IMPACT OF ELECTRICITY CONSUMPTION ON MANUFACTURING OUTPUT IN NIGERIA

ESTHER O. LAWAL PhD.
DEPARTMENT OF ECONOMICS, BABCOCK UNIVERSITY,
ILISAN REMO, OGUN STATE

&

EMMANUEL OWOICHO
DEPARTMENT OF ECONOMICS, BABCOCK UNIVERSITY,
ILISAN REMO, OGUN STATE

Abstract

The study analyzed the impact of electricity consumption on manufacturing sector performance in Nigeria. Annual time series secondary data over a period of 38 years, covering 1981 to 2019 was analysed using Vector Error Correction Model (VECM) and Johansen cointegration technique. The study concluded that, the low level of electricity consumption hampers the growth and development of the Nigerian manufacturing sector. There should be adequate funding of the power sector, security of gas supply, maintenance of existing power supply infrastructures. Alternative sources of energy for electricity production must be prioritized by the Government to reduce reliance on fossil fuel and thermal. Other renewable energy sources such as solar, biomass and wind can be used to generate power for socioeconomic electrification.

Keywords: Manufacturing, exchange rate, capital expenditure, co-integration, Renewable Energy

Introduction

Manufacturing sector performance plays a vital role in promoting economic growth as well as industrial production in Nigeria. In developed and developing economies, manufacturing sector is regarded as a driving force for sustainable economic growth because it helps in the eradication of unemployment and poverty, improving local technology, and serves as an avenue for mass production, import substitution and export expansion as well as aiding other related sectors (Qamruzzaman 2015). Despite all these well acknowledged advantages, in Nigeria, the manufacturing sector's performance is negatively influenced by instability in power supply. The problem with the power sector in Nigeria has been ascribed to numerous factors such as poor preventive routine maintenance of the country's power generation and distribution facilities, obsolete and heavily overloaded equipments with operational or mechanical difficulties ensue from mechanical breakdowns. These factors have led to constant malfunctions, inadequate power supply and energy losses (Akinbola 2017).

Since 1980, the share of the Nigeria's manufacturing sector to the gross domestic product (GDP) has remained constant at around 10%, with the exception of 1982, when it was 11.21 percent. In 2012, it contributed 4.16 percent to GDP, and in July 2014, it contributed 6.8 percent (Business Day, 2014). The sector is heavily reliant on imports, geared towards inward development (producing only domestic products for domestic markets), and makes little use of the abundant local raw materials. Furthermore, the poor performance of the manufacturing sector can be ascribed to the fluctuating exchange rate as one of the factors responsible for the sector's slow growth. This is important since it connects the pricing structures of two separate countries, allowing foreign trade to compare traded goods directly (Enekwe 2013).

Owing to the manufacturing sectors inability to utilize domestic resources vital to production processes, the Nigerian economy relies heavily on imports for factors of production. As the cost of input rises, Naira depreciates and decreases available resources to the producers to import factors of production, making the manufacturing process more costly. As production cost rise, the export price will also go up. This would lead to lower profits and a less competitive product in local and global markets as a result of consumers' inability to afford the goods at their new prices. Input and output costs will

fall with a strengthening naira, resulting in higher revenues and the ability to compete on both local and global markets. Despite the fact that Nigeria's capital expenditure was less than 30 percent of total budgetary expenditure, Nigeria's debt service payments have continued to rise since the implementation of the structural adjustment programme in 1986 to achieve an export led development economy until 1993, when it was revoked The inefficient performance of electricity generation and distribution facilities is caused by lack of capital spending on the sector, which was exacerbated by poor budgetary performance (Enekwe 2013).

