IAA JOURNAL OF SOCIAL SCIENCES (IAA-JSS) 2(1):1-12, 2016. ISSN: 2636-7289


# The impacts of investment in electricity generation on economic growth in Nigeria.

Nicholas Attamah
Department of Economics Enugu State University of Science and Technology (ESUT) Enugu, Nigeria.
Email: numanick@esut.edu.ng

ABSTRACT

Electricity supply is a prerequisite for a nation to move from a third world country to a developed country; for a developing country like Nigeria, the greater the stability of electricity supply, the better its chances to become more developed (Ubi and Effiom, 2013). With adequate utilization of electric power supply, there will be higher potentials for Nigeria to meet the demand for industrial development. The result also shows that our variable of focus, Electricity Expenditure (EEXP) does not meet *a priori* criteria, since it is negative. The same goes with Labour Force (LF). The coefficient for Capital Stock meets a priori expectations, since it is positive. On the basis of individual contribution of the variables, it is observed that 1% increase in Capital Stock leads to a 0.00007% increase in economic growth. The nation would experience high levels of economic activities through industrialization and high rate of capacity utilization. Electricity efficiency is the indispensable component of any effort to improve productivity and of course, contributes to economic wealth. This implies that one billion-naira increase in electricity expenditure leads to 0.1 decline in economic growth. This is an indication that the energy policy required to generate growth in the country needs to be fine-tuned, adequate structure, strengthened and funded.
Keywords: Investment, electricity, economic growth, Nigeria.

## INTRODUCTION

Majority of Nigerians are dependent on fossil fuel and fuel wood (firewood) [1, 2, 3]. The over dependence on fossils and fuel wood (used mainly by poor rural dwellers) have not yielded enough capacity to meet increasing demands for energy in the real sectors such as the manufacturing, industrial sector, mining and quarrying, etc, which relies much on electricity for efficiency to be recorded [4, 5, 6]. It should be noted that one of the pre-requisites of real sector development is adequate supply of electricity [7, 8, 9]. The electricity crisis is represented by such indicators as electricity blackouts, transformer explosions and persistence reliance on self-generating electricity. Indeed, as noted by [10] Nigeria is running a 'generator economy' with its adverse effect on cost of production. Thus, poor electricity could undermine the performance of the industrial sector in Nigeria. According to the report submitted by [11], in the 1970s, the installed capacity of electricity generation in megawatts averaged 1,097.79, while the average capacity utilization was 35.58 percent; installed capacity improved marginally to about 3,318.83 and only an average of 33.43 percent was actually utilized in 1980s. The period from 1990 to 2003, saw average installed electricity generating capacity of about 6000MW, whereas the utilization rate was on the average below 40 per cent. In the 2012, installed electricity generation capacity was 7,011MW, while actual utilization rate was 37.4 per cent [12]. The large gap between installed and actual operational capacity indicates that the level of technical inefficiency in the electricity sector is relatively high. This is attributed to the weakened industrial sector in Nigeria [13]. Nigeria's persistent electricity crises have weakened the industrialization process, resulting to production stoppages, shutdown and high operational cost, and significantly undermined the efforts of government of Nigeria to achieve sustained economic growth and development [14]. The pre-requisite of manufacturing productivity is adequate supply of electricity which is mainly utilized for driving machines for the production of various items [15]. Manufacturing sector is one which comprises agglomeration of industries engaged in chemical, mechanical, or physical transformation of materials, substances, or components into consumer or industrial goods [16]. This sector needs deliberate and sustained application and combination of an appropriate technology, infrastructure, managerial expertise, and other important resources to produce manufacturing goods (semi-finished or finished goods), the technology and infrastructure needed cannot be achieved without stable power supply of which electricity takes a prominent role. In the light of the foregoing, this study examines the impact of investments in human capital and electricity on economic growth in Nigerian [17].

