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CAUSALITY EFFECT OF ENERGY CONSUMPTION AND ECONOMIC GROWTH IN NIGERIA (1980-2012)

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Abstract: **This paper investigates the causality effect of energy consumption and economic growth in Nigeria using annual data from the World Bank Development Indicator and CBN Statistical Bulletin from1980 to 2012.The paper adopts Vector Auto Regressive (VAR) and Error Correction Model (ECM) to test the causality between energy consumption and economic growth in Nigeria. The order of integration of the variables was determined using Augmented Dickey Fuller (ADF) test and the DF-GLS test which was followed by co-integration and causality test. Our findings suggest a positive relationship between energy consumption and economic growth. There is no causality between energy consumption and economic growth in the short run; in the long run we find unidirectional causality running from Economic growth to Energy consumption. There is need for government to diversify the energy mix to include all the untapped potentials of renewable power options such as small hydro, wind, solar and biomass among others in all the states and local constituencies. Energy conservation policy is necessary to adopt if this causality is running from per capita GDP to energy consumption but policy should be designed in a way that energy conservation measures do not adversely affect the economic growth.**

Keywords: **Causality, Economic Growth, Energy consumption, Energy Conservation Policy, Error correction Model, Per Capita GDP.**

1. INTRODUCTION

The causality effect of energy and economic growth has been a controversial issue in energy economics. Some researchers argue that since energy is a crucial input along with other factors of production, it is therefore an essential requirement for economic growth while some argue that the cost of energy consumption is small percentage of GDP, thus it cannot stimulate economic growth. In addition to this, energy sector development is essential for economic development and improved quality of energy services are expected to increase economic productivity (Toman and Jemelkova, 2003). The improvements in economic productivity can then lead to increased wages and this helps in reducing poverty (International Energy Agency, 2002). Thus, energy sector development can lead to both economic development and poverty reduction.

In Nigeria, energy serves as the pillar of wealth creation evident by being the nucleus of operations and engine of growth for all sectors of the economy. The output of the energy sector (electricity and the petroleum products) usually consolidate the activities of the other sectors which provide essential services to direct the production activities in agriculture, manufacturing, mining, commerce etc. Nigeria is endowed with abundant energy resources but suffers from perennial energy crisis which has defied solution. The co-existence of vast wealth in natural resources and extreme personal poverty referred to as the “resource curse” or 'Dutch disease' afflicts Nigeria (Auty, 1993).

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The level of development in an economy can be measured by the total energy consumption. Nigeria is a developing country that currently has a significantly low level of per capital energy consumption. Survey carried out by the World Research Institute shows that Nigeria's per capital energy consumption ranks 90 out of 134 countries.

Energy is the ability to do work. It is a conserved extensive property of a physical system, which cannot be observed directly but can be calculated from its states. Energy consumption includes petroleum, electricity, coal, wood fuel, natural and liquefied gas. Adequate energy supply is necessary to meet the needs of a country and for poverty reduction (Najid, Muhammad, Naqvi & Muhammad 2012).

Energy plays an important role on both the demand and supply side. On the demand side, energy is one of the products a consumer decides to buy to maximize his or her utility. On the supply side, energy is a key factor of production in addition to capital, labour and materials (Jaruwan, Lester & Richard 2006).

The energy sector remains critical towards the development of all other sectors of the economy. The increasing attention given to global issues and international policies needed to reduce Green House Gas (GHG) emissions has stimulated research linkage between energy consumption and economic growth in different countries. Energy consumption and economic growth has been a major area of study in recent times (Valeria & Chiara 2009).

According to Mulugeta et al. (2010), energy plays an important role in the economic growth of both developed and developing countries. They suggest that energy consumption is an indispensable component in growth. In addition, it directly or indirectly complements capital and labour as an input in the production process.

Many authors have studied not only the correlation and relationship between energy consumption and economic growth but also the direction of causality, yet there is no consensus on their causal relationship.

This paper investigates the causal relationship between economic growth and energy consumption in Nigeria having in mind that energy plays a vital role in economic and social development and the quality of life of people .This is however the major aim of every economy in order to promote sustainable economic growth. The importance of energy cannot be underestimated and has gained prominence in the growth and development of the Nigerian economy since the discovery of oil in 1956.