Review of Literature and Theoretical Framework

The study's theoretical foundation is based on the endogenous and new growth theory. The endogenous growth theory talked about technology as an internal force for economic growth. Based on this perspective, economist in the 80s, attempted to endogenize technology by establishing the endogenous growth theory, which introduced new principles such as knowledge, human capital and investments. The theory posits that, these factors are responsible for growth internally. It is believed that, investment in internal affairs such as manufacturing, human capital and education are the most significant contributors to growth in any economy. The theory holds that favorable policy measure in education, human capital and manufacturing sector, are the key determinants of growth in an economy on the long run. Technology is seen as a dependent force which could be related to energy. Most technology are highly dependent on the usage of energy to power it. The technology emphasized here is that such as plants, machinery and the likes. And without adequate power supply, these technologies are of no good. The law of thermodynamics helps to validate the theory by stating that productive process cannot take places without energy consumption. Power supply is not the only determinant of high productivity but is a necessary condition to ensure that technology and raw materials are being utilized. While the new growth theory postulate that humans are insatiable and due to this unlimited wants, productivity and growth are ever increasing. The new growth theory holds that, due to individuals dive for profit the real gross domestic product (RGDP) per person will continue to rise indefinitely. The theory offers key engineers towards economic growth and stresses the significance of education, entrepreneurship, technology and innovation, opposing the exogenous growth theory, that economic prosperity is ascertained by external forces. One of the main beliefs of the theory is that institutions have to regularly improve technology and find ways to improve new commodities in order to maximise profit. The theory holds that innovation and technology do not happen accidentally rather, it depends on the seriousness and quantity demanded of individuals striving for new technologies and innovations. The theory sees knowledge as an unlimited asset which leads to growth and cannot depreciation unlike capital which is subject to diminishing returns. Knowledge is a qualitative characteristic which can be developed within an organisation.

Emmanuel and Oladiran (2015) examined the connection between government expenditure and Nigeria's manufacturing sector performance. The study made use of secondary time series data ranging from 1970 to 2013. The study adopts Johansen cointegration technique for its estimation. Findings reveals that, the parameters have a positive correlation. The result proves that an increase in government capital expenditure leads to an increase in manufacturing output. The study concluded that, the manufacturing sector should be apportioned a higher share of resources for better performance.

Nwanne (2015) investigated the implication of government capital expenditure on Nigeria's manufacturing sector. Multiple regression analysis was used as the basis for its analysis. For its estimation, the cointegration test was employed which corroborate the presence of a long-term correlation between the variables of interest. Finding shows that, capital expenditure on buildings, telecommunications and premises influence the output of the manufacturing sector while,

expenditure on electricity has no key effect on the output of Nigeria's manufacturing sector. It concludes that, since premises, roads and building are the largest determinants of manufacturing output in the long run in Nigeria, infrastructural development should be allotted a larger chunk of government capital expenditure

Olufemi (2015) employed times series data scaling from 1980 to 2012 to investigate the effect of electricity consumption on industrial growth in Nigeria. Electricity consumption and industrial growth were estimated using cointegration and error correlation technique. In the long run, there is a presence of substantial positive relationship between electricity generation and consumption, foreign exchange rate, industrial growth, and labour employment. While in the short term, industrial output and capital input have a negative connection according to findings. As a result, the study suggests that government should take a strategic approach in sub privatization sectors policy in order to generate jobs and minimize Nigeria's high unemployment rate.

Yakubu, Salisu and Umar (2015) reviewed the connection between electricity supply and manufacturing output in Nigeria. Annual time series data 1971 to 2010 were used. The study utilized autoregressive distribution lag (ARDL) and bound test for its analysis. According to findings, modern manufacturing process, electricity has been established as a key and independent variable of output, this indicates that manufacturing output was found to be positively dependent on energy either in the short or long run. The study suggested that policies should be adopted in order to strengthen the manufacturing sectors productive potential, and electricity supply must increase significance in order to boost productivity.

Edame and Okoi (2015) used economic freedom index, corruption perception index and contract intensive money from 1999 to 2013 as proxies for institutional quality. The study reviews the effects of energy consumption and institutional quality, on manufacturing sectors performance in Nigeria. It made use of ordinary least square technique for its analysis. Findings shows that the consumption of electricity, petroleum and gas do not largely upset the output of the of the manufacturing sector the study recommended that improvement should be made on the capacity to refine petroleum and electricity industries.

Lawal (2016) analysed time series secondary data sourced from CBN statistical bulletin and world development indicators (WDI) over a 28year period. The impact of exchange rate fluctuations on manufacturing sector output in Nigeria, from 1986 to 2014 was reviewed. Manufacturing output and exchange rate, customer price index, government capital expenditure were used as proxies for manufacturing output and exchange rate fluctuations respectively. Autoregressive distribution lag (ARDL) was used for its estimation. Findings reveal that the variables have a favourable correlation. The study recommends that favourable policies should be put place for export promotion and import substitution in order to attain a favourable balance of payment and also, international competitiveness should be encouraged by the government by using domestically produced materials in manufacturing processes.

