THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

Energy Consumption and Industrial Output Growth in Nigeria (1981-2018)

Dr. Ojo Rufus Olawumi
Senior Lecturer, Department of Economics,
College of Education, Ikere Ekiti, Ekiti State, Nigeria
Adesanmi Oriola
Post Graduate Student, Department of Economics,
Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria

Abstract:
Although Nigeria has strong oil resources present in its economy, still it suffers from energy shortages. This causes heavy crisis in the Industrial Output growth. This study has a primary objective to find out the nexus between Petroleum Consumption and Industrial Output from Nigerian economy point of view. it also checks the influence of electricity consumption on the growth of economy. This study has used a secondary data source. The data has been obtained from CBN Annual Report and Statement of Account 2018; a positive relationship between Industrial Output growth and Petroleum Consumption revealed by this study. Similar type f association found between Industrial Output growth and Coal Consumption. Based on the findings and conclusion, the study recommended among others that government should intensify efforts at maintaining consistency in the production and utilization of energy for improved Industrial Output growth in Nigeria; government should ensure reliable and sustainable supply of energy at a cost affordable to the Industrial sector in Nigeria and government should redesign policies that enhances increased production capacity of the sector through appropriate Energy Supply to achieve Industrial Output growth in Nigeria.

Keywords: *Petroleum consumption, gas consumption, coal consumption, electricity consumption and Nigeria industrial output*

1. Introduction

Needless to say, energy is one of the most important factors for an economy to judge its growth. It also contributes towards employability generation. It is also helpful to improve the efficiency in production. The primary as well as ideal purpose of an energy market is to boost the economy in multiple ways like to provide boost in manufacturing, conveyance, domestic and facility sectors. Hence, energy remains the lubricant of sustainable economic growth.

Supply and demand of energy has become an important aspect in Nigerian economy. In the current time, study of this area shows huge research scope. As per Iwayemi (2008), the energy industry in Nigeria, not performing up to the marks in fulfilling the needs of its customers. A strong continuous disequilibrium is seen to be present in the markets of electricity and petroleum products. For kerosene and diesel, this problem is most prominent.

The problem in energy services has significantly impacted the lives of people who live on less than $2 per day.

The continuous energy crisis create problem for the industrialization process. Economic growth hampered due to this. Problem becomes more prominent in the regional and global markets and employment generation. From mid-1970s, the oils crisis of the Nigeria has started. It has become more prominent in the recent time. Although huge investment is present but no such economic growth has been noticed (Adenikinju, 2005). The Nigeria Energy Policy report (2003) revealed that population connected to the grid system is short off power supply over 60% of the time (Okoye, 2017). Nigeria is one of the greatest developing nations in Africa. It has rich natural resources including potential energy resources. Increasing access to energy in Nigeria has proved not only to be a continuous challenge, but also a pressing issue with the international community. The energy crisis largely contributed to the incidence of poverty by paralyzing industrial and commercial activities during this period (Oyedepo, 2012).

Although this country has strong crude oil, natural gas, coal, hydropower, solar energy, fissionable materials, but it suffers from low productivity and underutilization of resources (Udah, 2010).

The industrial units of Nigeria are suffering hugely (Ekpo, 2009). Nigeria is the major procurer of stand-in energy producing plants in the world (Braimoh & Okedeyi 2010). Studies had revealed that Nigeria is constantly suffering from energy shortfalls.

Although the economy has huge energy resources, still many sectors are suffering due to inadequate supply of energy. Many productions are suffering due to this. The costs like idle workers (workforce), spoilt materials, loss of output and damaged equipment and restart cost (Adenikinju, 2005) have been carried by the industries. Energy is highly responsible behind any economic activity and indeed industrial production. The impact of technology is expected to boost heavily by the highly graded energy resources. It also causes tremendous economic growth. Ojinnaka (1998) argued that the consumption of energy tracks with the national product. The energy problem in Nigeria is facing huge challenge due to continuous increment in demand.

Industrial growth is a pre-requisite for a nation to grow from an emerging economy to a developed economy. For a country like Nigeria, the greater the industrial output growth, the better its chances of becoming more developed. Coal is the oldest commercial fuel used in Nigeria in 1916 and since oil was discovered in Nigeria; coal was given less relevance and became highly dormant. With a reserve of over two billion metric tons, Nigeria produces about 200,000 to 600,000 tonnes yearly (Ojinnaka, 1998).