## Statement of the Problem

Nigeria is a developing economy whose Gross Domestic Product (GDP) has been growing over the past decades except for recently in 2016 when the economy slipped into recession apart from early 1980s. However, this increasing GDP has not been translated into improvement in the quality of lives of its citizens. It cannot be overemphasized that regular power supply is the prime mover of economic, technological and social development. There is hardly any enterprise or indeed any aspect of human development that does not require electricity in one form or the other - electric power, fuels, etc. Nigeria is richly endowed with various electricity sources, crude oil, natural gas, coal, hydropower, wind, solar electricity, fissionable materials for nuclear electricity, yet the country consistently suffers from electricity shortage - a major impediment to industrial and technological growth. Inadequate power supply has been the major reason cited by many of the multinationals (Michelin, Dunlop Plc, Volkswagen Plc, PZ, Unilever) that either closed down or wound up their operations in Nigeria which further worsened level of unemployment and negatively impacted economic growth. The exit of Michelin Tyre from Nigeria costs the economy 1,300 direct jobs. Also, the poor performance of the former electric generating and distributing parastatal of the government, National Electric Power Authority (NEPA), led to the deregulation of the sector and the birth of Power Holding Company of Nigeria (PHCN) and later unbundled into Generation, Transmission and Distribution companies with Discos still being heavily accused of poor performance. Despite the privatization after deregulation, there is still perennial power shortage. This situation is exacerbated by a grossly inefficient and poorly maintained distribution system. Industry can only cope with power outages by resorting to internal generating plants. However, when electricity goes on and off, it creates serious problems for manufacturing and industrial sectors. Equipment is damaged by power surges that usually accompany epileptic power supply and goods at various stages of manufacturing are damaged. Industry’s response to this epileptic situation in Nigeria has been to run permanently on internal generating plants and use PHCN supply as standby. This suboptimal level of electricity supply, consumption and human capital formation in Nigeria has affected both economic growth and development negatively. This has created a problem to be examined since adequate studies have not been carried out by researchers to determine the impact of expenditure on electricity and human capital (education and health expenditures) on economic growth in Nigeria.These are pressing issues that this study would examine and provide empirical answers to.

## Research Questions

To what extent does investment on electricity impact on economic growth in Nigeria?

## Objectives of the Study

To determine the impact of investment in electricity generationon economic growth in Nigeria
.

## Hypothesis of the Study

$Ho_1$: Investment in electricity generationhas noimpact on economic growth in Nigeria.

## Significance of the Study

A study of this nature is beneficial to a lot of stakeholders. The outcome of the study will serve as a way forward for policy makers to understand the urgent need for government in Nigeria to increase investment in electricity generation, to increase the productivity of her citizens. Achieving this feat will ensure faster economic growth and development. It will enable policy makers understand the contributions of knowledge and skills as a means of overcoming poverty, hunger, and underdevelopment. This study will serve as reference materials for students and future researchers on this and related topic. The literature review and the empirical result will be used in comparison with other similar findings.The recommendations in this study, if well considered and applied, will go a long way in solving the problems of teething unemployment, low output and productivity in the manufacturing and agricultural sectors in Nigeria.

# METHODOLOGY

## Research Design

The study adopted Ex-Post Facto research design as it facilitated the use of time series data and adopted various econometric analyses to obtain data-driven and evidence-based findings for the study. The Augmented Dickey-Fuller (ADF) unit root test and Bound test cointegration are used to test for stationarity and long run relationship among the time series variables respectively. The Auto-Regressive Distributed Lagged (ARDL) model and Engle Granger models are used in testing the hypothesis. The research is designed to determine the impact of investments in human capital and electricity on economic growth in Nigeria from 1981-2017. Three models are formulated using proxies of Human Capital Development and Electricity variables as independent and Real GNP as dependent variables to test their impact on economic growth for the first two models and then Granger Causality to test the causality relationships amongst the variables for the third model.

## Theoretical Framework

The framework of the study is based on the Cobb-Douglas production function. The Cobb-Douglas functional form of production is widely used to represent the relationship of an output to inputs. They considered a simplified view of the economy in which production output is determined by the amount of labour involved and amount of capital invested. According to [8], the production function of Cobb-Douglas used to model production was of the form:

$$P(L,K) = bL^{\alpha}K^{\beta}$$

Where;

· P = total production (the monetary value of all goods produced in a year),

· L = labour input (the total number of person-hours worked in a year),

· K = capital input (the monetary worth of all machinery, equipment, and buildings),

· b = total factor productivity or technology,

· $\alpha$ and $\beta$ are the output elasticities of labour and capital, respectively. These values are constants determined by available technology. The notation, $\alpha$, may be used interchangeably as $1-\beta$.

## Method of Data Evaluation

This present study used the Auto-Regressive Distributed Lag (ARDL) bound testing procedure to examine the cointegration (long-run) relationship between the dependent variables and the explanatory variables, as well as the short-run dynamics. The use of the bounds technique is based on three validations. First, [8] advocated the use of the ARDL model for the estimation of level relationships because the model suggests that once the order of the ARDL is determined the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I(1) and I(0) variables as regressors. Third, this technique is suitable for small or finite sample size. Before performing the ARDL model, we will test for the level of integration of all variables because if any variable is I(2) or above, ARDL approach will not be applicable.

## PRESENTATION AND ANALYSIS OF RESULTS

The results of the various tests specified in the previous chapter are presented here. It is also in this chapter that we can address the research hypothesis and test them against the alternatives.