Chikelu and Okoro (2016) examine the relationship between capital expenditure and Manufacturing Sector. It is difficult to overstate the value of capital investment in an economy. Capital expenditure has been allocated sparingly in Nigeria, and the manufacturing sector has struggled to expand. To that end, this research investigates whether Nigeria's low manufacturing sector growth is due to a lack of capital expenditure allocation and searched for a link between capital expenditure and manufacturing sector growth. Augmented Dickey Fuller (ADF) unit root test and Johansen Co-integration technique were used for its analysis. The study revealed that capital expenditure drives Nigeria's manufacturing sector growth and recommended critical policy options which believed, if implemented, would result in substantial improvements in Nigeria's manufacturing sector.

Ugwoke, Dike and Elekwa (2016) undertook a research to unravel the impact of electricity supply on industrial output in Nigeria. Data were sourced from CBN and WDI for the period of 34 years from 1980 to 2014. The research utilized the Augmented

Dickey Fuller Test for its analysis. Findings show that electricity supply and trade openness have a negative impact on the industrial productivity in Nigeria. The study concludes that tax relief should be made available by the government for most privately generated power organizations in the manufacturing sector.

Sani, Mukhtar and Gani (2017) investigated the connection between electricity consumption, manufacturing output and financial development. Time series data from 1981 to 2015 was used. For its analysis, the Granger causality test and vector error correction were employed. Findings revealed the presence of causality between manufacturing firm, economic growth and power utilization. In this regard, it is worth noting that steady electricity consumption is a key factor in the manufacturing sector. The effect of variance decomposition also shows that industrial production varies more in response to shocks in the energy supply than it does in response to its own shock.

Akinbola (2017) analyzed the impact of government policies on power supply and industrial development in Nigeria, time series secondary data sourced from CBN statistical bulletin and word development indicators (WDI) from 1981 to 2010 was reviewed using Johansen cointegration technique to estimate the long run connection between the variables. the study investigates the relationship between power supply and business industrial development. Vector Error correction model (VECM) was also used to test for the short and long run correlation and correct any disequilibrium in the short run. The study concluded that the current state of electricity, which is a product of established government policies, has a bleak impact on industrial production and, in turn, has a negative impact on business profitability in the long term.

Usman and Ome (2018) looked at energy efficiency and manufacturing sector performance in Nigeria. Energy is widely recognized as a major driving force in the manufacturing sector. Energy intensity, on the other hand, is a measurement of how effectively energy is used in the manufacturing sector. This necessitates a study of Nigeria's energy efficiency and manufacturing sector output from 1986 to 2017. The dependent variable was time series secondary data on manufacturing sector contribution to GDP as a proxy for manufacturing sector output sourced from the CBN Statistical Bulletin and the International Energy Agency, while the energy efficiency proxy was energy intensity with labor and capital intensity as the independent variables. The research used the ADF unit root test, Johansen co-integration test, and Error Correction Model as estimation techniques. The results of the Error Correction Model showed that in one year, 65 percent of the variance in the variables used in the analysis would be restored. During the study era, it was also discovered that energy intensity, labor intensity, and capital intensity all had a substantial positive effect on the manufacturing sector's contribution to GDP in Nigeria. According to the findings, increased capacity, labor, and capital intensity led to improved manufacturing sector output in Nigeria during the study period. According to the findings, the government should ensure that the amount of energy intensity is increased in order to improve Nigeria's manufacturing sector efficiency. In order to improve the efficiency of Nigeria's manufacturing sector, the government and non-governmental organizations should ensure that labor intensity is increased.