The electricity subsector has not been able to meet the demand for electricity in the country and this has caused many problems which is affecting the economic growth. The Central Bank of Nigeria has identified problems associated with Power Holding Company of Nigeria (PHCN): maintenance of facilities, subsequent breakdowns, technical problems, vandalization of power equipment. Most of the existing plants in Nigeria are not utilized properly or they are not functioning at all. The inefficiency to boost electricity supply causes the gap between the demand and supply of power due to the poor maintenance of hydro plants, and the loss of power in transmission. On the basis of comparing Japan and Nigeria, it is observed that while Japan had a population of about 160 million people, zero natural resources, high power generation capacity of 124Giga Watts, 100% grid access, 5% carbon emission rate and 100% energy conservation compliance, Nigeria on the other hand, have a population of over 200 million people, abundant natural resources (coal, petroleum & gas, bitumen, gold, diamond, etc.), low power generation capacity of 0.54 Giga Watts, less than 40% grid access, 60% carbon emission rate and 2% energy conversation compliance(Bamidele & Mathew, 2013).

The energy situation in Nigeria has not been able to produced and managed in a way to ensure sustainable energy development. Nigeria has limited technological capacity but it should be able to manage the scarce energy resources efficiently. The aforementioned problems caused by the low consumption of energy in the midst of abundant energy resources are the basis of the study. Although corruption, incessant changes in government and poor national orientation have been seen as reasons that deprive Nigeria of the expected development in the energy sector, the study sought to find out the factors responsible for these and to develop strategies that can stem the deteriorating performance of the sector for enhanced Industrial growth and development.

The following research questions have been identified to be useful for the study; Is there any important connection between fuel ingesting and manufacturing production in Nigeria? Is there any noteworthy impression between Electricity ingesting and Manufacturing productivity in Nigeria? Is there any substantial effect between coal feasting as energy basis and manufacturing productivity in Nigeria?

Past studies have attempted to investigate the impact of energy consumption on industrial output growth and this has remained the central interest of researchers globally. To begin with, Ramazan & Soytas (2007) examined the effect of disaggregate energy consumption on industrial output in the United States.Chebbi & Boujelbene (2008) observed three sectors (farming, industrial and service) and overall gross domestic product are co-integrated with energy consumption. They found a long run relationship between the various output and energy consumption.

Sari, Ewing & Soytas (2008), used time series data on energy consumption and industrial production in the United State. The connection between per capita power ingesting and per capita GDP had been explored by Noor & Siddiqi (2010). The study had been conducted in Nigeria (1971 to 2006). The connection between energy feasting and industrial productivity in the background of Pakistan has been discovered by Qazi, Ahmed & Mudassar (2012).

Further, electricity consumption and economic growth from the perspective of Nigerian economy had been investigated by Komolafe, Danladi & Babalola (2012). Shahbaz, Muhammad & Talat (2012) scrutinized how energy consumption spurs economic growth in Pakistan. Baghedo & Atima (2013) examined the impression of petroleum on economic growth in Nigeria using time series data between 1981 to 2011. Nexus between economic growth, domestic energy consumption and energy prices had been explored by (Olumuyiwa, 2013). In the same area also had been studied by (Bamidele & Mathew, 2013). In the manufacturing sector in Malaysia, the relationship between output and price in electricity has been studied by Husaini & Lean (2015). Gbadebo & Okonkwo (2009) inspected the contribution of energy consumption in Nigeria. In a slightly different manner, Sun & Anwar (2015) examines the link between electricity consumption and industrial production in Singapore's Manufacturing Sector. The study employed the Johansen's Cointegration approach. The study concluded that consumption adjust very slowly to shocks to industrial production and entrepreneurship; electricity consumption causes industrial output and the growth hypothesis concerning energy consumption and economic growth holds in Singapore's manufacturing sector.

Mehdi & Rafaa (2015) had used the Granger causality test and found that feasting of energy and outputs produced by industry are associated. This study had been conducted in Tunisi. Alege, Adediran & Ogundipe (2016), observed the impression of power supply on economic development in the period 1980 to 2010. Their study recommended that the industries increase daily generation of power to meet up with the increasing demand for power, more plant stations should be built, and the alternatives to power supply by PHCN should be made more competitive so as to increase productions and the output of the economy as a whole.