### Unit Root Test of the Variables

The variables of interest were subjected to unit root test in order to ensure stationarity of the series. The unit root method adopted is Augmented Dickey-Fuller (ADF) unit root test.

Table 1: Result of ADF unit root test of the variables

| Variables | Level form | | First difference | | Decision on Stationarity |
|---|---|---|---|---|---|
| | ADF t-statistic | 5% critical value | ADF t-statistic | 5% critical value | |
| RGNP | -3.347336 | -2.945842 | - | - | I(0) |
| KS | -2.058747 | -2.951125 | -10.43888 | -2.951125 | I(1) |
| LF | -6.773797 | -2.945842 | - | - | I(0) |
| HCXP | 0.721426 | -2.945842 | -6.208766 | -2.948404 | I(1) |
| EEXP | -0.683430 | -2.951125 | -9.109653 | -2.951125 | I(1) |

*Source: Eviews 9 Output for the Result of ADF unit root test of the variables*

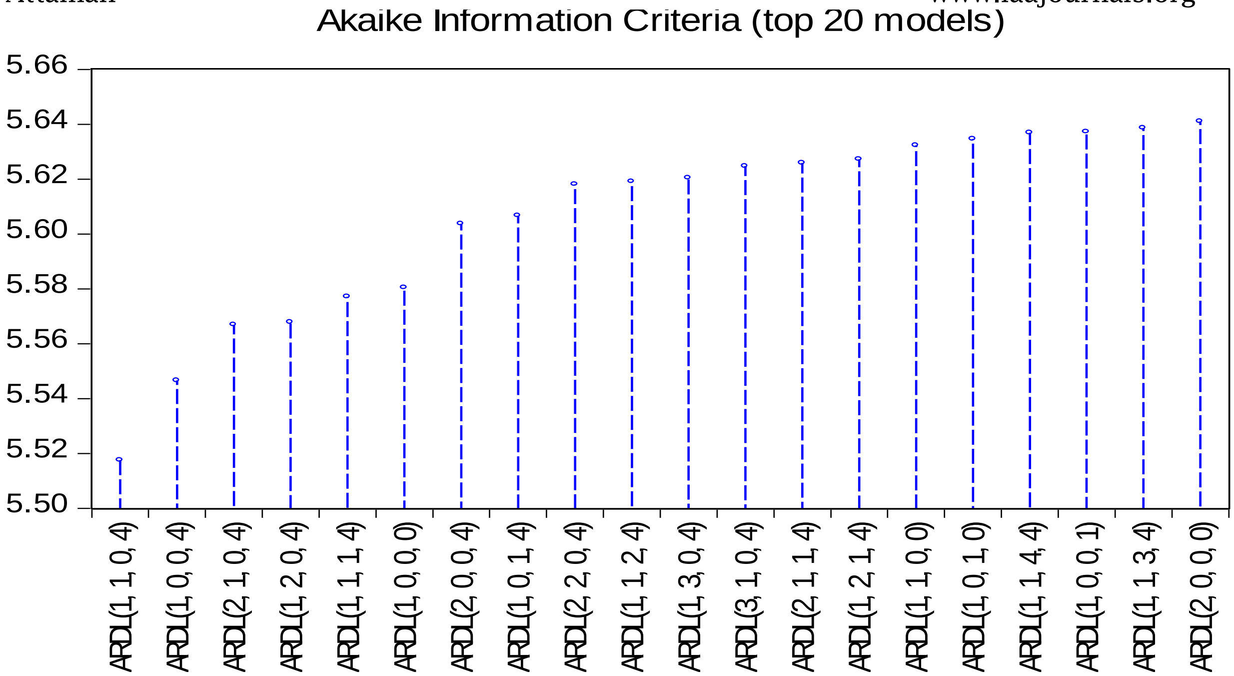
Table 1 shows the result of ADF unit root test conducted. Based on the difference between the absolute value of the ADF t-statistic and the 5% critical values, it is seen that Electricity Expenditure (EEXP), Human Capital Expenditure (HCXP), and Capital Stock (KS) are integrated at first difference while Labour Force (LF) and Real Gross National Product (RGNP) are stationary at levels. As a result of a mixture of I(0) and I(1) variables, the bounds test method of cointegration seems the best to use in explaining a long-run relationship among the variables

### Estimation of Model for Objective I

#### Lag Length selection using Akaike Information Criterion

Using Akaike Information Criterion, ARDL presented the selected model shown in figure 1.

Figure 1: Graph of lag of ARDL lag length selection based on Akaike Information Criterion.