The relationship between energy consumption and economic growth can be causal (uni-directional or bi-directional) or no causal relationship at all as proposed by some researchers, thus supporting neutrality hypothesis. Uni-directional causality can run from energy consumption to economic growth and vice versa. If causality runs from energy consumption to economic growth, it means that reduction in energy consumption could lead to a decrease in economic growth which could result in unemployment, low income, poor standard of living while if it runs from economic growth to energy consumption, it implies that policies for reducing energy consumption should be implemented with little or no adverse effect on economic growth. Bi-directional causality implies that either economic growth or energy consumption can be used as policy instrument to stimulate one another (Akinwale et al 2013).

2. LITERATURE REVIEW

Consumption function is a single mathematical function used to express consumer spending. It was developed by John Maynard Keynes in his book "The General Theory of Employment, Interest and Money". The consumption function or propensity to consume refers to income-consumption relationship. It is the functional relationship between the two aggregate: Total consumption and Gross national income.

C= f(Y) Where: C= consumption, Y=income and f= functional relationship

The absolute income hypothesis, only bases consumption on current income and ignores potential future income (or lack of) (Jhingan, 2010).

The consumption function can be expressed as

$$C_t = f(V_t) \quad \text{---------- 1}$$

Where V_t = total resources at time t

And $$V_t = f(Y_t + Y^e_{Lt} + A_t) \quad \text{---------- 2}$$

By substituting equation 2 and 1 and making 2 linear and weighted average of different income groups, the aggregate consumption function is

$$C_t = \alpha_1 Y_t + \alpha_2 Y^e_L + \alpha_3 A_1$$

Where, α_1=MPC of current income

α_2=MPC of expected labour income

α_3 =MPC of assets or wealth.

APC is constant in the long run because a portion of labour income in current income and the ratio of total assets to income are constant when the economy grows.

This paper is based on endogenous growth model, Endogenous growth economists believed that improvements in productivity can be linked directly to a faster pace of innovation and extra investment in human capital. They stress the need for government and private sector institutions which successfully nurture innovation, and provide the right incentives for individuals and businesses to be inventive. The theory suggests that investment on education or research and development of a firm has not only a positive effect on the firm itself but also spillover effects on other firms and the economy as a whole. It also suggests a convergence of growth rates per capita of developing countries. Romar states that production function of a firm is in the following form:

$$Y = A(R)\ f(Ri, Ki, Li)$$

Where:

A – public stock of knowledge from research and development (R)

Ri – Stock of results from the stock of expenditure on research and development.

Ki – Capital stock of firm i

Li – Labour stock of firm i

He takes investment in research technology as endogenous factor in terms of the acquisition of new knowledge by rational profit maximization firms. From the forgoing, we can derive the aggregate production function of the endogenous theory as follow:

$$Y=f\ (A, K, L)$$

Where: Y = aggregate real output, K = stock of capital, L = stock of labour, A = Technology (or technological advancement)

It is worthy of note that A (technological advancement) is based on the investment on research technology. Technology is seen as an endogenous factor which could be related to energy.

2.1 Empirical Review

According to Omotor (2008), findings revealed a bidirectional relationship between energy consumption and economic growth by disaggregating energy use into coal, electricity, and domestic oil consumption using the Hsiao's granger causality test. It suggest that energy conservation policy will inhibit economic growth in Nigeria and as such energy growth policies particularly electricity, coal and oil should be adopted and enhanced to amplify economic growth of Nigeria.

Haruna & Saifullahi (2012), also revealed that petroleum, coal and electricity consumption leads to economic growth without feedback but a bidirectional relationship exist between gas consumption and economic growth. Their study made use of both the aggregated and the disaggregated data of energy consumption: including coal, petroleum, gas and electricity. They employed the Augmented Dickey Fuller unit root test and Johansen integration test allowing for granger causality test. The implication of their findings is that energy conservation policy will retard the economic growth. Energy act as an engine for growth in the country ,thus not supporting neutrality hypothesis of energy consumption and economic growth in Nigeria.They concluded that government should find possible ways of redressing low energy consumption prevailing in Nigeria so that the sector could play its role of enhancing economic performance.

Huang et al. (2007) used a panel data and found in the low income group, there exists no causal relationship between energy consumption and economic growth; in the middle income groups, economic growth leads energy consumption positively; and in the high income group countries, economic growth leads energy consumption negatively due to great environmental improvement impacts.

