European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.9, No.27, 2017

Effects of Electricity Supply on Economic Growth in Nigeria (1980-2012): Vector Autoregressive Approach

Musa, Amina Bala *Tahir, Hussaini Mairiga Iliya, Thompson Ayuba
Department of Economics,
Faculty of Social and Management Sciences, Bauchi State University' Gadau – Nigeria.

Abstract
This research work is on the effect of electricity supply on economic growth in Nigeria between 1980 and 2012, a period of thirty two (32) years. Nigeria is seen as one of the greatest developing nations in Africa with highly endowed natural resources including potential electricity resources. However, increasing access to electricity in Nigeria has proved to be not only a continuous challenge but also a pressing issue with the international community. The study therefore analysed the effect of electricity supply on economic growth in Nigeria utilising secondary data with real gross domestic product (RGDP) as the dependent variable; and electricity supply, electricity generation, capital and labour as independent variables. Analytical techniques of Vector autoregressive (VAR) method, lag length selection criteria, variance decomposition and impulse response function were employed. The main or target VAR equation was transformed to system of equations and estimated through the Newey- Heteroskedasticity and autocorrelation (HAC) consistent covariance OLS estimator to enable objective determination of the effect of electricity supply on economic growth in Nigeria. Results indicate that the influence of electricity supply on economic growth is statistically significant; electricity generation has a positive relationship and also significant impact on the economy, while electricity supply negatively impacts economic growth. Despite the huge money which government claimed she is spending on the power sector, this study found that it has not been yielding desired positive effect on economic growth. Efforts should be directed at increasing electricity generation, ensuring effective monitoring of the activities of the newly established/private sector driven electricity generation companies (GENCOS) and distribution companies (DISCOS), curbing mismanagement to achieve efficient utilisation of energy resources and the training and retraining of staff in the power sector with a view to enhancing electricity supply for sustainable economic growth and development of Nigeria.
Keywords: electricity supply, vector autoregressive (VAR) method, variance decomposition, impulse response, lag length selection criteria.

1.0 Introduction

It is imperative to note that stable power supply is inevitable and is needed to support development of any economy be it developing or developed. There are apparently links between a sustained economic growth and electricity in any economy. Nigeria with her very high population of over 150 million is facing formidable economic, social, industrial, and human development challenges coupled with poor power supply to sustain the real sector of the economy (Uzochukwu, 2012). And because of all these challenges, the country is seen as one of the poorest countries in the world despite the huge resources from crude oil export. As at the end of 2009, Nigeria installed electricity capacity stood at about 6000 Megawatts (MW) with only a maximum of about 4,000 MW available, this is made up of a mix of 36% hydro and 64% thermal (Uzochukwu, Uche, 2012). The Federal Government has invested heavily in expanding generation capacity and has encouraged investments in power production through joint ventures, to make the total installed capacity to not less than 15,000 MW by 2010 (Energy commission of Nigeria 2010).

Despite the investment in the power sector, the report of Energy Commission of Nigeria (ECN) and the United Nations Development Programme (UNDP) (2011), indicates that, 70% of the population live below $1 per day, while about 91% of the population live below $2 per day. It has been observed that the citizens of many poor nations of the world have less access to electricity, and the richer countries have more access to electricity and consume far more electricity than the poor countries, suggesting that access to electricity is the driving force for a sustained economic growth of a nation. In real terms, access to electricity is directly proportional to good living standards and that is why Timothy (2005) asserts that about 2 billion people globally live without access to modern energy services and made it clear that, this number of people is concentrated mainly in rural and urban areas in developing countries in Africa and Asia. Also, Etiosa (2007) had opined that stable power supply is central to all human activities and it is needed to support development.

One of the effects of the Nigerian policy implementation failures is that despite the abundance of natural gas and renewable energy resources in the country, Nigeria has become known for its epileptic power supply. Some communities do not have access to this basic social infrastructure and those that have it cannot rely on the very poor supply from the Power Holding Company of Nigeria (PHCN). This contributed to adverse impacts on industrialization in the country. The production and provision of stable power supply from renewable energy sources is the new global focus with massive advocacy for increased investment in the research and development of renewable energy technologies, (Mark and Tonye, 2009). It is therefore not surprising to observe the collapsing natures of industries due to lack of accessible and stable electricity, while the overall result of this, is the loss of jobs in the industries and the impoverishment of many.

Udah (2010) described industrialization as a deliberate and sustained application and combination of an appropriate technology, infrastructure, managerial experts, and other important resources; and further observes that industrialization has attracted considerable interest in development economics in recent times. And this makes it very important in any nation because of its critical role in economic development. Industrial production in any nation accelerates the pace of structural transformation and diversification of economies; enables a country to fully utilize its factor endowment and to depend less on foreign supply of finished goods or raw materials for its economic growth. In fact, the (2009) in their appraisal report observed that indeed, the gap in the power sector has far reaching implications for improving business, sustaining economic growth and the social well-being of Nigerians. The report indicates that 45% of the population have access to electricity, with only about 30% of their demand for power being met; and that the power sector is plagued by recurred outages to the extent that some 90% of industrial customers and a significant number of residential and other non – residential customers provide power at a huge cost to themselves and to the Nigerian economy. Without doubt the epileptic nature of electricity supply in the nation has been a bane to development. Due to the lack of electricity, most businesses have had to rely on generators which are very expensive to run. This has forced many companies to close shop or relocate because they can no longer remain competitive.

Regular power supply is the prime mover of 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, solar electricity and fussionable materials for nuclear electricity. Yet the country consistently suffers from electricity shortage - a major impediment to industrial and technological growth. The erstwhile National Electric Power Authority (NEPA), a government parastatal, had the sole responsibility for managing the generating plants as well as distribution of power nationally. The poor performance of the parastatal led to the deregulation of the sector and the management of the sector transferred to the Power Holding Company of Nigeria (PHCN) in 2003.

Even after deregulation, there is still a perennial shortage of power supply; a situation exacerbated by a grossly inefficient and poorly maintained distribution system. However, when electricity goes on and off, this creates serious problems for manufacturing and industrial sectors. Equipment and goods at various stages of manufacturing are damaged by power surges that usually accompany epileptic power supply. Industry's response has been to run permanently on internal generating plants and use PHCN supply as standby. Therefore, questions which come up to the mind of any researcher on this topic are: What impact does Nigerian electricity supply has on economic growth? Will poor power supply affect the performance of the real sectors which contribute significantly to the growth of economic activities? These are pressing issues that this study would examine and provide empirical answers to.

Therefore, the main objective of this study is to examine the impact of electricity supply on economic growth in Nigeria while the specific objectives are:

i. To examine the trend of electricity power supply in Nigeria over the years.
ii. To investigate the effect of electricity supply on economic growth in Nigeria.
iii. To examine other macroeconomic variables which electricity supply motivates to enhance economic growth.

It is in recognition of the importance of electricity to industrial production for economic growth in Nigeria that this study examines the effect of electric supply on economic growth in Nigeria.

2.0 Review of Related Literature

Review of related literature is done under the following sub-headings: Conceptual Framework, Theoretical Framework, and Empirical Review.

2.1. Conceptual Framework

2.1.1 Overview of Energy Resources Investment in Nigeria

Nigeria with a population of over 160 million people is endowed with enormous energy resources, such as, petroleum, natural gas, coal, nuclear, tar sand. Others include solar, wind, biomass and hydro. However, development and exploitation of such energy sources have been skewed in favour of the hydro, petroleum and natural gas. At independence in 1960, agriculture was the dominant sector in the economy contributing about 70% to the country's gross domestic product. This trend changed with the discovery of oil in commercial quantity in the 1970s (Search.com, 2016).

The exploitation of the Nigerian energy resources began with coal in 1916. There are nearly three billion tons of indicated reserves in seventeen identified coalfields and over 600 million tons of proven reserves in Nigeria (Anaekwe, 2010). Following the Nigerian civil war, many coal mines were abandoned and coal production never completely recovered. This is evident by coal production levels becoming erratic as both the resuscitation and maintenance of imported mining equipment proved troublesome (Godwin, 1980). As a result, coal production dropped significantly from 50% in 1960 to less than 1% in 1990. This decline in coal production was hastened by the discovery of crude oil in commercial quantities in Otuabagi / Otuogadi, Oloibiri district in Bayelsa state by Shell Royal Dutch on 15th January, 1956. Between 1970 and 1980, petroleum products were cheap and readily available as premium motor spirit (PMS) otherwise known as petrol assumed the role of main source of energy in Nigeria. As a result, all other energy sources were neglected (Oji, Idusuyi, and Kareem, 2012).