Sakiru & Shahbaz (2016) reinvestigated the relationship between natural gas consumption and economic growth by including foreign direct investment, capital and trade openness in Malaysia: 1971-2012. The study applied combined co-integration test and ARDL bounds testing to examine the relationship between the variables in the long run. The results support the presence of feedback hypothesis between natural gas consumption and economic growth, and natural gas consumption and foreign direct investment.

Hlalefang, Mugano & Pierre (2017). They investigate the causal relationship between electricity supply and economic growth in South Africa using annual data covering the period between 1985 and 2014. This study used a multivariate framework which included trade openness, electricity price, capital and employment as intermittent variables. The autoregressive distributed lag bound testing was employed to establish the long run relationship between these variables. The vector error correction model (VECM) was estimated to carry out the test of causality. The results support the existence of co-integration among the variables. The VECM established a bidirectional causality flowing between electricity supply and economic growth

Grigorios & Loannou (2018) examined electricity consumption and Renewable Energy Source (RES) plants in Greece, the study concluded that, in the first analysis, the first cluster consists mainly of the lowest energy consumption regional units. while the second and the third cluster consist of regional units where the RES penetration is significant. In another different manner, Abokyi, Konadu, Sikayena & Oteng-Abayie (2018) in their work highlighted the 'Causative Relationship among Electricity Consumption and Industrial growth in Ghana.

Recently, Debin & Jiancheng (2020) examines the impact of electricity consumption in China's key economic regions using the Generalized Divista Index model. The study found that Output, Capital and Labour have stimulatory effects on electricity consumption with Capital having the greatest effect on electricity consumption. Many studies have attempted to investigate the relationship between energy consumption and the growth of industrial output: however, most of these studies were carried out in environment different from Nigeria with only a few from Nigeria. The time frame considered in these studies were short and their results created a knowledge gap due to their conflicting and inconclusive findings which this study intends to resolve. This necessitated a more systematic and comprehensive study of the relationship between energy consumption and the growth of industrial output in Nigeria by determining the impact of energy consumption of premium motor spirit (PMS), Coal, Gas and Electricity consumption on the Nigeria industrial output. It is observed that most of the studies in the literature seemed to have placed too much emphasis on electricity consumption while neglecting the impacts of other components of energy consumption on industrial output growth; such as: petroleum consumption, gas consumption and coal consumption. This neglect has therefore created a research gap which this study intends to fill.

Most of the studies on the impact of energy consumption on industrial output explored data period below 2018, a more recent study that cover data period up to 2018 is presumed to have the capacity to generate more reliable outcome on the nexus between energy consumption and industrial output growth in Nigeria. Also, there is need to employ more robust technique to examine the impact of energy consumption on the industrial output growth in Nigeria. Hence, the study considered the use of the Fully Modified Ordinary Least Square (FMOLS) approach to Cointegration and Granger Causality test as a more sophisticated technique in the examination of the nexus among the selected variables.

2. Materials and Methods

2.1. Model Specification

The study adopted the model in the work of Romer (1986) with some modifications. The model for this study is therefore specified thus;

INDOPT = F(C, PMS, GAS, COAL, ELECT)…………………………………………….. (1)

Explicitly,

$INDOPT_t = C_t, PMS_t, GAS_t, COAL_t, ELECT_t$ ……………………………………………. (2)

Where

C_t= Constant

$INDOPT_t$ = Industrial output at time t

PMS_t= Petroleum consumption at time t

GAS_t = Gas consumption at time t

$COAL_t$ = Coal consumption at time t

$ELECT_t$ = Electricity supply at time t

To estimate equation (i) there is need to take the natural log of both sides and add the error term (N_t) which result in the following;

$InINDOPT_t = \beta_{ot} + \beta_1 InPMS_t + \beta_2 lnGAS_t + \beta_3 lnCOAL_t + \beta_4 lnELECT_t + U_t$…………. (3)

Where $\beta_{0,}$ - β_4 are constant elasticity coefficient of output with respect to the explanatory variables.

U_t= constant parameter and represent the white noise error term.