Akinlo (2008) also employed the bounds cointegration test to examine the long-run relationship between energy consumption and economic growth in 11 Sub-Saharan African countries: Cameroon, Cote d'Ivoire, Congo, Gambia, Ghana, Kenya, Nigeria, Senegal, Sudan, Togo, and Zimbabwe. The author employed a multivariate framework which included energy consumption, GDP, government expenditure, and the consumer price index. The co-integration tests supported cointegration in 7 countries (Cameroon, Cote d' Ivoire, Gambia, Ghana, Senegal, Sudan and Zimbabwe. The granger causality tests showed that economic growth causes energy in countries (Sudan and Zimbabwe). Bi-directional causality was found for 3 countries (Gambia, Ghana and Senegal). For 5 countries (Cameroon, Cote d' Ivoire, Nigeria, Kenya and Togo) no causality was found.

Hondroyiannis et al (2002) study the relationship between energy consumption, GDP and the Consumer Price Index (CPI) for Greece. They consider annual data over the period 1960-1996. They provide evidence to support a long-term bi-directional causality between energy consumption (total and industry) and GDP, while there is no causal relationship between residential use of energy and GDP. This means that demand for residential energy is exogenous and merely neutral to the level of economic growth.

Jhingan (2007) states that the need to identify causal direction between energy consumption and income growth in developing countries is overwhelming because apart from providing further insights into the role of energy in economic development, it provides policy analysts with a clearer understanding of the likely impact of energy supply constraints on economic growth. Esso (2010) investigates the long-run and the causality relationship between energy consumption and economic growth for seven Sub-Saharan African countries during the period 1970–2007. Using the Gregory and Hansen testing approach to threshold co-integration, the study indicate that energy consumption is co-integrated with economic growth in Cameroon, Cote d'Ivoire, Ghana, Nigeria and South Africa. The test suggests that economic growth has a significant positive long-run impact on energy consumption in these countries before 1988; and this effect becomes negative after 1988 in Ghana and South Africa. Furthermore, causality tests suggest bi-directional causality between energy consumption and real GDP in Cote d'Ivoire and unidirectional causality running from real GDP to energy usage in the case of Congo and Ghana.

The investigation of the relationship between the consumption of crude oil, electricity and coal in the Nigerian economy (1970 to 2005) was conducted by Odularu and Okonkwo (2009). Their result obtained after applying the co-integration technique, showed that there exists a positive relationship between period energy consumption and economic growth. However, with the exception of coal, the lagged values of these energy components were negatively related to economic growth. Using a vector error correction based Granger causality test, the examination of the relationship between energy consumption and economic growth in Nigeria (1970 - 2005), Orhewere and Machame (2011) as cited in Adegbemi (2013) reports a unidirectional causality from electricity consumption to GDP both in the short-run and long-run. Unidirectional causality from gas consumption to GDP in the short-run and bi-directional causality between the variable in the long-run was also reported. A unidirectional causality from oil consumption to GDP is found in the long-run. However, in the short run, no causality was found in either direction between oil consumption and GDP. Phung (2011) found positive unidirectional causality running from GDP to energy consumption in Vietnam. For this purpose, policies such as the reduction in greenhouse emissions designed to reduce energy consumption and waste may not adversely affect real GDP.

3. METHODOLOGY

The data for empirical analysis of this study is exclusively secondary data .The secondary data from statistical reports were obtained for the study from the Central Bank of Nigeria statistical bulletin 2012(CBN), Central Bank of Nigeria annual reports, Journals, Economic textbooks, online articles and journals, World Development Indicator 2012 etc. The data are annual observations on economic growth (per capital GDP), energy consumption in Nigeria, secondary school enrolment for human capital formation and Gross Fixed capital formation for capital. Unit root test was carried out with the use of Augmented Dickey Fuller and Philip Perron tests. Johansen co-integration test was done to verify the long run causality among the variables