*Source: Eviews 9 Output for model selection based on Akaike Information Criteria*

The Autoregressive Distributed Lag (ARDL) model selection is presented in figure 4.1 above. The result of the lag length selection that is best for the analysis after 20 evaluations is the selected ARDL model, 1,1,0,4: (RGNP -1, KS -1, LF -0, HCXP - 4,).

Cointegration and Bond Test Approach

The result of the unit root test presented in table 1 shows that some of the variables are I(1) and some I(0). This informs the use of bound test approach to cointegration proposed by [3]. This result is presented in table 2. The null hypothesis associated with this test is that no long-run association exists and the decision is to reject the null hypothesis if the value of F-statistic from the bound test conducted is greater than the upper bound value of Pesaran test statistic.

Table 2: Result of bound test (cointegration of the variables)
Null hypothesis: No longrun relationship exists

| Test Statistic | Value | K | Bound Test | |
|---|---|---|---|---|
| | | | Lower bound | upper bound |
| *F-statistic* | *5.270501* | *3* | *3.23* | *4.35* |

Source: Eviews 9 Output for the Result of bound test (cointegration of the variables)

Table 2 shows that the value of F-statistic lies above the upper bound value of Paseran test statistic. This is an indication that the null hypothesis that there is no long-run association among the variables in the model is to be rejected. Therefore, there exists long-run association among the variables in the model for objective one.

Result of Model for the Objective

The Long-run Result

The existence of long-run association among the variables in the model allows us to estimate the long-run model and generate the error correction term which is used to examine short-run dynamics of the model. However, the result of long-run estimation is given in table 3.

Table 3: Long-run ARDL
Dependent Variable: RGNP

| Long Run Coefficients | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| KS | 0.000070 | 0.000492 | 0.141703 | 0.8885 |
| LF | -0.001712 | 0.005515 | -0.310351 | 0.7590 |
| EEXP | -0.146310 | 0.114251 | -1.280603 | 0.2126 |
| C | 14.174229 | 7.440338 | 1.905052 | 0.0688 |

*Source: Eviews 9 Output for the Result of ADF unit root test of the variables*

Table 3 shows the result of long-run estimation of the model for objective two. It could be observed that all the variables are statistically not significant. The result also shows that our variable of focus, Electricity Expenditure (EEXP) does not meet *a priori* criteria, since it is negative. The same goes with Labour Force (LF). The coefficient for Capital Stock meets a priori expectations, since it is positive. On the basis of individual contribution of the variables, it is observed that 1% increase in Capital Stock leads to a 0.00007% increase in economic growth. This did not occur as expected. The contribution of Capital Stock to economic growth in the long-run is so little or there is nothing.Indeed, it could be observed that Labour Force is negatively related to economic growth. It is observed that 1% increase in labour force leads to 0.002% decrease in economic growth. As could be seen, this contribution of Labour Force to economic growth is of quite insignificant and not growth-inducing, given the sign and magnitude of the coefficient. This is indicative of the large amount of unskilled labour in the country. The proxy for Electricity Expenditure (EEXP) is not found significant in terms of its contribution to economic growth. Indeed, it was negatively related to economic growth. This implies that one billion-naira increase in electricity expenditure leads to 0.1 decline in economic growth. This is an indication that the energy policy required to generate growth in the country needs to be fine-tuned, adequate structure, strengthened and funded.

Result of Short-run Estimation

The short run model explains the dynamics of the variables and the speed of adjustment of the model towards long-run equilibrium. This model utilized information from the long-run model to explain what happens in the short-run adjustment. This is presented in table 4.

Table 4 Result of Short-run Estimation
Dependent Variable: ΔRGNP

| Cointegrating Form | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(KS) | 0.000052 | 0.000369 | 0.142203 | 0.8881 |
| D(LF) | -0.001290 | 0.004098 | -0.314677 | 0.7557 |
| D(EEXP) | 0.165816 | 0.081685 | 2.029935 | 0.0536 |
| D(EEXP(-1)) | 0.008087 | 0.098603 | 0.082012 | 0.9353 |
| D(EEXP(-2)) | 0.238293 | 0.098130 | 2.428335 | 0.0230 |
| D(EEXP(-3)) | 0.148273 | 0.106377 | 1.393849 | 0.1761 |
| CointEq(-1) | -0.753486 | 0.172080 | -4.378694 | 0.0002 |

| | | | |
|---|---|---|---|
| R-squared | 0.515719 | Mean dependent var | 5.046970 |
| Adjusted R-squared | 0.354292 | S.D. dependent var | 3.832994 |
| S.E. of regression | 3.080038 | Akaike info criterion | 5.314762 |
| Sum squared resid | 227.6792 | Schwarz criterion | 5.722900 |
| Log likelihood | - | Hannan-Quinn | 5.4520 |

| | | | |
|---|---|---|---|
| | 78.69357 | criter. | 88 |
| F-statistic | 3.194753 | Durbin-Watson stat | 2.142031 |
| Prob(F-statistic) | 0.012957 | | |