2.2. A priori Expectation

It is expected that $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$ and $\beta_4 > 0$

2.3. Estimation Technique

The methods of estimation employed for this study were based on Fully Modified OLS (FMOLS) approach to cointegration and Granger causality test. FMOLS estimates a single cointegrating relationship which is having a combination of I(1) variables (Bashier & Siam, 2014). The study analyzes time series properties of the variables using the Augmented Dickey Fuller (ADF). For the purpose of diagnosing the employed variables for fitness and suitability for purposes intended, E-view 10.0 econometric application package (software) was used to gauge the data for stationarity or otherwise, employing the Augmented Dickey-Fuller tests procedures. Whether long run relationship exists or otherwise, among the choice of variables is checked using co-integration analysis.

To observe the stationarity of time series data, unit root test is one of the popular and mostly used test. It works on the basis of random walk principle. It checks if the regression between the variables is spurious (Amiruddin, Nor & Ismail 2007). A stationary time series data's mean and variance remains constant over time. To check the order of integration, Augmented Dickey-Fuller test statistic has been used. This test has an alternative hypothesis that the time series data is stationary. This can be assumed if the p value comes below .05.

Regression of one non-stationary variable on another is very likely to yield impressive-seemingly results which are wholly spurious. In general, if two time series variables are both non-stationary in levels but stationary in first-differences, they are integrated of order 1, I(1), then there could be a linear relationship between them which is stationary, I(1) and as such all the series of interest should be integrated of the same order, preferably I(1).The two time series variables that satisfy this requirement are considered to be cointegrated. Variables are cointegrated with one another if the residuals from the level's regression are stationary.

2.4. Types and Source of Data

The data used in this study are mainly time series secondary data obtained from the Central Bank of Nigeria Annual Report and Statement of Account 2018 and other editions. Data from the Federal Bureau of Statistic as well as Economic Statistical Websites were useful for the study.

3. Results and Discussion

3.1. Unit Root Tests

The Augmented Dickey-Fuller (ADF) unit root test results for the time series variables are presented in Table1 below.

Variable	ADF Test Statistic	95% Critical ADF Value	Order of Integration	Remark
D(INDOPT)	3.540**	7.914	*I* (1)	Stationary
D(PMS)	3.540**	6.993	*I* (1)	Stationary
D(GAS)	3.540**	4.563	*I* (1)	Stationary
D(COAL)	2.951**	6.308	*I* (1)	Stationary
D(ELECT)	2.946**	7.885	*I* (1)	Stationary

Table 1: Unit Root Test Results
Source: Authors' Computation, 2020
*Note: ** = 5 Percent Significance*

From table1, the ADF test statistic for each of the variables are greater than the respective critical values. Thus, we accept the hypothesis of unit roots in each of the time series. In our final evaluation all the variables became stationary after first difference. Hence, they are integrated of order *I* (1). Once all the series are non-stationary in the level, one can estimate an econometric model only if they are co-integrated. Thus, co-integration tests can be applied for all variables.

3.2. Result of Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None *	0.603115	73.33279	69.81889	0.0255
At most 1	0.392602	40.06487	47.85613	0.2202
At most 2	0.347975	22.11632	29.79707	0.2921
At most 3	0.134582	6.720092	15.49471	0.6104
At most 4	0.041252	1.516569	3.841466	0.2181
Trace test indicates 1 cointegratingeqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				

Table 2: Test for Johansen Co-Integration Results
Source: Author's Computation, 2020

The result of the Johansen co-integration test shows that the trace statistics indicate one (1) co-integrating equation. This indicates that there is a long run relationship among the variables, hence the variables have high tendency to converge to long-run equilibrium level. Since the ADF test value for the residual is greater than the critical value, it is said to be stationary. Thus, the time series are co-integrated, implying that a long-run stable relationship exists among the variables used in this study. The study therefore estimates the long run parameters for the study using FMOLS technique.

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IND(-1))	0.793488	0.160738	4.936538	0.0004
D(IND(-2))	0.687072	0.122671	5.600922	0.0002
D(IND(-3))	0.382274	0.127357	3.001585	0.0120
D(COAL)	0.011878	0.009898	1.200048	0.2553
D(COAL(-1))	-0.045190	0.009644	-4.685981	0.0007
D(COAL(-2))	-0.048737	0.009919	-4.913523	0.0005
D(ELECT)	-0.430288	0.161689	-2.661199	0.0221
D(ELECT(-1))	-0.448543	0.122586	-3.659005	0.0038
D(ELECT(-2))	-0.488206	0.120826	-4.040581	0.0019
D(ELECT(-3))	-0.434234	0.108676	-3.995675	0.0021
D(GAS)	-0.676343	2.571446	-0.263021	0.7974
D(GAS(-1))	10.55464	3.364674	3.136899	0.0095
D(GAS(-2))	25.40200	4.684219	5.422889	0.0002
D(PMS)	-0.377258	0.164615	-2.291762	0.0426
D(PMS(-1))	-1.534684	0.222918	-6.884517	0.0000
D(PMS(-2))	-1.114372	0.203799	-5.468007	0.0002
D(PMS(-3))	-0.852450	0.169408	-5.031943	0.0004
CointEq(-1)*	-1.515322	0.196032	-7.729959	0.0000
R-squared	0.881864			
Adjusted R-squared	0.756345			
Durbin-Watson stat	2.500359			