With proven oil reserves exceeding 9 billion tons, Nigeria is one of the largest Hydrocarbon feedstock producers in Africa, and ranks twelfth place worldwide. The country relies heavily on its petroleum industry for economic growth, the sector accounts for about 80% of government revenues and provides 95% of foreign exchange (Iwu, 2008). Nigeria is a member of the Organisation of Petroleum Exporting Countries (OPEC). Also, the country's natural gas reserves accounts for 5.2 trillion cubic metres, making it the world's seventh biggest natural gas reserve. Although, natural gas occur in associated form with crude oil, Nigeria's gas reserves are three times greater than its oil reserves. The government is committed to increasing gas production for domestic supply as well as for export evident by the Trans-Saharan gas pipeline currently in development. This will enable Nigeria to supply the continent of Europe with gas. The country provides 10% of the world's LNG (Corporate Nigeria, 2012). Despite this potential, gas flaring has continued unabated over the years (Eboh, 1998).

Currently, the Nigerian energy crisis has stymied the socio economic activities of the country which has brought untold hardship on the people of the country. In recent years, electricity supply in the country does not meet national demand. While the estimated daily power generation was about 3,700MW as at December 2009, the peak load forecast for the same period was 5,103MW. This is based on the existing connections to the grid which does not take into account the suppressed demand. Also, the projected electricity demand has been translated into demand for grid electricity and peak demand on the basis of assumptions made for transmission and distribution losses, auxiliary consumption, load factor and declining non - grid generation (Energy Information Administration, 2012). The demand is projected to rise from 5,746 MW in 2005 to 297,900 MW by the year 2030 which translates to generation of 11,686MW every year to meet this demand (Subair, and Oke, 2008). While the government owned monopoly company (Power Holding Company of Nigeria) has been unbundled, in its stead, three (3) hydro and seven thermal generating, a radial transmission grid (330kV and 132kV); and eleven distribution companies (33KVA and below) that undertake the wiring, sales, billing, collection and customer care functions within their area of geographical monopoly have been set up. Except for the transmission function, the others have been privatized (Akinlo, 2008).

The epileptic nature of electricity has led to scarcity of petrol and kerosene because the citizens have resulted to using generators and kerosene powered equipment to provide energy for use at homes. Also, import content of our domestic fuel usage has grown over the years to about 75% (International Energy Agency, 2012).This has resulted in the use and overdependence on fuel - wood which has led to deforestation and attendant degradation of the environment and worsening desertification (Babanyara and Saleh, 2010). An average annual deforestation rate of 2.38% between 1990 and 2000 was reported in Nigeria due in part to the change to the use of wood fuel as a result of hikes in prices of kerosene and cooking gas (IEA, 2012).

Other alternative energy sources including solar, wind wave are largely underdeveloped in the country. Furthermore, as a result of domestic fuel prices which have gone up several times with attendant upsurge in transport fare and prices of goods and services. Bamikole (2012) reported that industrial capacity utilization plummeted from 78.7% in 1977 to 30.1% in 1987 before resurgence to 53.3% in 2007 and 53% in 2010.

2.1.2. Economic Growth in Nigeria

Economic growth has been one of the most important issues that have attracted the attention of economists in the recent past, when viewed from the following dimensions: The necessity for growth could be for increasing the standard of living, its role in facilitating the maintenance of full employment; and its long term effect on quality of life.

The economic growth of a country can be defined in various ways- as "an increase in the gross domestic product, in the real GDP or in the per capita GDP" (Saez, and Goswam, (2010). It is evident therefore, that the rate of growth of real GDP reflects at least to some extent the growth in the productive capacity of a country. If we want to determine the growth rate in Nigeria for example the rate of growth of its real GDP stands as the most appropriate measure (Saez, and Goswam, 2010).

2.1.3 Electricity Supply and Economic Growth.

The positive relationship between electricity and economic growth has been justified by some authors as being consistent. Many economists agree that there is a strong correlation between electricity use and economic development. Morimoto and Hope (2001) have discovered, using Pearson correlation coefficient, that economic growth and energy consumption in Sri Lanka are highly correlated.

Paul Breshin (2004) asserts that electricity is vital for driving growth in the energy, manufacturing and social sector and further opined that a parallel (positive) growth trend existed between electricity demand and gross domestic product (GDP).Alam (2006) agrees that there is a departure from neoclassical economics which include only capital, labour and technology as factors of production to one which now includes energy as a factor of production. He further indicates that energy drives the work that converts raw materials into finished products in the manufacturing process. Sanchis, (2007) adds that increase in the electricity production will avoid the paralysation of the industrial production. Increased industrial production will eventually increase output. This implies that electricity production should become an economic policy high-priority objective which should be urgently responded.

Classical economists did not recognize energy as a factor of production in the production process and neither did the neo-classicals. Today, economists like Alam, (2006) found out in his work on 'Economic Growth with Energy' that not only does energy serve as a factor of production; it also acts as a booster to growth of a nation

2.2.0. Theoretical Review

This study attracts some basic theoretical discussions, reflecting issues bordering on electricity and the real sector of the economy which would eventually have effect on economic growth. Some of the theories include the liberalized electricity markets theory, traditional theory of cost modern theory of cost and the endogenous growth theory among others.

2.2.1. Liberalized Electricity Market Theory

The liberalized electricity market theory explains the right of firms to choose to invest in different types of power plants which allow production of electricity at different levels of marginal cost. Since electricity is not storable at reasonable cost, it is optimal for firms to invest in a differentiated portfolio of technologies in order to serve strongly the fluctuating demand. Prior to the liberalization of electricity markets, regulated monopolists decided on optimal investment and pricing strategies, but in the course of liberalizing those markets in Europe and US, which started in the 1990s, regulated monopolistic generators have been transformed into competing, but potentially and strategically acting firms.(Search.com, 2010)

2.2.2. Traditional Theory of Cost

The traditional theory of cost asserts that the optimal level of output is attainable at a single level of output above which, costs begin to rise. Under the traditional theory of cost, firms do not build plants with varying productive capacity, thus excess capacity is often a phenomenon experienced by firms. Excess capacity according to Bannock, et al (1998) is the difference between the amount produced by a firm or group of firms and the higher amount that could most efficiently be produced. For instance, if a firm produces 1,000 cars at a cost of N5, 000 each, but the lowest cost output would be 1,300 cars at N4, 000 each. Therefore, there is excess capacity of 300 cars. Bannock et al (1998) asserts that sustained excess capacity is also a feature of firms in monopolistic competition, while it will only exist in the short run under perfect competition. Excess capacity could also mean the difference between the actual output and maximum possible output of a firm, industry, or economy at large, when there are unemployed resources.

2.2.3. Modern Theory of Cost

The theory of cost assumes that firms build their plants with some flexibility in their productive capacity and making it possible for such firms to have reserve capacity. In furtherance to that, the theory also asserts that firms who utilize two-third and three quarters of their adequate supply of power are considered to be efficient. The reserve capacity under the modern theory of cost implies that some outputs can be produced at a single cost.

2.2.4. Growth Theory Linking Energy Sector (Endogenous Theory)

Before the growth theory proposed by Romar, there were other growth theories which thrived. Solow growth theory was one of such theories which was then in vogue. The Solow growth theory was also known as the exogenous theory because it professed technology as an exogenous factor which determines growth. One of the basic assumptions of the Solow model is the diminishing returns to labour and capital and constant returns to scale as well as competitive market equilibrium and constant savings rate. However, what is crucial about the Solow model is the fact that it explains the long run per capita growth by the rate of technological progress, which comes from outside the model.

The endogenous growth theory or new growth theory was developed as a reaction to the flaws of the neoclassical (exogenous) growth theory. Romar endogenous growth theory was first presented in 1986 in which he considers knowledge as an input in the production function. The theory aimed at explaining the long run growth by endogenizing productivity growth or technical progress.

The major assumptions of the theory are:

1. Increasing returns to scale because of positive externalities.
2. Human capital (knowledge, skills and training of individuals) and the production of new technologies are

essential for long run growth.

3. Private investment in research and development is the most important source of technological progress
4. Knowledge or technical advances are non-rival good.

In the new growth theory, the savings rate affects the long run economic growth because in this framework, a higher level of savings and capital formation allows for greater investment in human capital and research and development. The model predicts that the economy can grow forever as long as it does not run out of new ideas or technological advancement.

Just like the exogenous growth theory, the endogenous growth theory professes convergence of nations by diffusion of technology. That is, a situation where poor countries manage to catch up with the richer countries by gradual imitation of technology.

Romar states that production function of a firm 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

The Ri actually represents the technology prevalent at the time in firm i. Any new research technology spill over quickly across the entire nation. Technological progress (advancement) implies the development of new ideas which resemble public goods because they are non-rival. When the new ideas are added as factors of production the returns to scale tend to be increasing. In this model new technology is the ultimate determinant for long run growth and it is itself determined by investment in research technology. Therefore, Romar takes investment in research technology as endogenous factor in terms of the acquisition of new knowledge by rational profit maximization firms.