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3.1 Model Specification

Vector Error Correction (VEC) model was employed to detect the direction of the causality. The Vector Error Correction model is written as:

$$\Delta percapitalGDP_t = C_o + \sum_{i=1}^{k} \beta_i \Delta percapitalGDP_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta ENC_{t-1} + \sum_{i=1}^{k} \delta_i \Delta INV_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta SSE_{t-1} + \rho_i ECT_{t-1} + \mu_t$$

$$\Delta ENC_t = C_o + \sum_{i=1}^{k} \gamma_i \Delta ENC_{t-1} + \sum_{i=1}^{k} \zeta_i \Delta percapitalGDP_{t-1} + \sum_{i=1}^{k} \theta_i \Delta INV_{t-1} + \sum_{i=1}^{k} \phi_i \Delta SSE\eta_i + ECT_{t-1} + \varepsilon_t$$

where Δ is the difference operator;

k is the numbers of lags,

$\alpha, \zeta, \theta, \phi, \gamma_i$ are parameters to be estimated,

ENC_{t-1} represents the error terms derived from the long-run cointegration relationship

per capita GDP= $\alpha + \beta$ $ENC_t + \varepsilon_t$, and ε_t and μ_t the serially uncorrelated error terms.

ENC is energy consumption

INV=investment

SSE=secondary school enrolment.

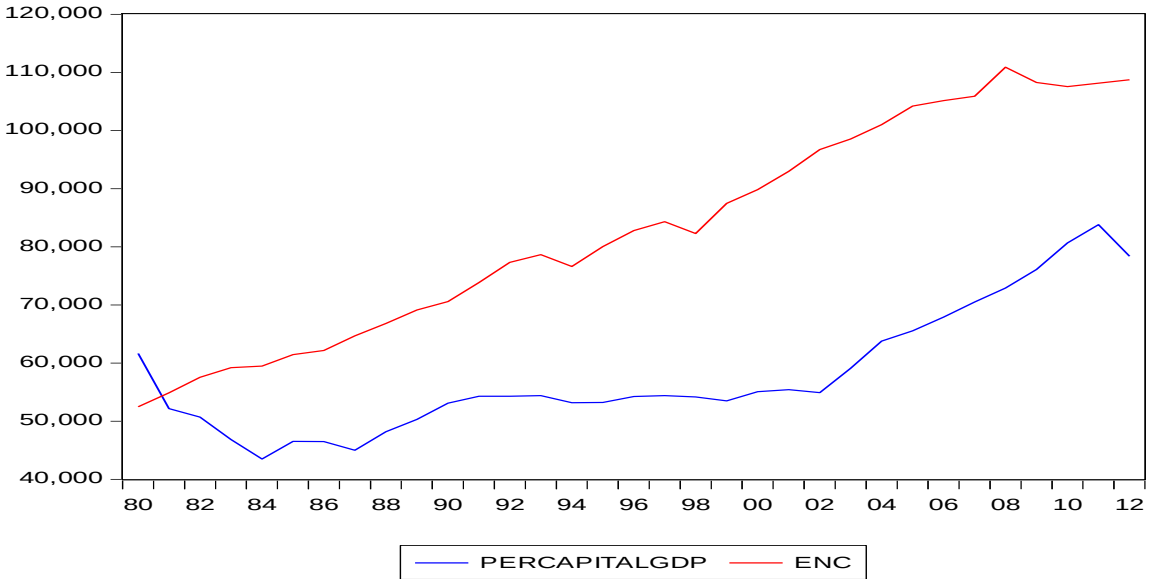
3.2. Data

The period 1980 to 1984 witnessed a decline in per capita GDP, it declined from N61, 644.30 in 1980 to N43, 470.60 in 1984 while energy consumption witnessed an increase N52,495.9 in 1980 to N59,479.80 in 1984,an average annual growth rate increase of 2.52%.In 1985 per capita GDP increased by N3031.3 as compared with 1984 and fell by N37.7 in 1986 and in 1987 a decline of 3.2% when compared to the previous year. It rose continuously until 1994 when it fell to N53,158.20 as compared with N54,381.00 of the previous year.

On the other hand, energy consumption has been on the increase since 1980 till 1993 with an average annual growth rate of 2.95% but declined by N2057.7 in 1994 and was on the increase again till 1997.Energy consumption and per capita GDP decreased in 1998 by N1509 and N252.8 respectively and later increased with an average annual growth rate of 1.95% and 3.25% respectively between 1999 and 2009.Energy consumption grew continuously till 2012 with a figure of N108701.66 while per capital GDP grew till 2011 and declined by N5,450.87 to give N78351.