Table 3: Short-Run Estimated Result
** P-value Incompatible with T-Bounds Distribution*
Source: Author's Computation, 2020

The result in table 3 showed that the variables would converge to long-run relationship after thirty-eight (38) years movement among the variables as shown by the negative and significant coefficient of error correction term (ECM). Having established the long-run co-movement among the variables, we employed fully modified Ordinary Least Squares (FMOLS) technique to establish the long-run relationship among the variables as shown in table 4.3 below.

Response Variable: ln INDOPT				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
lnPMS	0.191026	0.306598	0.623049	0.5377
lnGAS	-3.108990	4.830991	-0.643551	0.5245
lnCOAL	0.047616	0.017472	2.725349	0.0103
lnELECT	-0.648271	0.119468	-5.426305	0.0000
C	21.52247	1.358227	15.84600	0.0000
R-squared	0.818624			
Adjusted R-squared	0.795952			

Table 4: The Fully Modified Least Squares (FMOLS) Long Run Result
Source: Author's Computation, 2020

Table 4 presents the long-run relationship using industrial output (INDOPT) as the dependent variable. The estimated result above showed that the explanatory variables explained approximately 82% of the total variations in the growth of energy consumption in Nigeria. This result showed that the model has high goodness of fit and confirmed by the Adjusted R-squared showing that the model has a good fit at 80%.

The long run coefficient of the interactive variable (PMS) was positively signed (0.191026) and though not statistically significant at 5% level (0.623) with the Pvalue of 0.5377 which is greater than 5%. The positive relationship exhibited by the interactive Petroleum consumption showed that a percent increase in Petroleum consumption would lead to approximately 19.1% increase in growth of the industrial output in Nigeria.

Although, the sign of the parameter of GAS is negative (-3.108990) showing that a decrease in GAS consumption will lead to a decrease in industrial output in Nigeria showing that the result conforms not to the theoretical expectation of the study. Equally, statistically the result is not significant at 5% level of significance.

This result implies that the availability of Gas Consumption (GAS) in Nigeria has not backed significantly to the industrial output. The long run coefficient of the interactive variable (COAL) was positively signed (0.047616) and statistically significant at 5% level (2.725349) with the Pvalue of 0.0103 which is lesser than 5%. The positive relationship exhibited by the interactive coal consumption showed that a percent increase in its consumption would lead to approximately 0.47% increase in growth of the industrial output in Nigeria.

The long run estimated coefficient of (ELECT) was negatively signed (-0.648271) and statistically significant at 5% level (5.42) with the probability value of 0.0000 lesser than. The negative sign indicated that a unit percent increase electricity consumption would lead to 64.8% decrease in Industrial output of the Nigerian economy.

The result is in line with the study of Ogunjobi (2015). A long-run positive relationship has been observed between industrial growth and electricity consumption.

Qazi, Ahmed & Mudassar (2012) postulated that electricity is a vital tool for driving growth in energy, manufacturing and social sector. The parallel (positive) growth trend existed between electricity demand and industrial output growth. Electricity as an independent variable had effects not only on factors of production but also on the impact it had on capital accumulation. This implies that, electricity production is expected to become an economic policy with high priority objective which should be urgently responded to.

3.3. Test of Statistical Significance

T-test is a confirmatory test of significance and decision is always based on its outcome using 2-test at 0.05 level of significance or 95% confidence level. A parameter estimate is significant if its calculated value is greater than its tabular value. The following table shows the significance of the estimates.