Amadi, Nwidobie and Adesina (2018) between 1981 and 2016, examine the macroeconomic influences of exchange rate fluctuations on Nigeria's manufacturing sector performance. Manufacturing sector performance is proxy by variables such as manufacturing value added, manufacturing production and manufacturing capacity utilization with the exchange rate as the explanatory variable. The vector autoregression estimation technique was used to analyze the data. Empirical research indicates that currency depreciation has a positive effect on manufacturing production and value added while also increasing capacity utilization. It shows that exchange rate fluctuations limit the manufacturing sector's performance in Nigeria, and thus, have a significant impact on the sector. Whenever the domestic currency depreciates, efforts should be made to boost manufacturing production in order to stabilize the sector's performance.

Methodology

To empirically analyze the model, the Vector error correction model will be employed. VECM is a restricted vector autoregressive (VAR) model designed for use with stationary series. VAR can be applied to multivariate time series, the primary benefit of VECM is that it provides both long term and short term results. The VECM will test for the correlation between electricity consumption, manufacturing output, exchange rate, and government capital expenditure. However, to test for the long run correlation between these variables, the johansen cointegration technique was utilized. The model is specified below as;

Y= *f(X)*…….. *(1)*
Manufacturing output = f (Electricity Consumption)
MO = *f* (EC, EXC, GCE)
The model can be written explicitly as;
$MO = \beta_0 + \beta_1 EC + \beta_2 EXC + \beta_3 GCE + \mu_t$ ……..*(2)*

Where;

β_0= Intercept
$\beta_1, \beta_2, \beta_3$ = Variables to be estimated
μ_t = Error Term, with *t* time series
MO = Manufacturing output
EC = Electricity consumption
EXC = Exchange rate
GCE = Government Capital Expenditure

Data Analysis and Discussion

Unit Root Test

The unit root was utilized to determine if the variables are stationary or not. The study evaluated the time properties of the variables through the Augmented Dickey Fuller test. It should be noted that the five percent level of significance was used for this analysis.

Table 4.1: Augmented Dickey Fuller Test at Level

Variables	ADF Test Statistic	Critical Value	Probability Value	Remarks
LnMGDP	0.3767	-2.9434	0.9792	Non-stationary
LnPC	-2.3920	-2.9411	0.1506	Non-stationary
LnREER	-2.2070	-2.9411	0.2072	Non-stationary
LnGCE	-0.7737	-2.9411	0.8151	Non-stationary

S***ource: Author's Extraction from EViews***

Table 4.1 presented the ADF test results at level. The series are non-stationary at level as their respective probability values exceeded the 0.05 critical values. As such, the variables would have to be re-differenced to determine their order of integration.

Table 4.2: Augmented Dickey Fuller Test at First Difference

Variables	ADF Test Statistic	Critical Value	Probability Value	Remarks	Order of Integration
LnMGDP	-5.3234	-2.9434	0.0001	Stationary	I(1)

LnPC	-8.5744	-2.9434	0.0000	Stationary	I(1)
LnREER	-4.6373	-2.9434	0.0000	Stationary	I(1)
LnGCE	-6.3230	-2.9434	0.0000	Stationary	I(1)

S***ource: Author's Extraction from EViews***

The result in Table 4.2 showed the ADF test at first difference. The series are stationary at the first order difference as their respective probability values were below 0.05 critical values.

Cointegration

Cointegration test for the presence of long-run correlation in a stream that has similar order of integration. The study employed the Trace Statistic and Maximum Eigen Statistic of Johansen cointegration test for this purpose. A series is said to have long-run relationship if there are at least one cointegrating vector or equation.

Table 4.3: Johansen Cointegration Results

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**EigenValue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None*	0.5522	50.9447	47.8561	0.0249
At most 1	0.3419	21.2211	29.7971	0.3440
At most 2	0.1011	5.7384	15.4947	0.7262
At most 3	0.0473	1.7929	3.8415	0.1806
Trace test indicates one cointegrating eqns at 0.05 level *denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug Michelis (1999) p-values				
Unrestricted Cointegration Rank Max-EigenValue				
Hypothesized No. of CE(s)	**EigenValue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None*	0.5522	29.7236	27.5843	0.0262
At most 1	0.3419	15.3827	21.1316	0.2565
At most 2	0.1011	3.9455	14.2646	0.8650
At most 3	0.0473	1.7929	3.8415	0.1806
Maximum-Eigen value test indicates one cointegrating eqns at 0.05 level *denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug Michelis (1999) p-values				

Source*: Author's Extraction from Eviews*

The results in Table 4.3 showed that the Trace statistics indicated one cointegrating equation in the model. This is the same number of cointegrating equations indicated by the Maximum Eigen Statistic. Thus, it can be posited that there is long-run equilibrium correlation between the manufacturing output, power consumption, real effective exchange rate and government capital expenditure.

