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ELECTRICITY AND ECONOMIC GROWTH IN NIGERIA

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ABSTRACT

This paper empirically studied electricity and economic growth in Nigeria from 1971-2018. Having the dependent variable as GDP, and independent variables are electricity consumption, electricity generation, and electricity transmission and distribution losses. Data analyzed were collected from World Bank, the study found that electricity consumption conforms to economic theory, meaning there is a positive relationship between electricity consumption and economic growth. Electricity generation also have a negative relationship with economic growth, while electricity distribution and losses have a negative relationship with economic growth in Nigeria during the period reviewed. Based on the findings, this study recommends amongst others that government should ensure that energy generated in the country stays in the country and that electricity generation should be backed up with optimal production and utilization. There should be budgetary allocation into research and development in this sector so that innovation can be fostered.

Keywords: Electricity consumption, Economic growth, Distribution losses, Power generation.

INTRODUCTION

Nigeria has experienced problems in the area of power generation, transmission and distribution. The extent of this is underlined by the fact that Nigeria is the largest purchaser of standby electricity generating plants in the world (Braimoh & Okedeyi, 2010).

Access to modern energy is assigned to be a precondition for poverty alleviation, sustainable development and the attainment of millennium development targets. According to Sulan (2006) energy is the indispensable force driving all economic activities. Ekpo (2013) stressed that the positive multiplier effect of

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constant power supply cannot be over emphasized. A meaningful economic growth takes place in an economy when adequate supply and demand for energy is present. One of the most desired power is direction is electricity. Hence an impressive performance of Gross Domestic Product (GDP) is driven by the effective supply and consumption of electricity. As a key component of national sector, energy electricity is a major source of advancement and improvement in the standard of living of the people by stimulating other sectors like health, education, agriculture, commerce, transportation and industries. Some of the electricity generation stations were built in the 1970's and are still being operated without major revalidation (Oyedepo, 2012). Also, until very recently; electricity generation, production and distribution has been an exclusive preserve of the poorly managed government monopoly under National Electric Power Authority (NEPA) and later Power Holdings Company Nigeria (PHCN).

The inefficiency as well as inadequate facilities to boost electricity supply in the face of increasing population new and electronic based technologies, vast geographical landscape and an increasing business environment all combines to create electricity supply problems, While the demand for electricity is on the increase, supply tends to be falling. It is significant to note that any shock in the energy sector affects the level of productivity, profitability, income and employment opportunity and this is inadvertently link with national security, citizen safety, social order and health of the people who live in Nigeria (Unduma, 2009). The poor or near absence of physical infrastructure was also identified as a major problem.

LITERATURE REVIEW

This study concentrates its focus on the determinants of electricity supply in a developing economy as Nigeria. Focus on impacts of electricity supply is however borne out of the imperative of electric energy as a vital source of economic growth of a country.

Jonah et al. (2013) investigates the impact of electric energy supply on economic growth of Nigeria between 1970 and 2010. Data for the study were obtained from the reports and bulletins of Central Bank or Nigeria. The study adopted multiple regression analysis and modern econometric methodology. The result from the study showed that electricity supply in Nigeria does not significantly impact on industrial productivity and economic growth of the country. However, the ADF tests result indicated that all the variables for the study were stationary at first equilibrium line point of -0.945. This result depicts the poor state of electricity supply in the country because economic expectations are that electricity supply should contribute positively and significantly to economic growth.

In line with Jonah at al. (2013), Olayemi (2012) evaluated the impact of electricity crisis on manufacturing productivity growth in Nigeria. Time series data from 1980 to 2008 were analyzed using OLS multiple regression. The study's result showed that electricity generation and supply in Nigeria impact negatively on manufacturing productivity growth. This was attributed to necessary government spending on non-economic and unproductive sectors. They advised that electricity generation and distribution should be restructured through the initiative of independent power projects.