From the foregoing, 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 to 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. Most technology as given per time is dependent on the availability of useful energy to power it. The technology referred to include plants, machinery and the likes. Without adequate energy supply (in this case electricity or petroleum) then this technology is practically useless. The law of thermodynamics helps to justify this by stating that "no production process can be driven without energy conversion".

Energy is not the sole determinant of technology but is a necessary factor to ensure that technology (at whatever level) is being utilized. Conversion of energy in its raw state into useful state is highly technology oriented. Taking cue from the technology oriented nature of energy production; it is also known that energy production is capital intensive. Huge machineries are required to produce useable energy. This will mean that huge amount of capital will be required to produce energy. Huge investments must then be made on energy not only to produce but to attain energy efficiency.

The arguments put forward by each of the theories considered in this study are not meant to bridge the gap between the electricity crises, manufacturing productivity and economic growth especially in the developing countries of Africa. Permanent solutions should be sought in the total revolution and overhauling of the power sector, to allow for optimal use of equipment and other technological resources across the real sectors of developing countries especially, Nigeria. For instance, inadequate supply of power makes the manufacturing sectors in Nigeria go for power generators and the cost of running such leads to increase in cost of production such as money spent on petrol, diesel etc. which increased cost has sent many manufacturing firms out of business and eventually undermines the industrialization efforts of Nigeria.

In adopting the endogenous growth model, capital and labour will be used alongside electricity generated and electricity supply as energy sources in the specification of the model in this study.

2.3. Empirical Review

Stern (1993) in (Aqeel, and Mohammad, 2001) tested for Granger causality in a multivariate setting using a vector autoregressive (VAR) model of GDP, energy use, capital, and labour inputs. He also used a quality-adjusted index of energy input in place of gross energy use. The multivariate methodology is important because changes in energy use are frequently countered by the substitution of other factors of production, resulting in an insignificant overall impact on output. Weighting energy use for changes in the composition of energy input is important because a large part of the growth effects of energy are due to substitution of higher quality energy sources such as electricity for lower quality energy sources such as coal (Aqeel, and Mohammad, 2001). When both these innovations are employed, energy is found to Granger cause GDP. These results are supported by Barros, and Managi, (2011), who found that changes in oil prices Granger-cause changes in GNP and unemployment in VAR models whereas oil prices are exogenous to the system.

Masih and Masih (1996) in (Asafu-Adjaye, 2000) found cointegration between energy and GDP in India, Pakistan, and Indonesia, but no cointegration in Malaysia, Singapore, or the Philippines. Granger causality runs from energy to GDP in India but in the opposite direction in the other two countries. Again, bivariate methods yield indeterminate results. It would seem that if a multivariate approach helps in uncovering the Granger causality relations between energy and GDP a multivariate approach should be used to investigate the cointegration relations among the variables.

Aqeel, and Mohammad, (2001) ran a cointegration on energy and its relationship with economic growth in Pakistan, a developing nation like Nigeria and found that increase in electricity consumption leads to economic growth. They concluded that "electricity as an industry is responsible for a great deal of output."

Glasure (2002) also investigates the role of omitted variables in the energy income relation in Korea though the variables he investigated reflected fiscal and monetary policy – real money and real government expenditure. There is weak evidence of cointegration and bidirectional causality between energy and income in this model. These results support the results of Stern (1993) regarding Granger causality between energy and GDP. The result strengthens Stern's previous conclusions that energy is a limiting factor in economic growth. Shocks to the energy supply will tend to reduce output

Ndebbio (2006) argued that electricity supply drives industrialization process. He submitted that one important indicator whether a country is industrialized or not is the megawatt of electricity consumed. He further argued that a country's electricity consumption per-capita in kilowatt hours (KWH) is proportional to the state of industrialization of that country.

Okafor (2008) used descriptive analysis to corroborate the views of these authors by arguing that poor and inefficient electricity supply has adverse implication for industrial development in Nigeria.

Rabiu, (2009) applied production function approach to investigate the impact of erratic power supply on selected firms in commercial and industrial sectors in Nigeria from 1965-1966. His finding shows that about 130 Kilowatts/hour (KW/H) and 172KW/H were not supplied to the firms in the two periods. The estimated costs of this were N1.68 million in 1965 and N2.75 million in 1966. By implication, he noted that erratic power supply has adverse impact on productivity growth of manufacturing sector in Nigeria.

Meadows, Riley, Rao, and Harris (2003) and Tarun, Uddin, &and Ambarish (2013) studies, confirmed electrification to have a positive significant impact on the growth of SMEs as well improves the performance of new commercial establishments (as cited in Maleko, 2005). Correspondingly, Barros, Ibiwoye, and Managi, (2011), utilised primary data and descriptive analysis on 72 SMEs in Cape Town, South Africa to examine the impacts of electricity shortage on the performance of small and medium enterprises (SMEs). The policy options revealed that high prices of electricity, rebates/refund for energy savers and behaviour of electricity consumers do not have significant impacts on SMEs growth (Ellahi, 2011).

As a follow up, Ellahi, (2011) investigated the relationship between electricity supply, development of industrial sector and economic growth for the period 1980-2009 by adopting the endogenous growth theory. The result using autoregressive distributed lag (ARDL) model shows that productivity level of the industrial sector in Pakistan is declining as a result of power shortage. The major recommendation from this study was that electricity problem should be fixed to improve industrial growth.

Corroborating the result of Ellahi, (2011), Mojekwu and Iwuji (2012) investigated the impact of power supply and macro-economic variables on manufacturing sector performance in Nigeria, using time series data from 1981-2009. The multiple regression analysis (MRA) showed that power supply positively has significant impact on capacity utilization, while interest and inflation rate have adverse impact on capacity utilization in Nigeria. The R^2 of 88.54 percent shows changes in capacity utilisation as a result of the predictor variables. It was recommended that, the on-going power reform of the privatisation of the subsector should be fully undertaken by the government and a single digits lending and inflation rate should be adequately sustained.

Olayemi, (2012) utilised the modern and traditional theories of cost to study the impact of electricity crisis on productivity of manufacturing sector in Nigeria using time series data from 1980-2008. The outcome using multiple regression shows that electricity generation and supply have negative impact on productivity growth of manufacturing sector. The poor performance of the power sector is attributed to government expenditure on unproductive sectors. The study recommended for the implementation of the independent power project (IPP) advocated by some states in Nigeria.

3.0. Materials and Methods

3.1. Data Collection and Data Source

Secondary data on the real gross domestic product (RGDP), Electricity supply, (ELCS), Electricity generation (ELCG), Capital (K) and Labor (L) spanning the period 1980-2012 were obtained from the World Development Indicators, 2015 edition.

3.2 Model Specification

The study starts by adopting the simple model of endogenous growth. This growth model has been used by Stern (1991); Romer (1986, 1990), Salai-martin (1990); Ndiyo (2003) etc. According to Romer, the economy-wide capital stock has a positive impact on output. Therefore concentrating on the issue of electricity supply and economic growth, this research adopts the endogenous growth model. The general endogenous production function is taken as:

$$RGDP=AK^{\alpha} L^{\beta} \qquad \text{(i)}$$

Where:

RGDP = GDP (GDP is taken to proxy economic growth)
A = total factor productivity which incorporates the electricity generation expenditure
K = capital stock
L = labour.

Total factor productivity is important because electricity and industrial production operates through the total factor productivity before they affect economic development. Therefore the model can be written as shown below which is also similar to the model used by Ndebbio (2006) and Simon (2012).

$$GDP = f(EECG, ELCS, K, L) \qquad \text{(ii)}$$

The model can be transformed into econometric form and expressed as:

$$GDP = \beta_0 + \beta_1 EECG + \beta_2 ELCS + \beta_3 K + \beta_4 L + \mu \qquad \text{(iii)}$$

Where:

β_0 = Intercept
$\beta_0 - \beta_4$ = Coefficient of variables
ELCS = Electricity Supply
EECG = Total Electricity Generation
K = Gross Fixed Capital Formation
L = Labour force (measured as proportion of workers between 15-64 years)
μ = error term.

The gross fixed capital formation has been used as a proxy for capital (K) while the population proxies the labour force (L) on the assumption that a high population involves physically active individuals between the age of 15-64 years

All the variables were in log form which contributes directly in reducing or solving the problem of heteroscedasticity and autocorrelation (Gujarati, 2004)

3.3 Measurement of Variables

Time series data covering 1980-2012, a period of 34 years was estimated using analytical techniques of unit root test, vector autoregressive (VAR) method, lag length selection criteria, variance decomposition, impulse response function and the Newey- Heteroskedasticity and autocorrelation consistent covariance, OLS estimation method.

3.3.1. Unit Root Test

The prerequisite for time series variables being stationarity or non-stationary is notable in econometrics. Unit root or stationarity test is thus preliminary to the analyses of time series data and is imperative for proper modelling, while it has important economic interpretations (Nuri, 2000). Time series data that are often non-stationary are generally seen as a problem in empirical analysis (Nelson & Plosser, 1982). Using non-stationary variables may lead to spurious regression results from which further inference is worthless. Thus, the existence of a significant and or reliable relationship requires the determination of whether the series are stationary at levels I(0) or at first difference I(1). As such, unit root test is required to identify the true order of integration of each variable in the model to avoid running spurious regression.