Vector Error Correction Model

Vector autoregressive (VAR) model designed for use with stationary series. VAR can be applied to multivariate time series using VECM, the primary benefit of VECM is that it provides both long term and short-term results.

Table 4.4: VECM Estimates of the Impact of Power Consumption on Manufacturing Output in Nigeria

Vector Error Correction Estimates
Date: 04/17/21 Time: 15:39
Sample (adjusted): 1983 2019
Included observations: 37 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LNMGDP(-1)	1.000000
LNPC(-1)	-2.539865 (0.25380) [-10.0074]
LNREER(-1)	-0.013977 (0.08372) [-0.16695]
LNGCE(-1)	-0.022817 (0.03395) [-0.67203]
C	1.833038

Error Correction:	D(LNMGDP)	D(LNPC)	D(LNREER)	D(LNGCE)
CointEq1	-0.180665 (0.05235) [-3.45122]	0.153402 (0.06022) [2.54718]	-0.221114 (0.22822) [-0.96888]	-0.081863 (0.19817) [-0.41309]
D(LNMGDP(-1))	0.319143 (0.12998) [2.45541]	0.497625 (0.14953) [3.32790]	-0.105359 (0.56664) [-0.18594]	0.170829 (0.49204) [0.34718]
D(LNPC(-1))	-0.643269 (0.11480) [-5.60316]	-0.238014 (0.13208) [-1.80208]	-0.053124 (0.50050) [-0.10614]	-0.462692 (0.43461) [-1.06462]
D(LNREER(-1))	-0.045668 (0.04008) [-1.13943]	0.019085 (0.04611) [0.41390]	0.215019 (0.17473) [1.23058]	0.338637 (0.15173) [2.23191]
D(LNGCE(-1))	-0.077351 (0.04331) [-1.78597]	-0.011205 (0.04983) [-0.22489]	-0.065005 (0.18881) [-0.34428]	-0.081802 (0.16396) [-0.49893]
C	0.022507 (0.00692) [3.25011]	0.002921 (0.00797) [0.36667]	-0.002201 (0.03019) [-0.07292]	0.081582 (0.02622) [3.11203]
R-squared	0.550297	0.376805	0.086833	0.185221
Adj. R-squared	0.477764	0.276290	-0.060452	0.053805

Sum sq. resids	0.041442	0.054850	0.787643	0.593907
S.E. equation	0.036563	0.042064	0.159398	0.138413
F-statistic	7.586882	3.748733	0.589557	1.409427
Log likelihood	73.19537	68.00954	18.71740	23.94037
Akaike AIC	-3.632182	-3.351867	-0.687427	-0.969750
Schwarz SC	-3.370952	-3.090637	-0.426197	-0.708520
Mean dependent	0.015248	0.007220	-0.011574	0.068981
S.D. dependent	0.050595	0.049445	0.154788	0.142294

Determinant resid covariance (dof adj.)	8.35E-10
Determinant resid covariance	4.12E-10
Log likelihood	189.7979
Akaike information criterion	-8.745832
Schwarz criterion	-7.526759

Source: EViews Result

From the results in Table 4.4, the error correction term can be specified as:

ECT_{t-1}= 1.00 $LnMGDP_{t-1}$ -2.54 $LnPC_{t-1}$ – 0.01$LnREER_{t-1}$ – 0.02$LnGCE_{t-1}$ + 1.83 +μ

In addition, the short-run VECM model is expressed as:

$\Delta LnMGDP_t$ = -0.18 ECT_{t-1} + 0.32$\Delta LnMGDP_{t-1}$ - 0.64$\Delta LnPC_{t-1}$ - 0.05$\Delta LnREER_{t-1}$ - 0.08$\Delta LnGCE_{t-1}$ +0.02