Contrary views on the strength of contribution of electricity supply in Nigerian were given in Ubi & Effiong (2013). They studied the relationship between electricity supply and economic growth in the country. Time series data for the study were analyzed using modern econometric technique. The result indicated that despite poor state of electricity supply in the country, it influences economic developments although its impact is relatively very low. Based on this, they recommend among other that more power project should be completed. i.e more electricity generation effort should be made.

Similar study in African Eggoh (2018) in his study of energy consumption and economic growth revisited in Africa countries with 21 African countries as the scope of study covering the period 1970 to 2006. Using the bound analysis points out that there is a long-run equilibrium relationship between GDP and energy consumption. It was pounding that decreasing energy consumption decrease growth and vice versa.

Having empirically reviewed the related work, it is worthwhile to point out that the studies so far provide mixed and conflicting evidence with respect to energy consumption and economic growth. This divergent can be attributed to different factor i.e variable, choices, estimation techniques, time frame with quantity and quality of data used and developmental stage of different economics. It is also relevant to observe that the majority of the past work is of analysis of energy (electricity) on economic growth neglected the conventional or prime determine of economic growth in the estimation model there by leading to the bias result due to the omission of variables.

The research work performed an extensive review of literature consisting of prior studies on electricity classifying it in three broader heads namely; Electricity consumption, Electricity generation, electricity distribution losses.

The work however embodies the combined significance of three independent variables; electricity consumption, generation and distribution losses and how it affects economic growth from 1971 to 2018 in extension.

RESEARCH METHOD

In the model, the independent variable is GDP representing Economic Growth, While the Independent variables are Electricity Consumption, Electricity eneration and Electricity Distribution losses.

The functional form of the model is specified below as:

GDP = f (EC, EG, ED) …… (1)

where: GDP – Gross Domestic Product representing Economic Growth, EC – Electricity Consumption

EG – Electricity Generation, ED– Electricity power transmission and Distribution losses

Mathematical form of the model is specified as

$GDP=B_0 + B_1EC + B_2EG + B_3ED$……. (2)

Econometric Relationship

$GDP_t= B_0 + B1EC_{t-i} + B2EG_{t-i} + B3ED_{t-i}+ B4GDP_{t-i}+A1EC_{t-1}+ A2EG_{t-1}+ A3ED_{t-1}+ A4RGDP_{t-1}+ U_t$…… (10)

where B_0=intercept, B_1, B_2, B_3, B_4= Parameters for short-run dynamics.

The method of data analysis used for this project work is the long run autoregressive distributive lag model.

DATA PRESENTATION

Unit root test (Table 1)

Table 1. Properties of Time Series.

Variables	Intercept (a)	Trend (b)	Decision
GDP	1.545 (0.46)	0.10 (0.21)	No intercept and trend
EC	36.54* (0.00)	2.46* (0.00)	Intercept and Trend
EG	39.91* (0.00)	0.9833* (0.00)	Intercept and Trend
ED	27.93* (0.00)	-0.0702 (0.59)	Intercept Only

*Source: Author's computation using Eviews 9 (NB: *shows significance at 5% level)*

From the result presented, it was found that all the time series are trended. The unit root at level result is summarized in the first panel (i.e. level panel) of table. From the unit root result, we observed that the absolute ADF test statistics for three out of the time series are insignificant 5% level of significance. This implies that not all the time series have unit root at level, hence, the need to difference the time series that were not stationary at levels and conduct the test again. From the result presented in the second panel (i.e. first difference panel) of table, it was observed that absolute ADF test statistics for three series were significant 5% level of significance. This implies that not all the time series have unit root at level. Hence the time series exhibited a mix of order of integration **(Table 2)**.

Table 2. ADF test results for Time Series.

