variations in the independent variables included in the model. This implies that the estimated model has a good fit. The computed *F*-statistic (27.22571) is larger than the critical value (3.58), meaning that the model used in the study is statistically significant and adequate for purposes of analysis. Finally, the Durbin-Watson result is inconclusive.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This study investigated the effect of the consumption of energy and institutional quality on the performance of the manufacturing sector in Nigeria. The results revealed that the industrial sector consumption of electricity, petroleum and gas do not have a significant impact on the performance of the manufacturing sector. The results also indicated that while the industrial sector consumption of electricity and the consumption of petroleum products has a positive relationship with the performance of the manufacturing sector, its relationship with the consumption of gas was found to be negative. The latter finding corroborates the findings of Olusanya (2012). In general, the results of this study and the possible inferences derivable thereof differ from the findings and conclusions Gbadebo and Okonkwo (2009); Onakoya et al. (2013). The findings may be explained by the inadequacy of the supply of energy in the country. In this regard, Gbadebo and Okonkwo (2009) attribute the country's inability to match the demand for petroleum products as a result of the lack of refining capacity and the low capacity utilization rates in the existing refineries. The supply of electricity to the industrial sector is also epileptic and inadequate, and its consumption by the industrial sector is <26% of the total consumption of electricity in the country. This accounts for the high usage of private generating sets my manufacturing concerns, the high incidence of breakdown of machines, high costs of operation, as well as the frequent shortage of petroleum products in the country.

Table 1: Regression results

Variables	<i>C</i>	<i>CSL</i>	<i>PCN</i>	<i>GCS</i>	<i>CIM</i>	<i>CPI</i>	<i>ECF</i>
Coefficient	-1044688	445.8237	1165.974	-533.4471	296430.6	308307.8	66345.97
Standard error	287044.6	283.5057	960.7993	233.649	181829.2	41059.07	40165.63
<i>t</i> -statistic	-3.639461*	1.572538	1.213546	-2.283106	1.630270	7.508885*	1.651810
<i>R</i> ²	0.953313						
Adjusted <i>R</i> ²	0.918298						
<i>F</i> -statistic	27.22571						
Durbin-Watson statistics	2.610648						

Source: Authors computation. *Significance at the 5% level. *CPI*: Corruption perception index, *CIM*: Contract intensive money, *ECF*: Economic freedom

On the other hand, the study found that there is a positive and significant relationship between the *CPI* and the performance of the manufacturing sector in Nigeria. This result indicates that increases in the level of output can only be attained at the cost of increases in the level of corruption, indicating that the growth of investment and productive activities in the manufacturing sector are consistent with high levels of corruption. This conclusion is further reinforced by the positive relationship and insignificant relationship which was found to exist between the index of *ECF* and the *CIM*, and the contribution of the manufacturing sector to the GDP. On the one hand, the findings indicate the failure of the country's monetary institutions such as the CBN, as well as the inability of the legal institutions to ensure the enforcement of property rights and ensure a level playing field for businesses to operate. On the other hand, the *CPI* results imply the failure of the EFCC and other such institutions to stem the tide of corruption in the country. Put together, the findings reveal that the cost and risks associated with investing and carrying out productive activities in Nigeria is very high.

In view of the findings, the study concludes that the quality of the domestic institutions and the consumption of energy have not had a significant impact on the performance of the manufacturing sector in Nigeria. Based on this, the study makes the following recommendations:

1. The improvement in the country's capacity to refine petroleum products. This can be done through the full utilization of the capacity of the existing refineries, as well as the use of tax and no-tax incentives to encourage the inflow of foreign direct investment in the area of the building of new refineries in the country
2. The maintenance of the current policy stand in the electricity industry by the new government led by General Muhamadu Buhari. This will ensure the avoidance of the pitfalls associates with policy reversal, and thereby reduce the uncertainty of investors
3. The removal of executive interference in the operations of the country's institutions such as the EFCC, the police and the judicial institutions.

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