The stationarity of the variables or otherwise is determined by applying the unit root tests of the conventional Augmented Dickey-Fuller (ADF). A Dickey-Fuller test is an econometric test that examines whether a time series data has a unit root problem otherwise known as non-stationary. It was developed by Dickey in 1976 and subsequently by Dickey and Fuller in 1979 and 1981 which resulted into the DF, (1979, 1981). Dickey- Fuller-test is a one-sided test because of the alternative proposition or hypothesis that: $\delta < 0$ (or $\rho < 1$).

3.3.2. Vector Autoregressive Method

In econometric circles, the Vector Autoregressive (VAR) modelling is employed in examining the relationship between and among a set of economic variables. It is additionally used in situations where the researcher is not confident about whether a variable is exogenous or not while the frequency of its use is mostly in forecasting analysis. The VAR model is generally referred to by scholars of econometrics as a set of linear dynamic equations where each of the variable of concern is specified as a role of an equal number of lags of itself and all other variables in the system (Lada & Wójcik, 2007). It is, thus, seen as a multiple equation systems involving a set of say *k* time series variables taken as lagged values of all the *k* series. A VAR model depicts many advantages when compared with others like univariate time series models or simultaneous equations models.

The VAR method, pioneered by Sims (1980) has been widely used in macroeconomic modelling. It is an estimation approach in which every equation has the same right-hand variables, that also contains their lagged values. VAR models use observed time series of data to forecast economic variables and have been confirmed effective for forecasting systems of interconnected time series variables. The VAR model is also commonly used for analysing the active impact of diverse kinds of arbitrary instability on systems of variables such as the monetary transmission mechanism.

According to Bjornland (2000), in contrast to what has been practice in many traditional VAR papers like Bernanke (1986) or more recently by Bayoumi and Eichengreen (1992), more emphasis should be put into assuring that the models are dynamically well specified. That is, non-correlation, heteroscedasticity, and normality should be checked, and the order of integration, cointegration and possible regime changes should be dealt with appropriately. In this sense, the approach taken should be more in line with the works of Hendry and Mizon (1990) and Clements and Mizon (1991). They select an unrestricted VAR that is congruent, that is a model that captures the dynamic relationships in the data, is well specified and has constant parameters. Bjornland (2000) further opines that the VAR can be estimated through single equation methods like OLS, which would be consistent, and under the assumption of normality of the errors, efficient. The unrestricted VARs are on reduced form, and are therefore uninterpretable without "reference" to theoretical economic structures. Suppose that zt is a (n x 1) vector of macroeconomic variables whose dynamic behaviour is governed by a finite structural model:

$$\beta_0 z_t = \gamma + \beta_1 z_{t-1} + \beta_2 z_{t-2} + \ldots + \beta_p z_{t-p} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(iv)}$$

Where γ is a constant, β_i, is a (nxn) matrix of coefficients, and ut is a (n x 1) vector of white noise structural disturbances, with covariance matrix $\sum$. A reduced form of zt can be modelled as:

$$Zt = \delta + \alpha_1 z_{t-1} + \alpha_2 z_{t-2} + \ldots + \alpha_p z_{t-p} + \varrho_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(v)}$$

Where $\delta = \beta_0^{-1}\gamma$, $\alpha_1 = \beta_0^{-1}\beta_1$ and $\varrho_t = \beta_0^{-1}\mu_t$ is a white noise process, with nonsingular covariance matrix Ω

In examining the effect of electricity on economic growth in Nigeria, a system of equations is employed using VAR methodology.

$$rgdp = \alpha_0 + \sum \alpha_1 RGDP_{t-k} + \sum \alpha_2 EECG_{t-k} + \sum \alpha_3 ELCS_{t-k} + \sum \alpha_4 K_{t-k} + \sum \alpha_5 L_{t-k} + \mu_1 t$$

$$eecg = \beta_0 + \sum \beta_1 RGDP_{t-k} + \sum \beta_2 EECG_{t-k} + \sum \beta_3 ELCS_{t-k} + \sum \beta_4 K_{t-k} + \sum \beta_5 L_{t-k} + \mu_2 t$$

$$ecls = \delta_0 + \sum \delta_1 RGDP_{t-k} + \sum \delta_2 EECG_{t-k} + \sum \delta_3 ELCS_{t-k} + \sum \delta_4 K_{t-k} + \sum \delta_5 L_{t-k} + \mu_3 t$$

$$k = \lambda_0 + \sum \lambda_1 RGDP_{t-k} + \sum \lambda_2 EECG_{t-k} + \sum \lambda_3 ELCS_{t-k} + \sum \lambda_4 K_{t-k} + \sum \lambda_5 L_{t-k} + \mu_4 t$$

$$l = \pi_0 + \sum \pi_1 RGDP_{t-k} + \sum \pi_2 EECG_{t-k} + \sum \pi_3 ELCS_{t-k} + \sum \pi_4 K_{t-k} + \sum \pi_5 L_{t-k} + \mu_5 t \text{..(vi)}$$

Where:
rgdp = real gross domestic product (proxy for economic growth)
eecg = Electricity generation
elcs = Electricity supply
k = Capital formation
l = Labour
α_0 …… π_0 = Constant or Intercept terms
t = time
k = (1- n years)
$\mu_1 t$ ….. $\mu_5 t$ = Error terms

3.3.2.1. Lag Length Selection

In order to escape reporting unauthentic causal relations; for example to avoid reporting of spurious presence or absence of causal relations, it is important to determine the optimal lag length to be used for the VAR estimations. A combination of Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SC), Likelihood Ratio (LR), Hannan- Quinn (HQ), Final prediction error (FPE) and other lag selection criteria were adopted and ran for determination of the optimal lag length.

3.3.2.2. Variance Decomposition

Another instrument for the interpretation of VAR models is the variance decomposition (VD), which decomposes the total forecast error variance of a variable into the variances of the structural shocks. It is based on the causal representation of the VAR model. Usually, the result is either displayed graphically or in table form. These numbers show which percentage of the forecast variance can be attributed to a particular structural shock and thus measure the contribution of each of these shocks to the overall fluctuations of the variables in question. Variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. In other words, the variance decomposition provides information about the relative importance of each random innovation in affecting the variation of the variables in the VAR. The forecast error variance decomposition shows the magnitude of the forecast error or influence of the variables in the VAR model over time (Rusek, 1994). Equation (vii) describes the mean square error (MSE) matrix of the s-period ahead forecast as:

$$MSE\ (\hat{z}_{t+sit}) = E[(Zt+s - \hat{z}_{t+sit})(Zt+s - \hat{z}_{t+sit})] = \sum_{1=0}^{s-1} Ø_i\, Ø_i' = \sum_{1=0}^{s-1} \theta i' \Omega\, \theta i' \quad \text{……. (vii)}$$

where the conditional variance of the level of z_{t+s}, at various horizons s, is split into the variance from the different unforecastable structural shocks, ξ_t+s . (Liitkepohl, 1993)

3.3.2.3. Impulse Response Function

The direct interpretation of VAR models is rather difficult because it is composed of many coefficients so that it becomes difficult to understand the dynamic interactions between the variables. It is therefore advantageous to simulate the dynamic effects of the different structural shocks by computing the impulse response function (Hall *et al.,* 1996). It shows the effect over time of the structural shocks on the variables of concern. The impulse response function (IRF) will help this study to see the shock effects of, for example electricity supply on economic growth over a long period of time.

Impulse response functions are derived from the causal representation of the VAR process. Clearly, the impulse response function depends on the identification scheme chosen. There are n^2 impulse response functions if the system consists of n variables. Usually, the impulse response functions are represented graphically and are estimated to show the effect of shock on the adjustment path of the variables.

According to Bjornland (2000), a major limitation of the VAR approach is that it has to be estimated to low order systems. All effects of omitted variables will be in the residuals. This may lead to major distortions in the impulse responses, making them of little use for structural interpretations although the system may still be useful for predictions. Further, all measurement errors or misspecifications of the model will also induce unexplained information left in the disturbance terms, making interpretations of the impulse responses even more difficult. However, this does not imply that that impulse responses are useless, but emphasises instead that a careful empirical analysis should be applied when specifying the VAR. Bjornland (2000) indicates that Ericsson et al. (1997) put it more strongly and argue that if inferences are to be made about the characteristics of the underlying data generating process on the basis of impulse response analysis of an estimated VAR, it is imperative that the model be congruent, encompass rival models, and be invariant to extension of the information used. In using VAR models, special concern should therefore be given to check against dynamic misspecifications. All models should also be identified using an economic theory, either tight or loose. Checks can be made as to whether the impulse responses remain invariant to variations in the model specifications, by introducing other relevant variables.