*Source: Eviews 9 Output for the result of the short run model*

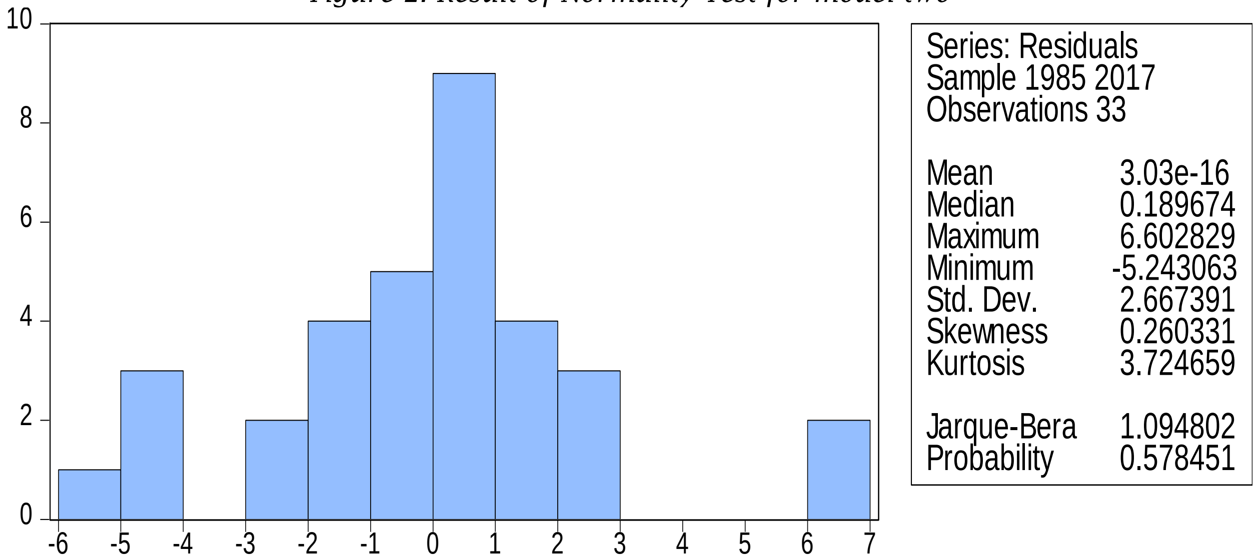
Table 4 shows the result of the short-run dynamics of the impact of Electricity Expenditureon Real Gross National Product in Nigeria. It is seen that the coefficients for Capital Stock and Electricity Expenditure meet theoretical expectations by being positive. Just like in the long run, capital stock is still negative and statistically not significant in their current years. On the basis of the contribution of each of the variables, the study finds that 1% increase in Capital Stock leads to a 0.000052% increase in economic growth. This is an indication that changes in domestic investment have not been significant or beneficial to economic growth.Labour Force is found to contribute negatively to economic growth, but not significantly. It was observed that 1% increase in Labour Force leads to 0.0013%decline in economic growth. Moreover, the result indicates that our variable of focus, Electricity Expenditure is positively related to economic growth, but not significantly. One-billion-naira increase in electricity expenditure leads to 0.17 per cent increase in economic growth, but not significantly in the current year. However, two years after the first, the relationship between the two variables is positive and statistically significant. Finally, on the basis of the goodness of fit of the entire model, the study found that the value of R-squared (0.5157) shows that the variables in the model explained about 51.57 percent variations in the Real Gross National Product. Although the value of Durbin-Watson statistic is 2.14, it shows that there is evidence of autocorrelation in the model, it is free from serial correlation which is the most important assumption in this test.Also, the probability value of F-statistic (0.012) shows that the model is robust and fit for this analysis. The overall regression plane is statistically significant.Lastly, the error correction term which measures the speed of adjustment of the short-run model toward long-run equilibrium was found to be negative and statistically significant. This means that in one year, about 75.35 percent of the fluctuations in the short-run would be corrected towards long-run equilibrium.

Diagnostic Test for the short-run model for objective

Normality Test

Normality test is essential to ascertain the distribution of the data set in the model. The null hypothesis for this test is that the variables are normally distributed. This is to be rejected if the probability of Jarque-Bera is less than 0.05. Figure 4.5 shows the result of normality test.