Variable	Calculated t^*	Prob. Value	Decision
β_1	0.623049	0.5377	Not significant
β_2	-0.643551	0.5245	Not Significant
β_3	2.725349	0.0103	Significant
β_4	-5.426305	0.0000	Significant

Table 5: T-statistics
Source: Author's Computation, 2020

From Table5 above, both coal and electricity consumption are statistically significant and contribute immensely to the growth of industrial performance (output) in Nigeria under the year reviewed.

4. Conclusion and Policy Recommendations

The study investigated the energy consumption and the growth of industrial output in Nigeria. The result of the finding was determined through the use of Fully Modified Ordinary Least Square (FMOSL) regression technique. The variable was investigated by conducting a regression analysis using time series data for the observed years. From the Central Bank of Nigeria, the data has been collected. A positive relationship found between industrial output growth and petroleum consumption. But electricity consumption and gas consumption found to be negatively associated. Notwithstanding, both electricity and Coal consumption are statistically significant.

The study established that Premium Motor Spirit, Gas consumption, Coal consumption and Electricity Supply in Nigeria are significant to industrial output growth in Nigeria.

This study revealed that industrial output growth caused by the demand for energy consumption. Here, the explanatory variables were found to be significant. It is therefore paramount that such a sector is not neglected in the country. Energy is the vital backbone of volume of productivity. Therefore, an increase in the electricity production would greatly avoid the paralyzation of the industrial output.

Based on the findings and conclusion, the study recommended that government should intensify efforts at maintaining consistency in the production and utilization of energy in improving industrial output growth in Nigeria; government should ensure reliable and sustainable supply of energy at affordable cost to investors in the Nigeria industrial sector; government should diversify energy mix to reduce over dependence on non-renewable energy by investing in renewable energy infrastructure with the aim of increasing energy consumption through energy service availability, accessibility, and affordability; government should as a matter of urgency ensure that power supply in Nigeria is stable in order to reduce the cost of production and improved industrial output that can compete head to head with the foreign goods, government should therefore build more thermal stations and try as much as possible to increase the capacity utilization of the existing ones while the capacity utilization in the hydro stations should also be increased and government should redesign policies that enhances increased production capacity of the real sector through appropriate energy supply for industrial output growth in Nigeria

5. References

i. Abokyi, E., Konadu, P. A., Sikayena, I. & Oteng-Abayie (2018). Consumption of Electricity and Industrial Growth in the case of Ghana. *Journal of Energy,* 2018.
ii. Adenikinju, A. (2005). Analysis of the cost of Infrastructure failures in a developing economy. The case of the electricity sector in Nigeria. *AERC Research paper 48,* Nairobi. AERC.
iii. Akomolafe K.F., Danladi, J.D. &Babalola, D. (2012). Electricity Consumption and Economic
iv. Growth: A causality Test in Nigeria. *Proceeding of the 2012 NAEE/IAEE Conference on Energy Technology and Infrastructure for Development. Pp509-517.*
v. Alege, P. O., Adediran, O. S. & Ogundipe, A. A. (2016). Pollutant Emissions, Energy Consumption and Economic Growth in Nigeria: A Multivariate Granger Causality Framework. *International Journal of Energy Economics and Policy,* 6(2).

vi. Baghebo. M., & Atima, T.O. (2013). The impact of petroleum on economic growth in Nigeria (1980-2001). *Global Business and Economic Research Journal,* 2 (5), 102-115.

vii. Bamidele, P.A. and Mathew, A.D. (2013). Energy consumption and economic growth nexus: Empirical evidence from Nigeria. *Proceedings of the NAEE/AEE conference on energy resource management in a federal system, challenges, constraint, and strategies, Nigeria. Pp 241-257.*

viii. Bashier, A. A. & Siam, A. J. (2014). Emigration and Economic Growth in Jordan. *Arc Journal,* 1(9), 85-92.

ix. Braimoh, U. & Okedeyi, K. (2010). Energy and Power Generation, Transmission and Distribution in Lagos State.

x. Chebbi, H. E. & Boujelbene, Y. (2008). Agricultural and Non-Agricultural Outputs and Energy Consumption in Tunisia: Empirical Evidences from Co-integration and Causality, 12th Congress of the European Association of Agricultural Economists – EAAE 2008.

xi. Chi, Z. & Zhen, S. (2017). On Electricity Consumption and Economic Growth in China. *Renewable and Sustainable Energy Review,*76, 353-368.