3.3.3. Newey- Heteroskedasticity and Autocorrelation Consistent Covariance Estimator

Newey-West, Heteroskedascity and autocorrelation consistent covariance estimator (HAC Newey-West method) under the OLS estimate produces Newey–West standard errors for coefficients estimated by OLS regression. The error structure is assumed to be heteroskedastic and possibly autocorrelated up to some lag. The Newey-West standard error correction is a commonly used for heteroscedasticity and autocorrelation correction. The formula for the Newey-West covariance matrix estimator can be found in Greene (2000). The Newey-West estimator corresponds to the Bartlett kernel with bandwidth parameter L+1, where L is the maximum lag length. To specify the Newey-West kernel with lag length L, specify KERNEL=(BART, L+1, 0), which produces bandwidth parameter:

l(n) = (L+1)n0 = L+1………………………………………… (viii)

The methodology to compute what are often termed heteroskedasticity and autocorrelation consistent covariance (HAC) standard errors was developed by Newey and West; they are often referred to as Newey-West standard errors.

The main or target equation of the VAR estimates was converted to systems of equation and analyzed via the Newey- HAC consistent covariance OLS estimation method and the result used to explain the effect of external debt on economic growth.

4.0. Data Analysis and Interpretation of Results

4.1. Unit Root Test

In order to avoid spurious result, unit root test through the ADF was conducted on the GDP, electricity generation, electricity supply, capital and labour to determine their stationarity using Eviews 9.0 statistical software. The result of the unit root tests is presented on table 4.1

Table 4.1. Unit Root Tests

Variables	Order of integration	Augmented Dickey Fuller Test ADF tests Critical Values 1%	5%	10%	ADF Statistic	Prob.
ΔGDP	I(1)	3.737853	2.991878	2.635542	4.437344	0.0000
ΔK	I(1)	4.394309	3.612199	3.243079	5.192968	0.0000
ΔL	I(1)	4.296729	3.568379	3.218382	5.718977	0.0003
ΔELCG	I(1)	3.661661	2.960411	2.619160	6.781008	0.0000
ΔELCS	I(1)	3.661661	2.960411	2.619160	8.449011	0.0000

1. Δ = Difference Operator
2. I(d) = No. of times of integration
3. Level = 10%, 5% and 1% level of significance

Results obtained show the order of integration and stationarity of real domestic product, electricity generation, electricity supply, capital and labour by the ADF test. The table shows the order of integration and the number of times the series were differenced. All the variable were stationary at first difference implying an integrated order of I(1).

4.2. The Vector Autoregressive Estimates

In the VAR, all variables are treated as basically endogenous while importance is laid on the conditionality that the error terms should be serially uncorrelated. An extract of the estimates is presented on Table 4.2.

European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.9, No.27, 2017

Table 4.2 Vector Autoregression Estimates

	GDP	EECG	ELCS	K	L
	-1.432796	9.69E-06	-4.32E-05	-0.469958	3.00E-08
	(0.44643)	(0.00031)	(0.00031)	(0.05935)	(2.0E-08)
GDP(-1)	[-3.20948]	[0.03114]	[-0.14061]	[-7.91850]	[1.47330]
	3.250736	0.001822	0.000353	0.474489	1.39E-08
	(0.49376)	(0.00034)	(0.00034)	(0.06564)	(2.3E-08)
GDP(-2)	[3.58363]	[5.29292]	[1.03772]	[7.22842]	[0.61529]
	-1.227394	-0.001565	-0.001069	-0.203580	-8.90E-09
	(0.67572)	(0.00047)	(0.00047)	(0.08983)	(3.1E-08)
GDP(-3)	[-1.81642]	[-3.32245]	[-2.29646]	[2.26622]	[-0.28859]
	753.2618	0.526949	0.099816	138.2223	-7.55E-06
	(368.793)	(0.25714)	(0.25394)	(49.0285)	(1.7E-05)
EECG(-1)	[2.02451]	[2.04926]	[0.39307]	[2.81922]	[-0.44826]
	-908.8843	-0.015742	-0.081646	-168.0564	-8.03E-06
	(350.115)	(0.24412)	(0.24108)	(46.5454)	(-1.6E-05)
EECG(-2)	[-2.59596]	[-0.06449]	[-0.33867]	[-3.61059]	[-0.50262]
	523.8390	-0.032283	-0.106067	81.57250	4.93E-05
	(289.532)	(0.20188)	(0.28344)	(38.4914)	(1.3E-05)
EECG(-3)	[1.80926]	[-0.15991]	[-0.92359]	[2.11924]	[3.72979]
	-873.5527	-0.458221	-0.261786	-137.0798	-3.17E-05
	(411.637)	(0.28701)	(0.28344)	(54.7243)	(1.9E-05)
ELCS(-1)	[-2.12214]	[-1.59651]	[-0.23950]	[-2.50491]	[-1.68427]
	226.5604	-0.744628	-0.068159	24.97755	1.10E-05
	(413.310)	(0.28818)	(0.28460)	(54.9467)	(1.9E-05)
ELCS(-2)	[0.54816]	[-2.58390]	[-0.23950]	[0.45458]	[0.58455]
	-931.3938	-0.217146	-0.118901	-183.1429	-1.98E-05
	(441.648)	(0.30794)	(0.30411)	(58.7140)	(2.0E-05)
ELCS(-3)	[-2.10891]	[-0.70516]	[-0.39098]	[-3.11924]	[-0.98408]
	9.926408	0.001588	0.000639	2.559373	-6.21E-08
	(1.83012)	(0.00128)	(0.00126)	(0.24330)	(8.4E-08)
K(-1)	[5.42390]	[1.24433]	[0.50733]	[10.5193]	[-0.74290]
	-15.11033	-0.008329	-0.002362	-2.507539	-9.12E-08
	(2.14464)	(0.00150)	(0.00148)	(0.28512)	(9.8E-08)
K(-2)	[-7.04563]	[-5.57025]	[-1.59956]	[-8.79483]	[-0.93151]
	18.55409	0.002507	0.005397	5.267151	9.09E-09
	(5.13741)	(0.00358)	(0.00354)	(0.68298)	(2.3E-07)
K(-3)	[3.61157]	[0.69975]	[1.52563]	[7.71198]	[0.03874]
	-5374774.	-12335.44	-3348.075	-247155.9	1.079820
	(4923721)	(3433.07)	(3390.35)	(654575.)	(0.22478)
L(-1)	[-1.09161]	[-3.59313]	[-0.98753]	[-0.37758]	[4.80396]
	-7822920.	7522.738	2683.546	-1169456.	-0.570019
	(1.0E+07)	(7144.41)	(7055.53)	(1362210)	(0.46777)
L(-2)	[-0.76347]	[1.05295]	[0.38035]	[-0.85850]	[-1.21858]
	13279638	5239.218	1120.599	1453248.	0.462034
	(7209744)	(5027.00)	(4964.45)	(958486.)	(0.32914)
L(-3)	[1.84190]	[1.04222]	[0.22572]	[1.51619]	[1.40377]
	1.75E+13	1.75E+10	-1.06E+09	1.12E+12	1878863.
	(9.1E+12)	(6.3E+09)	(6.3E+09)	(1.2E+12)	(415311.)
C	[1.91936]	[2.75106]	[-0.16935]	[0.92695]	[4.52399]
R-squared	0.997702	0.986056	0.883084	0.998372	0.999975
Adj. R-squared	0.995241	0.971115	0.757816	0.996627	0.999949

Diagnostic check of serial correlation was further applied to confirm the stability of the VAR estimates, ensure a better model and determination of appropriate lags length determined. Result of the LM serial correlation test is presented on table 4.2.1

Table 4.2.1: VAR Residual Serial Correlation LM Test

Lag	LM Statistic	Prob.
1	25.72364	0.4225
2	31.30176	0.1792
3	18.15935	0,8356

Result of the test shows that the VAR estimates is generally free from serial correlation and the residuals are not autocorrelated, thereby indicating that lags selection of up to 3 periods would be appropriate.

4.3. Lag Length Selection Criteria

The lag length selection criteria results are as presented on table 4.3

Table 4.3: Lag Length Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-3655.624	NA	6.66e+99	244.0416	244.2751	244.1163
1	-3444.159	338.3429	2.73e+94	231.6106	233.0118	232.0589
2	-3390.705	67.70846	4.77e+93	229.7137	232.2825	230.5355
3	-3307.346	77.80198*	1.51e+92*	225.8231*	229.5596*	227.0184*

* indicates lag order selected by the criterion

From table 4.3, LR, FPE, SC, AIC and HQ selected lag 3 as the optimal lag. Thus, lag 3 was selected for the estimation procedure as presented on the table.

4.4. Variance Decomposition

The result in respect of the variance decomposition of GDP is presented on table 4.4.1 below.