LEVEL				
	ADF Test Statistics	**5% Test Critical Values**	**Decision**	**Order of Integration**
GDP	-4.961*	-1.948	Stationary	I (0)
EC	-2.81	-3.51	Not Stationary	I (0)
ED	-2.66	-2.92	Not Stationary	I (0)
EG	-2.65	-3.51	Not Stationary	I (0)
FIRST DIFFERENCE				
	ADF Test Statistics	5% Test Critical Values	Decision	Order of Integration
EC	-8.41*	-3.51	Stationary	I (1)

ED	-6.207*	-2.931	Stationary	I (1)
EG	-8.53*	-3.51	Stationary	I (1)

Source: Author's computation
*NB: Statistics are in absolute terms and * shows significant at 5% level*

Cointegration test (Table 3)

Table 3. ARDL bounds test result for the model.

Computed F-statistic	5% Lower Critical Value Bound [I (0)]	5% Upper Critical Value Bound [I (1)]
10.77	3.23	4.35

Source: Author's Computation using Eviews 9

The most appropriate cointegration test for series that are of different order of integration is the one proposed by Pesaran, Shin & Smith (2001) defined as bounds cointegration test. Since the calculated F-statistic is greater than the 5% critical value bounds for the upper bound I (1) (i.e. 10.77>4.35), then we can conclude that there is cointegration; there is a long-run relationship between the time series. The study therefore proceeded to estimate the both ARDL long-run and short-run dynamics.

Model estimation

The order of lag in the ARDL process for the model is automatically decided based on Schwarz criterion (SC) and the short and long run behaviours of the explanatory variables are reported respectively in the upper and lower panels (Panels A and B) of **Table 4.**

Table 4. ARDL Result.

Panel A: Short Run Dynamics		
Variable	Coefficient	Probability
D(EG)	-0.301	0.0483
D(ED)	0.0506	0.7402
D (ED (-1))	0.2515	0.0920
D (ED (-2))	-0.013	0.924
D (ED (-3))	-0.353	0.011
D(EC)	0.167	0.0181
CointEq (-1)	-1.0877	0.000
Panel B: Long Run		
Variable	Coefficient	Probability
EG	-0.276	0.037
ED	0.189	0.0920
EC	0.1535	0.0110
C	1.433294	0.8075

Source: Authors computation using Eviews 9

From the short run analysis of ARDL it is seen that electricity generation has a negative and significant impact on GDP. Electricity power transmission and

distribution losses is insignificant with GDP in the current year and also insignificant in the previous and last two years but it was significant in the last three years but it has a negative relationship with GDP. Electricity consumption has a positive and significant relationship with GDP.

In the long-run electricity generation has a negative and significant impact on GDP. Electricity power transmission and distribution losses have a positive but insignificant impact on GDP in the long run. Electricity consumption has a positive and significant impact on GDP.

Post estimation test (Table 5)

Table 5. Post-estimation tests model.

Test	F-value	Prob.	Decision
Autocorrelation	-	>0.10	No problem of Autocorrelation
Serial Correlation	0.42	0.65	Residual not Serially Correlated
Heteroscedastricity	0.603	0.768	Homoscedasticity Confirmed
Ramsey reset test	0.11	0.73	Model well specified

Source: Author's Computation using Eviews

CONCLUSION AND RECOMMENDATION

In the light of the above, we found out that electricity generation has a negative and significant effect on economic growth both in the short run and long-run, which means a unit increase in electricity generation would bring about a unit decrease on economic growth; which do not conform with *a prirori* expectation.in this part of the world, there is no enough electricity generated to meet the need of the teeming generation-electricity generated faces fluctuations (mostly downward). This has forced residents, especially industries to seek for alternative sources of generating electricity; generators, plants, inverters, solar energy, etc. Electricity consumption shows that a unit change on electricity consumption would bring about a unit increase on economic growth. The regression analysis further shows that an electricity power transmission and distribution loss is insignificant to economic growth. As a result of the findings, this study recommends that the government should ensure that energy generated in the country is improved and that electricity generation should be on a sustainable increasing trend backed up with optimal production and utilization such that there is sustainable and continuous increase in output and utility in the household and business levels, hence, increased consumption.

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