The Error Correction Term (ECT) is negative and statistically significant in table 4.4 as expected. That is, 18 percent of the preceding year's divergence from long run equilibrium is adjusted each year. The speed of adjustment from short run to long run equilibrium is 18 percent. The estimated coefficient of per capita consumption of electricity stood at -0.64 in the short-run model. This implies that at a percentage increase in power consumption kWh/per capita would translate to 0.64 percent decline in manufacturing output on the axiom that other explanatory variables are constant. However, the impact of per capita consumption of capital on manufacturing sector performance was significant given that its t-statistic value of -5.60 is less than the critical value of -1.96 at five percent level of significance and 35 degrees of freedom. The estimated coefficient of real effective exchange rate and government capital expenditure stood at -0.05 and -0.08 respectively. This indicates a percentage increase in real effective exchange rate translates to 0.05 percent decline in manufacturing output while a percentage increase in public capital project is associated with with 0.08 percent decline in manufacturing output within the sampled period. However, the magnitude of impact of real effective exchange rate and government capital expenditure was insignificant on manufacturing output given that their respective t-statistics values of -1.13 and -1.78 exceeded the -1.96 critical value at five percent level of significance and 35 degrees of freedom.

The coefficient of determination otherwise known as R-squared stood at 0.55 while the adjusted coefficient of determination settled at 0.48. This connotes that the explanatory variables accounted for 55 percent of the total variation in manufacturing output, implying that the explanatory variables have a fair predictive influence on manufacturing output.

Discussion of Findings

Findings from the VECM model showed that power consumption had a strong negative impact on manufacturing output between the estimated periods. The result is consistent with the submissions of Nwanne (2015), Ugwoke, (2016) and Akinbola, (2017) who in their respective studies found that electricity consumption impacts negatively on performance of the Nigerian manufacturing sector. The results confirm that Nigeria's power supply is extremely poor and

insufficient to support all Nigerian households and industries. This demonstrates the poor condition of Nigeria's electric grid, which has continued to stifle manufacturing production and the real economy in general. Nigeria has been suffering from a severe electricity shortage for the past two decades. There are three main causes of this deficiency: economic, socio-political and structural. power loss from production to payment are high in Nigeria's power sector, which suffers from limited access to electricity for the population. The existence of an inadequate power supply in the economy delays production and raises the cost of output. Standard of living will rise in a situation where power is adequately supplied because the cost of generating one's own energy by private generators will be eliminated, freeing up income for more profitable projects. Economic activity and industrial development are generally regarded as being driven by power. Hence, abundant energy supplies will boost technology's influence and spur massive economic growth. High-quality power generation can help technology advance, while low-quality power generation can stifle innovation

Findings, Conclusion and Recommendations

According to the findings, the study concludes that the low level of power consumption hampers the growth and development of the Nigerian manufacturing sector. The chronic shortage of available generating capacity negatively impacted the industrial and manufacturing sector. This is on account of inefficiency of power sector, under-investment, inadequate power infrastructures and over-dependence on hydroelectric as major energy source. In a bid to improve the current level of Nigeria's generating capacity to enhance industrial development in the country, the following suggestions are proffered:

a. Power sector objectives must be properly implemented in order to ensure an efficient and sustainable energy supply for Nigerians. An increase in private sector participation and investment in the power sector will be a result of this.
b. It is critical that the federal government ensures a level playing field for independent power producers and other genuine power industry investors. Additionally, energy consumers should be equipped with the knowledge of efficient use of energy.
c. Sufficient funding for the power sector, gas supply protection, maintenance of existing power supply infrastructures, harmonization of activities among various stakeholders in the power sector, and expansion of transmission and distribution networks should all be given careful consideration.
d. Government has to step up to implement renewable energy and energy efficiency programmes. As evident in developed economies like Germany, Japan and Denmark, a strong and long-term commitment from the government as being emphasized is important in implementing any kind of policies which will result to the development of renewable energies in particular and sustainable development in general.
e. The development of the power sector must be integrated into sustainable development in which sustained improvement in the welfare of the populace and enlargement of their social choices are key elements.

References

Adofu, I., Taiga, U. U., & Tijani, Y. (2015). Manufacturing sector and economic growth in Nigeria (1990-2013). Donnish journal of economics and international finance, 1(1), 001-006.