4. ANALYSIS AND DISCUSSION OF FINDINGS

Graphical Representation of Energy Consumption and per Capita GDP in Nigeria (1980-2012)



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4.1 Unit Root Test

Table 4.1: Results of Unit Root Tests

VARIABLES	LEVEL		1ST DIFFERENCE		5% critical values	
	ADF	DF-GLS	ADF	DF-GLS	ADF	DF-GLS
LNPCGDP	0.13	-0.87	-3.78*	-0.709*	-2.96	-1.95
LNENC	-2.22	0.26	-5.51*	-5.17*	-2.96	-1.95
INV	-1.08	-1.20	-5.03*	-4.28*	-2.96	-1.95
SSE	-1.84	-0.72	-6.01*	-5.50*	-2.96	-1.95

Source: Author's Computation using E-views 7.0, 2013

The results of the unit root tests as summarized in Table 4.2 shows that all the variables can be treated as non – stationary at levels but stationary at first difference. This can be seen by comparing the observed values (in absolute terms) of both the ADF and DF-GLS test statistics with the critical values (also in absolute terms) of the test statistics at the 1%, 5% and 10% level of significance. But that all the variables were stationary at first difference. We therefore conclude that the variables are stationary and integrated of order one .i.e. I (1) .Thus co-integration tests can be applied for all variables.

4.2 Co-integration Test

Johansen co-integration tests were applied for all the variables since the variables are integrated of order one. To investigate whether or not per capita GDP, energy consumption, human capital and investment share common trend in the long run, we consider both the trace statistic and Maximum Eigen Value Statistic test. The result is as shown below;

TABLE 4.2: Johansen Test Result

Series	Null hypothesis	Trace statistics	5% critical value	Max Eigen value statistics	5% critical value
percapitaGDP, ENC, INV AND SSE	r = 0*	69.03	47.85	38.76	27.58
	r ≤ 1*	30.27	29.79	22.61	21.13
	r ≤ 2	7.65	15.49	4.15	14.26
	r ≤ 3	3.499	3.84	3.39	14.26460

Source: Authors' computation using E-views 7.0 (2014)

From the above, there is a stable long-run equilibrium relationship between per capita GDP, energy consumption, investment and human capital in the estimated model. Both the trace test and the maximum eigenvalue test statistics reject the null hypothesis of no co-integration at 0.05% level of significance in the estimated model. The trace test and the max-eigenvalue test indicates two (2) cointegrating equation respectively. We reject the null hypothesis and accept the alternative hypothesis of a presence of a stable long run equilibrium relationship between the variables.
The optimal lag length was identified using Schwartz information criteria and the optimal lag length selected was one as shown on the table below;

Table 4.3: Lag Length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-393.2340	NA	3726049.	26.48227	26.66909	26.54204
1	-284.0543	181.9662	7565.361	20.27029	21.20442*	20.56912*
2	-264.6255	27.20040*	6414.692*	20.04170*	21.72313	20.57960

The co-integrating equation is normalized to give the long run equation and which is reported below.

LNPCGDP = 8.064041 + 0.270LNENC + 0.00000992INV – 0.006SSE

SE	(0.10449)	(0.0000076)	(0.00409)
t stat	[-2.58643]	[1.50572]	[-5.79723]

The normalizing co integrating equation reveals that Energy consumption and investment is positive while human capital negatively affects per capita GDP in the long-run. Energy consumption has a coefficient of 0.270, which implies that a unit increase in energy consumption will lead to 0.27% increase in per capita GDP as a result of the positive relationship revealed in the model. The model shows a negative relationship between human capital and economic growth.
We have found that the chosen time series are co-integrated and there exist long run relationship that indicates there must be Granger causality in at least one direction, but it does not indicate the direction of temporal causality among the variables.