*Figure 2: Result of Normality Test for model two*




It could be seen from figure 2 that the condition for normal distribution of the time series data is satisfied since the probability of the null hypothesis is greater than 0.05.Therefore, this test is satisfied.

Serial correlation LM test of the selected ARDL Model

Serial correlation test was conducted using the Breusch-Pagan Serial correlation LM test. The null hypothesis of this test is that there is no serial correlation in the residual of the model and the decision rule is to reject the null if the probability Chi-Square is less than 0.05 for 5% level

.

Table 5: Result of Serial Correlation LM Test

| Breusch-Godfrey Serial Correlation LM Test: | | | |
|---|---|---|---|
| F-statistic | 0.254468 | Prob. F(2,22) | 0.7776 |
| Obs*R-squared | 0.746144 | Prob. Chi-Square(2) | 0.6886 |

*Source: Eviews 9 Output for Breusch-Godfrey*

Serial Correlation LM Test

From table 5 above, it can be seen that the probability Chi-Square (0.6886) is greater than 0.05 at 5% significant level. In that we cannot reject the null hypothesis that there is no serial correlation in the residual of the short-run model and conclude that the residual in our short-run ARDL model is not serially correlated.

Heteroscedasticity Test

This test was conducted using the Breusch-Pagan LM test. See table 6. Heteroscedasticity test follows the F-distribution with degree of freedom given as F (8,24). The null hypothesis is that the error term is homoscedastic and we are to reject the null hypothesis if the probability of the Obs*R-square is less than 0.05. Otherwise, we do not the null hypothesis.

Table 6: Heteroscedasticity Test for model one (objective one)

| Heteroskedasticity Test: Breusch-Pagan-Godfrey | | | |
|---|---|---|---|
| F-statistic | 0.642357 | Prob. F(8,24) | 0.7348 |
| Obs*R-squared | 5.819800 | Prob. Chi-Square(8) | 0.6674 |
| Scaled explained SS | 4.193579 | Prob. Chi-Square(8) | 0.8392 |

*Source: Eviews 9 Output for Heteroscedasticity Test for model one*

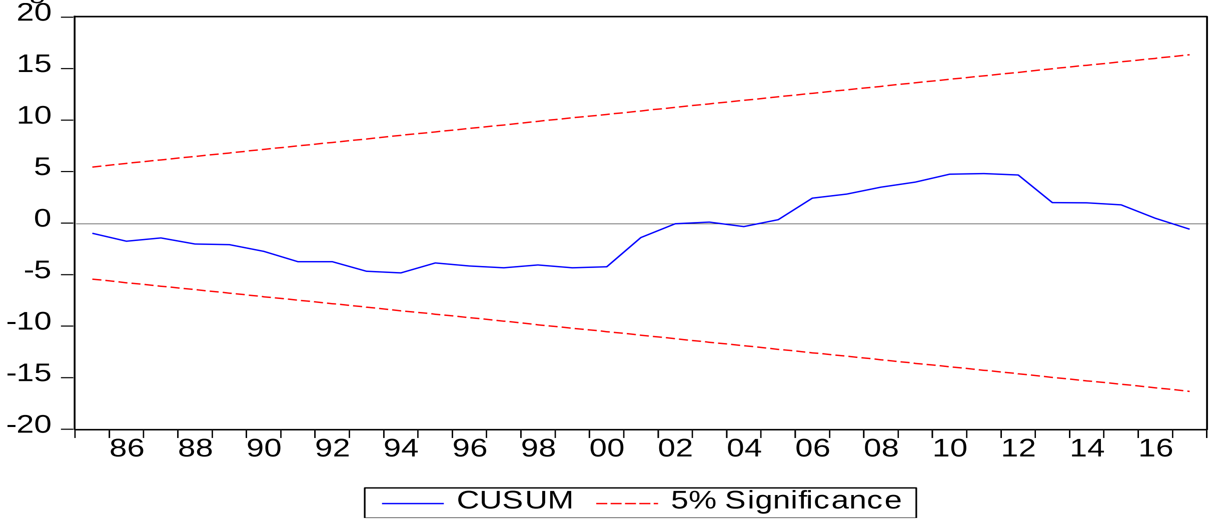
The result of table 6 shows that the probability of the Obs*R-square (0.6674) is greater than 0.05. In that, we do not reject the null hypothesis of homoscedasticity or constant variance of the residual.

### Stability Diagnostic Test

Stability of the short-run model was tested using CUSUM test and CUSUM of Squares test. The idea behind this test is to reject the hypothesis of model stability if the blue line lies outside the dotted red lines, otherwise, the model is said to be stable. The result of this test is presented in figure 3.