Table 4.4.1: Variance Decomposition of GDP:

Period	S.E.	GDP	EECG	ELCS	K	L
1	1.34E+12	100.0000	0.000000	0.000000	0.000000	0.000000
2	2.03E+12	64.66584	1.096882	10.57623	21.97223	1.688812
3	2.17E+12	56.38343	2.403443	9.501946	19.15606	12.55512
4	2.74E+12	52.87703	6.396482	12.21126	20.13204	8.383187
5	5.49E+12	13.37679	15.10463	4.508562	64.75252	2.257499
6	1.13E+13	60.14193	7.808244	2.227814	29.09103	0.730978
7	1.22E+13	57.12420	13.09939	2.687935	25.12736	1.961117
8	2.46E+13	21.02269	19.08300	1.115411	52.89153	5.887371
9	5.81E+13	43.88586	9.883912	0.723745	44.38509	1.121394
10	7.03E+13	55.21530	10.92723	0.575525	32.45775	0.824193

Result from the variance decomposition of Gross Domestic Product (GDP), shows that in the short run, that is from the 1st period to the 3rd period, the impulse or shock to GDP account for 56.38% variation of the fluctuation in GDP (own shock).Whereas, shock to electricity generation (EECG) would cause about 2.40% fluctuation in the GDP while shock to electricity supply (ELCS) would cause 9.50%. Shock or innovation to capital (K) would cause 19.15% variation of the fluctuation in the GDP, whereas, the shock to Labour (L) account for 12.55% variation in the fluctuation of the GDP in the short-run. And in the long-run, the own shock to GDP would cause 55.21% variation in GDP, thereby indicating that the contribution of GDP to GDP will fall in the long-run own shock.

The shock to EECG account for 10.92% fluctuation in GDP indicating that the contribution of EECG to GDP will increase in the long-run contribution while the shock to ELCS would cause 0.57% variation to GDP which shows that the contribution of ELCS to GDP is less than proportionate in the long-run. The shock to K accounts for 32.45% variation in GDP indicating that the contribution of K to GDP will increase in the 10th period which is the long-run contribution of K to variation in GDP. And for Labour (L) the variation in GDP is accounted for by shock to labour by 0.82%, a decrease in the long-run which is the 10th period.

Result in respect of the variance decomposition of electricity generation, EECG is presented on table 4.4.2.

Table 4.4.2: Variance Decomposition of EECG

Period	S.E.	GDP	EECG	ELCS	K	L
1	9.33E+08	0.071666	99.92833	0.000000	0.000000	0.000000
2	1.30E+09	2.975860	51.73945	16.52048	7.169179	21.59504
3	1.63E+09	1.925866	35.79273	32.37864	4.699643	25.20311
4	2.03E+09	24.29540	23.37119	30.18166	3.511620	18.64013
5	3.15E+09	64.27919	11.00266	12.58164	4.396139	7.740367
6	3.79E+09	67.02394	7.630200	11.56483	7.461912	6.319112
7	4.64E+09	44.69166	6.450325	13.14513	29.69379	6.019089
8	7.95E+09	62.08737	3.714406	4.601425	26.80843	2.788362
9	9.14E+09	62.82105	2.885426	3.506646	28.63693	2.149948
10	1.74E+10	81.06430	3.406943	1.543992	8.449411	5.535356

Result in respect of EECG on table 4.4.2 indicates that the variation in EECG of 1.92% is due to shock from GDP in the short-run, while the own shock from EECG, and shocks from ELCS, K and L are 35.79%, 32.37%, 4.69% and 25.20% in the short-run respectively thereby indicating that own shock resulting to variation in EECG from EECG is 35.79%; In the long-run, shocks of GDP, EECG, ELCS, K and L to EECG in the 10th period are 81.06%, 3.40%, 1.54%, 8.44% and 5.53% in its variations respectively, thereby indicating that own shock resulting to variation in EECG from EECG impacts EECG by only 3.41%, a major decrease from 35.79% in the shortrun. It is important to note the tremendous increase, the contribution to EECG resulting from shock to GDP i.e from 1.92% in the shortrun to 81.6% in the longrun, thereby indicating the importance of EECG to economic growth over the longrun.

Result in respect the variance decomposition of electricity supply ELCS is presented on table 4.4.3.

Table 4.4.3: Variance Decomposition of ELCS

Period	S.E.	GDP	EECG	ELCS	K	L
1	9.21E+08	13.59894	11.22346	75.17761	0.000000	0.000000
2	9.88E+08	13.76097	10.36330	71.82614	1.295767	2.753812
3	1.00E+09	15.03750	10.45673	69.83887	1.640071	3.026825
4	1.12E+09	18.73853	18.04155	56.19119	4.361781	2.666949
5	1.24E+09	15.74454	17.40731	49.50402	7.611054	9.733071
6	1.99E+09	61.23215	6.954881	20.81311	3.027892	7.971967
7	2.89E+09	62.86635	3.626574	17.68700	9.177828	6.642244
8	3.49E+09	43.01411	4.057651	12.22897	29.67068	11.02859
9	5.79E+09	70.53569	1.578914	4.666473	18.55393	4.664998
10	6.62E+09	54.84926	2.373950	4.061961	35.13200	3.582833

Result shows that in the short-run, variation to ELCS due to own shock is 69.83%, while the shock or impulse from EECG, GDP, K and L are 10.45%, 15.05%, 1.64%, and 3..03% respectively; whereas, in the long-run, shock of GDP, EECG, ELCS, K and L to ELCS in the 10th period account for 54.84%, 2.37%, 4.06%, 35.13% and 3.58% respectively in the variations of ELCS thereby indicating decrease in the contribution of ELCS to ELCS resulting from its own shock. However, it is important to note that the variation in ELCS resulting from shock to GDP increased from 15.05% in the shortrun to 54.84% in the longrun meaning that over the longrun, the importance of GDP to ELCS cannot be over emphasised.

Result in respect of the variance decomposition of labour L is presented on table 4.4. 4

Table 4.4.4: Variance Decomposition of L:

Period	S.E.	GDP	EECG	ELCS	K	L
1	61087.11	15.45845	6.672121	5.779823	7.831706	64.25790
2	96862.39	29.27695	2.802207	3.400337	9.163079	55.35743
3	112986.7	36.45153	2.219019	4.111234	8.621618	48.59660
4	127718.1	38.89374	8.490569	5.202869	8.172329	39.24049
5	162294.7	43.33958	16.14289	10.72819	5.105712	24.68363
6	216277.4	34.67955	12.37022	28.28309	5.887191	18.77995
7	282541.4	21.06126	7.933531	43.94971	6.382240	20.67326
8	343368.0	23.20912	5.448152	46.94407	4.356772	20.04188
9	470336.2	26.38935	7.424002	38.53623	16.66316	10.98725
10	710823.8	23.50327	10.28559	24.13453	36.65020	5.426413

In the short-run, variation in labour resulting from shock to GDP, EECG, ELCS and K are 36.45%, 2.21%, 4.11% and 8.62%, respectively; while variation in labour due to own shock is 48.59%. In the long-run, i.e. the 10th period, shock of GDP, EECG, ELCS and K account for 23.50%, 10.28%, 24.13% and 36.65% to the variations in labour respectively. However, variation in labour due to own shock decreased from 48.59% in the short run to 5.42% in the longrun; and correspondingly, a decrease of the contribution of GDP to the variation in

European Journal of Business and Management www.iiste.org
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.9, No.27, 2017

labour from 36.45% in the shortrun to 23.5% in the longrun.

It can be concluded that, GDP is not only influenced by other variables but also greatly affect changes in variables such as labour, most probably due to its endogenous status.

The conclusion that can be reached is that, GDP is influenced by the other variables in the system, and hence GDP is highly endogenous variable. And the variation of the fluctuation in own shock or impulse is accounted for by all the variables in the model used for this research.

Result in respect of variance decomposition of capital, K is presented on table 4.4,5 below.

Table 4.4.5.Variance Decomposition of K

Period	S.E.	GDP	EECG	ELCS	L	K
1	1.78E+11	65.90928	10.06415	0.447813	2.561560	21.01719
2	4.39E+11	62.42805	3.633506	3.623348	4.234320	26.08078
3	4.68E+11	63.41250	5.162185	3.737082	4.066755	23.62148
4	7.52E+11	61.61846	11.66414	1.594124	3.124330	21.99895
5	1.65E+12	25.72252	12.07024	1.073804	2.935404	58.19803
6	2.88E+12	66.67016	6.461248	0.393771	2.321783	24.15304
7	3.36E+12	66.72332	9.562235	1.203378	4.583571	17.92750
8	6.89E+12	17.95198	16.12453	0.848094	1.278376	63.79702
9	1.61E+13	55.33577	7.259656	0.576463	3.100900	33.72721
10	1.72E+13	57.28134	9.486240	0.922100	2.880534	29.42979

Result of the variance decomposition of K indicates that in the shortrun, variation in K due to own shock is 23.62% while variation in K resulting from shocks to GDP, EECG, ELCS and L were 63.41%, 5.16%, 3.73% and 4.06% respectively. However, in the longrun, variation in K due to own shock slightly increased to 29.42% while variation in K resulting from shocks to GDP, EECG, ELCS and L were 57.28%, 9.48% 0.92% and 2.88% respectively.