4.3 Vector Error Correction Model

Table 4.4: Short run dynamics with per capita GDP as dependent variable

D(LNPCGDP) Dependent variable	
Constant	0.008746 (0.01054) [0.82953]
D(LNPCGDP(-1)	0.208987 (0.18256) [1.14478]
D(LNENC(-1)	0.134931 (0.32622) [0.41362]
D(INV(-1)	5.54E-07 (4.1E-07) [1.33644]
ECM(-1)	-0.045718 (0.06202) [-0.73711]

( ) denotes standard error
[ ] denotes t statistics

Table 4.5: Short run dynamics with energy consumption as dependent variable

D(LNENC) Dependent variable	
Constant	0.025320 (0.00619) [4.09324
D(LNPCGDP(-1)	-0.073357 (0.10711) [-0.68488]
D(LNENC(-1)	-0.166718 (0.19140) [-0.87104]
D(INV(-1)	-4.39E-07 (2.4E-07) [-1.80412]
D(SSE(-1)	-0.000296 (0.00138) [-0.21467]
ECM(-1)	-0.079573 (0.03639) [-2.18666]

( ) denotes standard error
[ ] denotes t statistics

Tables 4.4 shows, the coefficient of the vector error correction term in change in per capita GDP equation was -0.045718 but it is not statistically significant. This implies that energy consumption does not granger cause economic growth in the long run. However, the coefficient of the vector error correction term in change in energy consumption equation was -0.079573 and statistically significant. This implies that economic growth granger causes energy consumption in the long run. The implication of these findings is that causal relationship runs from economic growth to energy consumption and not from energy consumption to economic growth. For the short run causal relationship the result shows that, there is no causal relationship running from per capita GDP to energy consumption, investment and human capital and vice- versa because their probabilities are not less than 10% except investment which granger causes energy consumption in the short run.

The findings of this study is in line with that of Akinwale et al (2013) who found a long run relationship and a unidirectional causal relationship without a feedback effect running from economic growth to electricity consumption in Nigeria. It is also similar to the work of Kraft and Kraft in USA,Wolde-Rufael for Nigeria; Abaidoo for Ghana, Najid et al for Pakistan among others. While some other studies such as the work of Yusuf &Nasiru (2012) who examined the causal relationship between economic growth and energy consumption in Nigeria by employing the granger causality test for 1980-2010 suggested a unidirectional causality running from energy consumption to economic growth revealing that energy conservation policies will have a negative impact on economic growth, some work such as that of Omotor (2008) revealed a bidirectional relationship between energy consumption and economic growth by disaggregating energy use into coal, electricity, and domestic oil consumption using the Hsiao's granger causality test thus suggesting that energy conservation policy will inhibit economic growth in Nigeria and as such energy growth policies particularly electricity, coal and oil should be adopted and enhanced to amplify economic growth of Nigeria.

This study found a unidirectional causality running from economic growth to energy consumption thus implying that the past values of economic growth is useful to forecast the value of energy consumption in Nigeria, whereas the past values of energy consumption are not useful in forecasting the value of economic growth and as the Nigerian economy grows the consumption of energy also increases. Economic development enhances energy sector development because it involves a transition from less efficient energy sources such as commercial fossil fuels to more efficient sources such as electricity.

5. CONCLUSION, IMPLICATION OF STUDY AND RECOMMENDATIONS

This study examined the relationship between energy consumption and economic growth in Nigeria for the period spanning 1980 to 2012. Given the result of the unit root test and the Johansen's co-integration test, it was revealed that the variables are co-integrated. Consequent to the co-integration result, the model was analyzed using the Vector Error Correction Method of analysis. Based on the analysis, a positive long run regression estimate was revealed by Johansen co integration test but was not reinforced by the VECM .Energy consumption and economic growth do not have a long run relationship from the VECM result. In addition, the short run dynamics revealed no causal relationship between energy consumption and economic growth in Nigeria but a unidirectional causality running from economic growth to energy consumption in the long run.

Therefore, it can be inferred that economic growth has a positive relationship with Energy consumption and also energy consumption does not affect the standard of living of Nigerian citizens. Thus, energy consumption does not predict economic growth.

This study provides some recommendations which could assist the government in policy formulation and implementation. The causality running from economic growth to energy consumption reveals that the level of energy consumption in Nigeria in the past couldn't cause economic growth. Thus, the present growth in the Nigerian economy does not exclusively rely on the level of energy consumption. So, conservation policy through efficient and proper management of new energy technologies in all sectors of the economy might not affect economic growth. This means that continuous growth of the economic activities in the country will invariably improve the level of energy consumption. Although the government is in the right direction of deregulating the energy sector (electricity) so as to allow private sectors to run it in a competitive manner, there is need for the government to also invest in; research and development and capacity building in the area of renewable energy technologies.