xii. Debin, F. & Jiancheng, W. (2020). The Impact of Electricity Consumption in China's Key Economic Regions. *Applied Energy,* 267,

xiii. Ekpo, A. H. (2009). The Global Economic Crisis and the Crisis in the Nigerian Economy, Presidential Address to the 50th Conference of the Nigerian Economic Society, September, Abuja-Nigeria.

xiv. Gbadebo, O. &Okonkwo, C. (2009). Does energy consumption contribute to economic performance: Evidence from Nigeria. *Journal of Economics and Business,* Xll (2), 43-79.

xv. Grigorios, L. K. &Loannou, K. (2018). Electricity Consumption and RES Plants in Greece: Typologies of Regional units. *Renewable Energy,* 127, 134-144.

xvi. Hlalefang, K., Mugano, G. & Pierre, L. R. (2017). Exploring the Nexus of Electricity Supply and Economic Growth in South Africa. Working Paper 656, Economic Research Southern Africa.

xvii. Husaini, D. H. & Lean, H. H. (2015). Does Electricity Drive the Development of Manufacturing Sector in Malaysia? *Energy Research Journal*, 7(1).

xviii. Iwayemi, A. (2008). Energy Sector Development in Africa, A Background paper prepared for African Development Bank.

xix. Mehdi, A. & Rafaa, M. (2015). Energy Consumption and Industrial Production: Evidence from Tunisia at both Aggregated and Disaggregated Levels. *Journal of the Knowledge Economy,* 6(4), 1123-1137.

xx. Noor, S. & Siddiqi M. (2010). Energy consumption and economic growth in South Asian countries: A co-integrated panel analysis. *International Journal of Human and Social Sciences.* 5(14), 921-926.

xxi. Ogunjobi, J. O. And Bamiro, O. M. (2015). Determinants of Household Energy Consumption in Nigeria: Evidence from Ogun State*. Research Journal of Social Science and Management*, 4 (12), 35-41.

xxii. Ojinnaka, I.J. (1998). Energy Crisis in Nigeria, The role of Natural Gas. The Bullion, *The Publication of Central Bank of Nigeria,* 22 (4), 78-97.

xxiii. Okoye, J.K. (2007). Background study on water and energy issues in Nigeria to inform the national consultative Conference on Dams and development.

xxiv. Olumuyiwa, O. (2013). The interaction between economic growth, domestic energy consumption and domestic energy prices in Nigeria: An Econometric Analysis. *Proceedings of the NAEE/IAEE conference on energy resource management in a federal system, challenges, constraint and strategies.* Pp 37-52.

xxv. Oyedepo, S.O. (2012). Efficient energy utilization as a tool for sustainable development in Nigeria. *International Journal of Energy and Environmental Engineering,* 3(11), 1-12.

xxvi. Qazi, A., Ahmed K. & Mudassar M. (2012). Disaggregate Energy Consumption and Industrial Output in Pakistan: An Empirical Analysis. *Discussion paper* No. 2012 to 2029. Kiel Institute for the World Economy.

xxvii. Ramazan, S. & Soytas, U. (2007). Disaggregate Energy Consumption and Industrial Output in the United States. *Energy Policy,* 35(2), 1274-1281.

xxviii. Romer, P. M. (1986). The Model of Economic Growth. *Journal of Political Economy,* 94(5), 1002-1037.

xxix. Sari, R., Ewing B. & Soytas U. (2008). The relationship between disaggregated energy consumption and industrial production in the United State: an ARDL approach. *Energy Economics,* 30, 2302-2313.

xxx. Shahbaz, M., Muhammed Z. &Tablat A. (2012). Is energy consumption effective to spur economic growth in Pakistan? New evidence from Bounds Test to level Relationships and Granger Causality Tests. *MPRA Paper No. 39734.*

xxxi. Sakiru, A. S. & Shahbaz, M. (2016). Natural Gas Consumption and Economic Growth: The Role of Foreign Direct Investment, Capital Formation and Trade Openness in Malaysia. *Renewable and Sustainable Energy Review,* 42, 835-845.

xxxii. Sun, S. & Anwar, S. (2015). Electricity Consumption, Industrial Production and Entrepreneurship in Singapore. *Energy Policy,* 77, 70-78.

xxxiii. Udah, E.B. (2010). Industrial Development, Electricity Crisi and Economic Performance in Nigeria. *European Journal of Economics, Finance and Administrative Science,* (18), 105-121.