It is instructive to note that over the long run, variation in K due to own shock increased from 23.62% to 29.42% thereby underlining the importance of capital in engendering economic growth. Similarly, the variation in K resulting from shock to GDP remained high both in the shortrun and the longrun i.e. 63.41% and 57.28% respectively thereby indicating the symbiotic relationship between capital and GDP.

Result of the Impulse response functions of the VAR model is presented on figure 4.1 below.

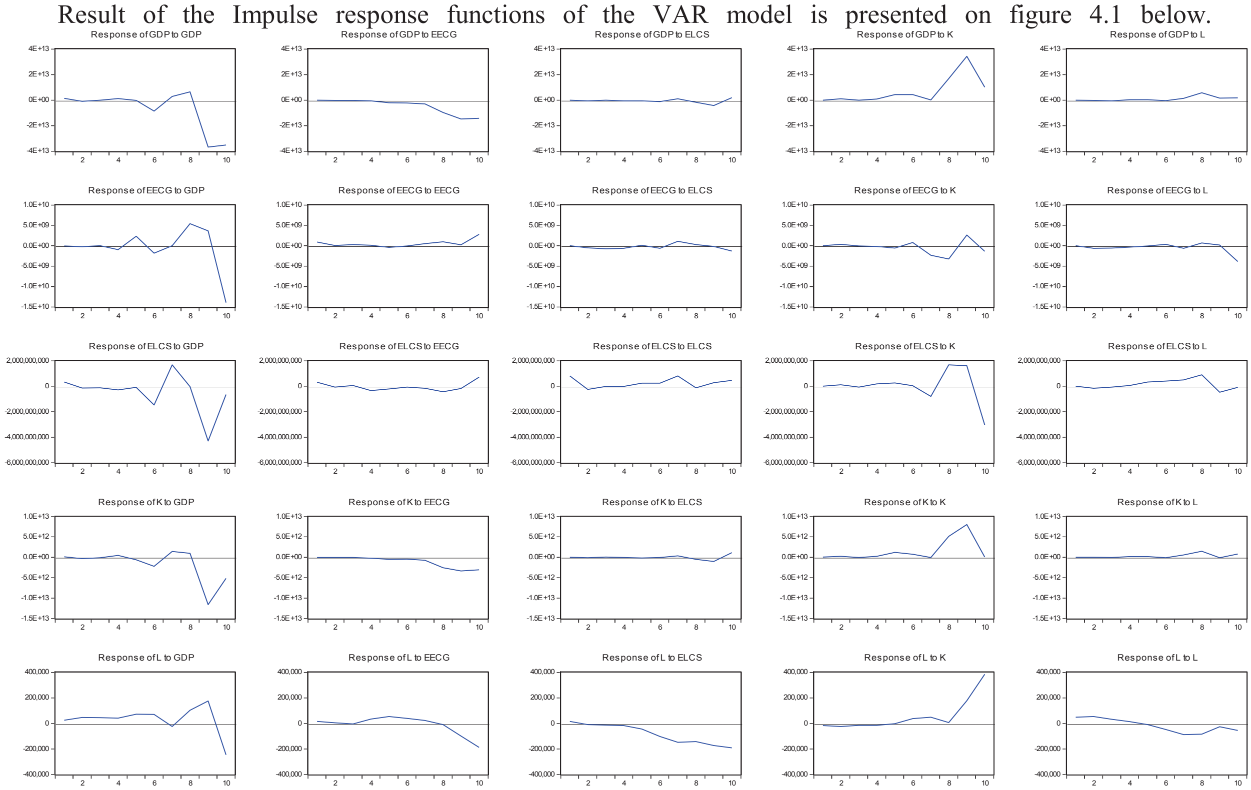

Fig. 4.1: Impulse Response Functions of VAR Estimates of GDP, EECG, ELCS, K and L

In figure 4.1, the representation is that of a response to one standard deviation innovation in *GDP* resulting into a positive response or reaction from *GDP*. The highest positive response by GDP in Nigeria was in period ten. From period 1 to period 3, therefore, the positive response was at an increasing rate, after which it changed to decreasing rate up to period 6 after which it started moving on at an increasing rate up to the tenth period with the same positive reaction to innovations in *GDP*.

On the same panel, figure 4.1, the representation is that of a response to one standard deviation innovation in *EECG* resulting into a positive response or reaction from *GDP*. The highest positive response by GDP in Nigeria was in period eight. From period 1 to period 2, therefore, the positive response was at zero rates, after which it changed to negative at decreasing rate up to period 5 after which it started moving on to positive at an increasing rate up to the eighth period and declined thereafter at the tenth period with the same positive reaction to innovations in *GDP*.

The theoretical expectation has been a positive relation between gross domestic product and electricity generation. Reason for a positive relationship here might be connected with the high production of goods and services, consumption and investible capital which traditionally is expected to come from government and industrial sectors in Nigeria in the long run.

The figure displays the traces of the responses of *GDP* as a result of a shock on electricity supply *(ELCS)* variable. The results show that *GDP* reacted negatively to changes in *ELCS*. The highest response was seen in periods 2 and 3 from which moves on to negative at decreasing rate down to period 4 and started rising at an increasing rate up to period 9 and thereafter fell at period 10. The theoretical expectation has been a positive relation between real gross domestic product and electricity supply. However, the insignificant relationship in the long run may be due to the low level investment which can be explained by lack of strong government expenditure. Increased in government expenditure is usually accompanied with increasing economic activities hence the positive relationship noted in the shortrun and at a slower pace in the long run.

On the same panel of figure 4.1, it is shown that successive responses or reactions to one standard deviation in *GDP* by L. It can be traced that the response was generally positive for the ten-year period under observation. From initial stage the reaction was rapidly positive up to the second period which marked the highest positive reaction before it starts decreasing at the third period and becomes negative at the 4th period moving on a straight line down to the seventh period and thereafter became positive at an increasing rate up to the tenth period. Therefore, in the short run a shock on *GDP* leads to a negative reaction in *L*. In the long run however, though the response remains positive and relatively constant in subsequent periods, the model was statistically significant. The *L* effects on GDP were more essential on the Nigerian economy in the long run.

Finally, in the last panel, it had shown the successive response or reaction of one standard deviation in *GDP* by K. It can be noted that the response was generally negative for the ten-year period under observation. Initially the reaction was zero and then negative in period 1 and period 2 respectively, then ultimately becomes positive in period 4. It declined marginally to negative in period 6 at a decreasing rate down to the tenth period. In the long run, as represented by the last three periods, however, the response reverts to negative. This is not surprising given the state of capital, *K* in Nigeria. It was so weak that the slightest negative shock effect resulting from innovation in *K* will have serious consequences on *GDP*.

Result in respect of the Newey, HAC, OLS estimation of the target or main equation of VAR estimates is presented on table 4.5.

Table 4.5. Newey, HAC - OLS Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.432796	0.446426	-3.209478	0.0020
C(2)	3.250736	0.493760	6.583634	0.0000
C(3)	-1.227394	0.675722	-1.816418	0.0736
C(4)	753.2618	368.7931	2.042505	0.0449
C(5)	-908.8843	350.1150	-2.595959	0.0115
C(6)	523.8390	289.5325	1.809258	0.0747
C(7)	-873.5527	411.6370	-2.122143	0.0374
C(8)	226.5604	413.3099	0.548161	0.5853
C(9)	-931.3938	441.6476	-2.108907	0.0385
C(10)	9.926408	1.830123	5.423903	0.0000
C(11)	-15.11033	2.144639	-7.045630	0.0000
C(12)	18.55409	5.137406	3.611568	0.0006
C(13)	-5374774.	4923721.	-1.091608	0.2787
C(14)	-7822920.	10246557	-0.763468	0.4477
C(15)	13279638	7209744.	1.841901	0.0697
C(16)	1.75E+13	9.10E+12	1.919355	0.0590

R-sqd.	0.997702	F. Stat.	405.2779
Adj. R-sqd.	0.995241	Prob (F. Stat.	0.000000
DW Stat.	1.927349		

Result of the OLS estimation of the target or main equation indicates that the coefficients of variables, C(1) – C(15) exhibited both positive and negative correlation with the gross domestic product, GDP i.e. economic growth; with some statistically significant and others not statis tically significant at various lag levels/periods.