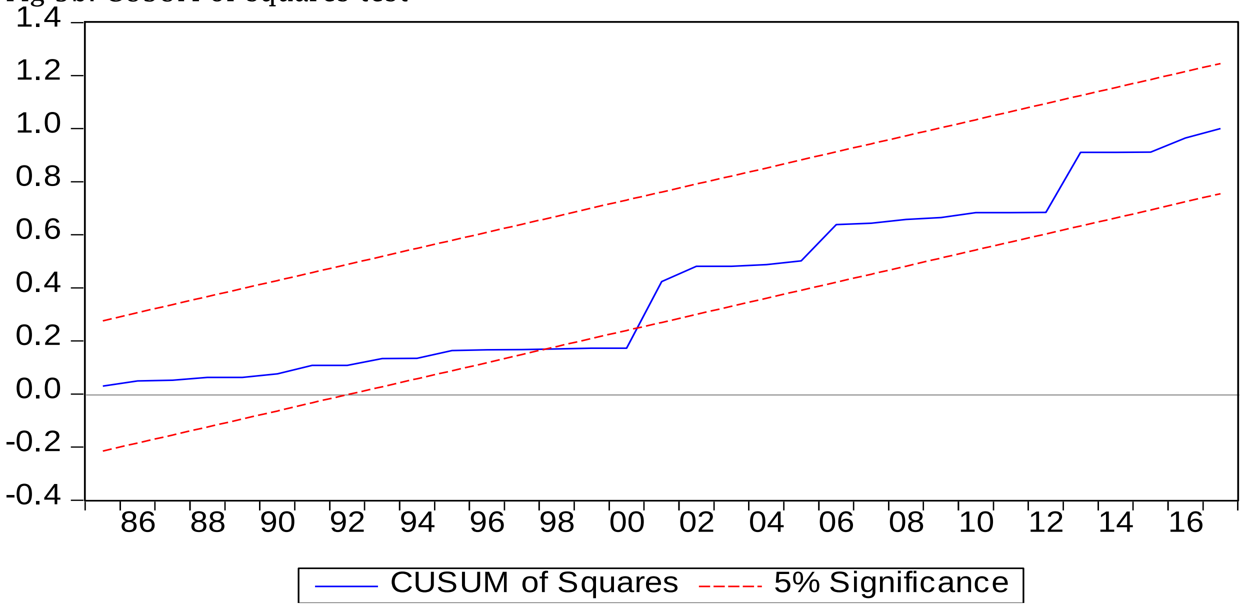
Figure 3: CUSUM and CUSUM square test of the short run model for objective one

Fig 3a: CUSUM test




*Source: Eviews 9 Output for Stability test of Estimated Model*

Fig 3b: CUSUM of squares test




*Source: Eviews 9 Output for Stability test of Estimated Model*

The result of the CUSUM and CUSUM square test shows that the blue line lies inside the dotted red line which indicates that the model is dynamically stable.

Evaluation of Research Hypotheses

Hypothesis 2 ($H_{02}$):Investment on Electricity does not have impact on economic growth in Nigeria.The probability value for the coefficient of expenditure on electricity (investment) is 0.2126. Since this probability value is not less than 0.05 (0.2126 > 0.05), we do not reject the null hypothesis and conclude that investment in electricity does not have significant impact on economic growth in the long-run. The probability value of investment in electricity is 0.0536. Since this probability value is not less than 0.05 (0.0536 > 0.05), we do not reject the null hypothesis and conclude that investment in electricity does not have significant impact on economic growth in the short-run in Nigeria.

## DISCUSSION OF THE RESULTS

In view of the forgoing results of the data investigation done in this study, there is a need to align or misalign the findings in this study with previous studies done in this area. The result of the data evaluation of the second hypothesis reveals that investment in electricity does not have significant impact on economic growth in the long-run. In addition, investment in electricity is positively related, but does not have significant impact on economic growth in the short-run. This is in line with [5], who discover that electricity expenditure is positively related to GDP Per capita in the short-run. As a group, [9] ,human capital was found to be positive and statistically significant to economic growth. The infrastructure variable (electricity) is positive but statistically insignificant. This result is not entirely surprising considering the unreliable, epileptic, unstable supply of energy and incessant power holidays in Nigeria.

## SUMMARY, CONCLUSION AND RECOMMENDATIONS

Second, the study reveals that investment in electricity is positively related, but does not have significant impact on economic growth in the short run ((*p(t)=0.0536)*). Investment in electricity is negatively related to growth, anddoes not have significant impact on economic growth in the long-run (*p(t)=0.2126)*.