It is also recommended that the government should provide policies which will create an enabling environment for the private sector to generate electricity from renewable sources. These policies might be in terms of fiscal incentives such as tax rebate, subsidies, and lower import duties for the imported equipment among others. This will reduce the extent of carbon emissions and energy poverty. A sound, robust technological and implementable energy policy that will be able to

solve the challenges of the electricity sector should be formulated and implemented in order to make the sector to start having more impact on the economy and also policies guiding against oil spillage, deforestation to make life a better place.

Energy conservation policy is necessary to adopt if this causality is running from GDP to energy consumption. But policy should be designed in a way that energy conservation measures do not adversely affect the economic growth.

REFERENCES

[1] Adegbemi, B., Adegbemi, O., Olalekan A. & Babtunde, O. (2013). Energy Consumption and Nigerian Economic Growth: An Empirical Analysis. European Scientific Journal (9) 4, 25-40.

[2] Akinlo, A.E. (2008). Energy Consumption and Economic Growth: Evidence from 11 Sub-Sahara African Countries, Energy Economics, 30, 2391-2400.

[3] Akinwale Y., Jesuleye O. and Siyanbola W.(2013) Empirical Analysis of the Causal Relationship Between Electricity Consumption and Economic Growth in Nigeria, British Journal of Economics, Management & Trade, 3(3): 277-295, 2013

[4] Auty, R. M. (1993). Sustaining Development in Mineral Economies: The Resource Curse Thesis. London: Routledge.

[5] Toman, Michael & Jemelkova, Barbora (2003), Energy and Economic Development: An Assessment of the State of Knowledge, April, 2003. Discussion paper 03-13.

[6] Esso, Loesse,J. (2010). Threshold cointegration and Causality Relationship between Energy Use and growth in seven African countries. Energy Economics, Elsevier, 32(6), 1383-1391.

[7] Haruna & Saifullahi (2010),The Relationship between Energy Consumption and Economic Growth in Nigeria: A Causality Analysis, International Journal Of Marketing and Technology, (3)2.

[8] Hondroyiannis, G., Lolos, S., Papapetrou, E., (2002.) Energy consumption and economic growth: assessing the evidence from Greece.

[9] Huang B, Hwang MJ, Yang CW (2007). Causal Relationship between Energy Consumption and GDP Growth Revisited: A Dynamic Panel Data Approach. Ecol. Econ. 64:41-54.

[10] Jaruwan C, Lester CH, Richard P (2006). Casuality between Energy Consumption and GDP: Evidence from 30 OECD and 78 Non - OECD Countries. Surrey Energy Economics Discussion Paper (SEEDS) No.113.

[11] Jhingan (2010),Macro economic theory ,Vrinda publications ltd,12th Ed.India,105-118.

[12] Jhingan, M. L. (2007) Economies of Development and Planning, Viranda Publication, 36th Ed. India. 65-80.

[13] Mulugeta S. K., Chali N. & Peter V. S. (2010). Energy Consumption and Economic Growth: Evidence from COMESA Countries, Research Paper, 2010-1.

[14] NajidA,MuhammadF,Naqvi H & Muhammad L (2012),Energy consumption and economic growth :Evidence from Pakistan ,Australian journal of business and management research (6) 2, 9-14.

[15] Odularu, G. O. & Okonkwo C. (2009). Does energy Consumption contribute to economic performance? Empirical evidence from Nigeria, Journal of Economics and International Finance (1) (2), 044-058.

[16] Omotor, D.G., (2008), ―Causality between Energy Consumption and Economic Growth in Nigeria, Pakistan Journal of Social Sciences, 5 (8), 827-835.

[17] Orhewere, Bright & Machame Henry (2011). Energy Consumption and Economic Growth in Nigeria, JORIND (9) 1, 153-165.

[18] Phung, T.B. (2011). Energy Consumption and Economic Growth in Vietnam: Threshold Cointegration and Causality Analysis, International Journal of Energy Economics and Policy (1), (1), 1-17.

[19] Valeria & Chiara (2009),The causality between energy consumption and economic growth: A Multi-Sectoral analysis using non-stationary cointegrated panel data.

[20] Yusuf &Nasiru(2012),A granger-causality examination of the relationship between energy consumption & economic growth in Nigeria, Journal of Economics, Commerce and Research, 2(2).