Akinbola, O. A., Zekeri, A. and Idowu, H. A. O. (2017): "The power sector and its impacts on industrialization of businesses in Nigeria", Archives of Business Research, 5(12), 294-30

Akiri, S. E., Ijuo, O. A., & Apochi, M. P. (2015). Electricity supply and the manufacturing

productivity in Nigeria. IOSR Journal of Economics and Finance, 6(6), 90-94.

Akpan, D. B., Yilkudi, D. J., & Opiah, D. C. (2016). The impact of lending rate on the manufacturing sector in Nigeria.

Amadi, A. N., Nwidobie, B. M., & Adesina, J. B. (2018). Macroeconomic Implications of Exchange Rate Fluctuations on the Manufacturing Sector Performance in Nigeria. *Business & Entrepreneurship Journal*, *7*(2), 1-14.

Anyene, S., Ezu, G., & Ananwude, A. (2019). Government expenditure and industrial development in Nigeria: Long run and short run dynamics from ARDL approach. *Journal of Scientific Research & Reports*, *23*(6), 1-9.

Anyanwu, C. M. (2000). Productivity in the Nigerian manufacturing industry. Research department, central bank of Nigeria, 124-129.

Baltagi, B. (2008). Econometrics. Fourth Edition. Texas: Springer Publishers.

Chikelu, J. C., & Okoro, V. C. (2016). Impact of capital expenditure on the Manufacturing Sector of the Nigerian Economy

Chinedum, E. M., & Nnadi, K. U. (2016). Electricity supply and output in Nigerian manufacturing sector. *Journal of Economics and Sustainable Development*, *7*(6), 154-163.

Edame, G. E., & Okoi, O. B. (2015). Energy consumption, institutional quality and the performance of the manufacturing sector in Nigeria (1999-2013). International Journal of Energy Economics and Policy, 5(3).

Edomah, N. (2019). Governing sustainable industrial energy use: Energy transitions in Nigeria's manufacturing sector. *Journal of Cleaner Production*, *210*, 620-629.

Eke, F. A., Okoi, O. B., Eke, I., Eke, F. A., Okoi, O. B., & Eke, I. C. (2018). Institutional Quality, Energy Consumption Mix and Industrial Sustainability in Nigeria. African Journal of Applied and Theoretical Economics, 4(1), 73-94.

Emmanuel, F. O., & Oladiran, O. I. (2015). Effect of government capital expenditure on manufacturing sector output in Nigeria. *Business and Economic Research*, *5*(2), 136-152.

Eze, O. R., & Ogiji, F. (2014). Impact of fiscal policy on the manufacturing sector output in Nigeria: An error correction analysis. British Journal of Business and Management Research, 1(2), 31-54.

Femi Kayode, O. F., Edun, A. T., & Obamuyi, T. M. (2010). Bank Lending. *Economic Growth and the Performance of the Manufacturing Sector in Nigeria*.

Gujarati, N (2006). Essentials of Econometrics. New York: MC Graw Hill International Press.

Imoughele, L. E., & Ismaila, M. (2014). Empirical investigation of the impact of monetary policy on manufacturing sector performance in Nigeria (1986–2012). International journal of education and research, 2(1), 1-20.

Jhingan, M. L. (2010). Macro-Economic Theory, New Delhi, Vrinda Publications Ltd.

Kassim, F., & Isik, A. (2020). Impact of Energy Consumption on Industrial Growth in a Transition Economy: Evidence from Nigeria.

Kenny S, V. (2019). Determinants of Manufacturing Sector Performance and Its Contribution To Gross Domestic Product In Nigeria.

Lawal, E. O. (2016). Effect of exchange rate fluctuations on manufacturing sector output in Nigeria. Journal of Research in Business and Management, 4(10), 32-39.

Matthew, O. A. (2019). Electricity consumption, government expenditure and sustainable

development in Nigeria: A co-integration approach. *670216917*.

Quarruzzaman, A. (2015). Productivity and Performance Evaluation of SME Sector in Bangladesh: Evidence from the Historical Data. *Journal of Islamic Finance and Business Research, 3(1)*, 14-22.

Ugwoke, T. I., Dike, C. K., & Elekwa, P. O. (2016). Electricity consumption and industrial production in Nigeria. Journal of Policy and Development studies, 289(3519), 1-12.