## CONCLUSION

From the days of Adam Smith, economic theories have always emphasized the role of investment as a determinant of economic growth. What has preoccupied the minds of economists all over the world is the identification of those unique and specific factors that account for growth, not only in developed, but developing and third world countries.Investments in human capital and infrastructure have been identified as factors that account for economic growth in many studies. Unlike previous studies that merely focused on the use of electricity consumption to account for economic growth, this study hypothesizes thatinvestment on human capital and investment on electricity are assumed to be the engine drivers of the Nigeria economy. After an extensive review of related literature in this area of study, the Autoregressive Distributed Lagged (ARDL) model was adopted as the technique for data analysis after the preliminary tests to ascertain the nature of the time series variables used for data analysis. Sequel to the findings from this study, it is concluded that: Investment in electricity generation has negative and no significant effect on economic growth in the long-run. In the short-run, investment in electricity generation has a positiveimpact but not significant on economic growth in Nigeria.

## RECOMMENDATIONS

In view of the findings in this study, the researcher makes the following recommendations:

The government should sufficiently increasenot only funding, but also enhance regulations in electricity generation and distribution in Nigeria to reverse the negative relationship posed to economic growthas observed in this study (a decline of 0.146% due to a 1% increase in investment in electricity). The enhanced investments should be sustained for some years to engender desired impact as it was observed that expenditure on electricity takes at least 2 years to impact economic growth. In addition, there is need to explore and exploit alternative sources of energy such as wind, solar, et cetera, to boost generation of electricity Megawatts. Investments in electricity should be the concern of not only the federal government, states and local governments should be mandated to have a certain small number of political appointees, so that money saved from this cut should be usedto solve the problems of prolonged power-outages and undue power holidays

REFERENCES


1. Aigbokhan, B., O. Imahe & M. I. Ailemen(2007). '*Education Expenditure and Human Capital Development in Nigeria: Any Correlation so far*', Research Paper, Ambrose Alli University, Ekpoma, Nigeria
2. Ajanaku, L. (2007). "Battling with Darkness", *TELL* (*Special Edition),* 31-33.
3. Alani, R. A. &Isola, W. A. (2015).Human Capital Development And Economic Growth: Empirical Evidence From Nigeria. *Asian Economic and Financial Review* 2(7):813-827.
4. Hunt A., Collard-Wexler, A. and O'Connell, S. D. (2014), "How Do Electricity Shortages Affect Productivity? Evidence from India", New York University and NBER.
5. Ibok E.E. and Ibanga S.E. (2014). Impact of Human Capital Development on Economic Empowerment on the socio-economic development of Akwa-Ibom State, Nigeria, *GlobalJournal Human Resources Management*, vol. 2, 37-44.
6. Iduu G. (2012), "Power Supply and the Performance of Small and Medium Scale Industries in Nigeria From (1986 – 2010)". An unpublished Study Submitted to the Department of Economics, faculty of management and social sciences. Caritas university, Amorji-Nike Enugu
7. Igun, S. E.(2006).' *Human capital for Nigerian Libraries in the 21st Century*', Library Philosophy and Practice (e-Journal) 8(2).
8. Imoro B. and Owusu A. (2012), "Causes and Effects of Frequent and Unannounced Electricity Blackouts on the Operations of Micro and Small Scale Industries in Kumasi", *Journal of Sustainable Development* 5(2)
9. Nakamura, J.I.(1981). *Human Capital Accumulation in Pre-Modern Rural Japan,* The Journal of Economic History, 14; 263-281.
10. Nwankwo, O. C. and Njogo, B. O. (2013). The Effect of Electricity Supply on Industrial Production Within The Nigerian Economy (1970 – 2010), *Journal of Energy Technologies and Policy*, 3(4)
11. Oboh J. S,. Ismail, R, & Shaari, A.H (2010). The Impact of Human Capital Development on the Economic Growth of Nigeria. *Prosiding Perkem V, Jilid* 1 63 – 72
12. Odiaka, P. (2006). Power Sector reforms: Still a reign of blackout, *The Guardian,* August 24, 2006, 15.
13. Ogunjobi, A. (2007). Succumbing to Imports, *TELL*, May 21, 2007, 40-41.
14. Ogujiuba, K (2013). The Impact of Human Capital Formation on Economic Growth in Nigeria.*Journal of Economics*, 4(2):121-132
15. Okafor, E. O. (2008). Development Crisis of the Power Supply and Implications for Industrial Sector in Nigeria, *Kamla-Raj Journal*, (6)83-92.
16. Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics,*70(1) 65-94.
17. Solow, R. M. (1957). Technical change and the aggregate

production function. *Review of Economics and Statistics*. Cambridge, MA: MIT Press Journals, 39(2), 312-320.