Electricity generation, EECG at one year lagged and at three years lagged had a positive/direct correlation with economic growth with a values of 753.26 and 523.84 and statistically significant at 5% and 10% levels of significance respectively; thereby indicating that a percent change in electricity generation would positively impact economic growth by 753.26% and 523.84% during periods, one year lagged and three years lagged respectively. On the other h and, EECG at two years lagged had an inverse/negative relationship with GDP and statistically significant at 5% level; thereby indicating that a percent change in EECG negatively impacts economic growth by 908.88% during the period. This could mean that electricity generation need to be enhanced particularly over the longrun in order to achieve sustainable economic growth.

Electricity supply, ELCS at periods one year lagged and three years lagged show that inverse relationship between ELCS and GDP given the respective coefficients values, -873.55 and -931.39 which are both statistically significant at 5% level. Although, ELCS exhibited a positive correlation with GDP at two years lagged, it was statistically not significant. This indicates that, for most of the period of study, ELCS was negatively correlated with economic growth. This may be a true reflection of the epileptic supply of electricity and in line with the apriori expectation that inadequate/poor supply of electricity constraints the capacity of the economy to achieve full utilisation of resources or sustained economic growth.

This is also consistent with the positions of Okafor (2008) who argued that poor and inefficient electricity supply has adverse implication for industrial development in Nigeria and Olayemi, (2012) that showed that electricity generation and supply have negative impact on productivity growth of manufacturing sector. Also, Aqeel, and Mohammad, (2001) ran a cointegration on energy and its relationship with economic growth in Pakistan, a developing nation like Nigeria and found that increase in electricity consumption leads to economic growth and that "electricity as an industry is responsible for a great deal of output." while Ellahi, (2011) showed that productivity level of the industrial sector in Pakistan is declining as a result of power shortage.

Capital, K exhibited similar behaviours as EECG but statistically significant at 1% level during the first to the third periods, though the coefficient values are relatively smaller at 9.93, -15.11 and 18.55 respectively; thereby indicating that a percent change in capital would impact GDP i.e. economic growth to the tune of between 9.93% and 18.55%.

Result in respect of labour shows that, except for the period lagged three years which was positively correlated with GDP and statistically significant at 10% level, labour had an inverse relationship during other periods lagged and statistically not significant. This might be reflective of the absence/lack of or inadequate skilled, highly trained and well-motivated manpower required for the effective and efficient operation of the power sector.

The R-squared and the corresponding adjusted R-squared values of 99.77 and 99.52 indicate that fit of the model is appropriate and the independent variables (in conjunction with the lagged value of the dependent variable) account for over 99% variation in economic growth. The F-statistics of 405.28 and its corresponding P-value of 0.00000 further attest to the goodness of fit of the model, while the DW statistic of 1.92 indicates absence of serial correlation in the residuals of the model.

4.6. Diagnostic Tests

Diagnostics tests applied to the OLS estimates of the target or main VAR equations include serial correlation test, test for heteroskedasticity and normality test. Result of the diagnostic tests is presented on table 4.6 below.

Table 4.6: Diagnostic Tests of Serial correlation, Normality and Heteroskedasticity.

Types of Tests	χ^2	*p*-value
Serial Correlation test	12.52686	0.0058
Heteroscekasdicity test	14.51455	0.4868
Normality test (Jack-bera)	1.175418	0.5556

Note: Serial correlation test conducted based on LM statistics values.

Result from the tests point out that the estimated target or main VAR system exhibits serial correlation. But this position could be downplayed given that the result of LM serial correlation test conducted for the VAR estimates (Table 4.2.1), indicated that the residuals of VAR equations are not autocorrelated. However, no evidence of heteroskadasticity was found on the errors of the estimated system. To put it differently, the errors were found to be homoskedastic. On the normality of the errors, it was confirmed that they are normally distributed. Therefore, it can be concluded that the results are not affected by the white noise distribution process, hence efficient and consistent.

Summary, Conclusion and Recommendations

Nigeria is seen as one of the greatest developing nations in Africa with highly endowed natural resources including potential electricity resources. However, increasing access to electricity in Nigeria has proved to be not only a continuous challenge but also a pressing issue with the international community. Economic growth is a prerequisite for a nation to move from a third world country to a developed country. Without doubt constant power supply as well as the provision of other infrastructural facilities usually facilitates the industrial development of any economy. In Nigeria, the near absence of these has affected most industries negatively. Various literatures were theoretically examined in order to establish the linkage between effect of electricity supply and economic growth and this study also utilized time series data to establish the major findings of the study.

The study found that there is a negative relationship and or low impact between capital on electricity and real gross domestic product; thereby indicating that government capital/expenditure on electricity has not been yielding positive effect on the economic growth and development of the country. Despite the huge money which government claimed it has committed to the power sector, this study found that it has not been yielding the desired positive effect on economic growth rather; an increase in capital has resulted on average a decrease in gross domestic product. This might be a reflection that the huge money allocated to the energy sector might have been mismanaged.

More so, the study found that generally, there exists a positive relationship between total electricity generated and real gross domestic product, i.e an increase in electricity generated would increase the real gross domestic product, indicating that electricity generated fosters productive activities which eventually lead to growth. This showed that lots of things still need to be done to further promote the power sector in Nigeria in order to reap the benefit of the power sector.

Furthermore, the study found that there is also indirect/inverse relationship exists between electricity supply and the real gross domestic product and also statistically significant. This may be reflective of the epileptic nature of electricity supply in Nigeria. Gross Domestic Product was found to have indirect relationship with the labour force in the country, the study found that a percent increase in the labour force result on average a decrease in the gross domestic product which may be reflective of the inadequacy of skilled manpower required in the power sector.

Other key challenges facing the energy sector include; the weak development of infrastructure, the high capital cost of energy projects, lack of technical expertise, poor energy service quality/delivery and inefficient technologies and lack of financing and investment for energy projects.

Lack of access to electric power supply, and modern energy in general has a negative effect on productivity and constrains the economic opportunities available to Nigeria. This is compounded by the poor state of existing infrastructure, which creates the dual challenge of finding resources for maintenance of existing facilities and also to build new power plants. Consequently, improving access to modern energy is a necessary condition for boosting growth and reducing poverty in not only Nigeria but Africa in general. It should be noted, however, that energy will enhance the overall economic development goals of Nigeria only if it is supplied in sufficient quantity, at an affordable price, and in a form and quality that support human well-being without threatening the environment. Therefore, the Nigeria government must pay attention to the environmental consequences of various options for enhancing the provision of energy services.

In view of the foregoing, the following recommendations and policy option are suggested thus:

In view of the positive impact of electricity generation on economic growth, deliberate policy which aims at increasing electricity generation should be vigorously pursued to meet the increasing demand of electricity by the real sector for commercial and private uses.

The Public Private Partnership leading to the establishment of the GENCOS and DISCOS should be adequately exploited and effectively monitored to improve efficiency in the sector. Staff of power holding company of Nigeria (PHCN PLC) should be thoroughly trained to be able to handle the machines with great expertise for increased efficiency and productivity of the sector with a view to engendering increased power generation and supply for sustainable economic growth and development of the country.

The study also recommends that; the Nigerian government should therefore build more thermal stations and try as much as possible to increase the capacity utilized of the existing one while the capacity utilization in the hydro stations should also be increased. Government should design policies that enhance more productive capacity of the real sector through appropriate energy supply that can aid the economic activities of the real sector

Mismanagement and corruption within should be addressed so as to sanitize to the sector.

All these have to be in place if the Nigeria must achieve the goals and objectives set out in the country's vision 20:20:20 document and the current economic recovery and growth plan (ERGP).

References

Adegbamigbe A (2007). Obasanjo's Legacies. *The News*, 28 (21); 68-70.
Adenikinju, O. S. (1990): Analysis of the cost of infrastructure failure in a developing economy
Adeyemi B (2007). Eight years of Obasanjo: Foundation laid for Industrial Revival *The Guardian,* 54.
Aigbokan, B. E. (1999): Evaluating Investment on Basic Infrastructure in Nigeria Proceedings of the Eight Annual Conference of the Zonal Research Unit organized by the Research Department of Central Bank of Nigeria
Alam, M. S. (2006). Economic growth with energy. *Journal of Sustainable Development,* 4(1), 200 – 206.
Aqeel, A. & Butt, M. S. (2001). The Relationship between Energy Consumption and Economic Growth in Pakistan*. Asia-Pacific Development Journal,* 8(2). 101 – 110.
Aqeel, A. & Mohammad Sabihuddin Butt, M. S. (2001): The relationship between energy consumption and economic growth in Pakistan, *Asia-Pacific Development Journal,* 8(2). 101 – 110.
Aremu, M. A. & Adeyemi, S. L. (2011). Small and Medium Scale Enterprises as A Survival Strategy for Employment Generation in Nigeria. *Journal of Sustainable Development,* 4(1), 200 – 206.
Asafu-Adjaye, J. (2000): 'The relationship between energy consumption, energy prices and economic growth: time series evidence from Asian developing countries'. Energy Economics. 22**.** 615-625.
Asaolu, T. O. & Oladele, P. O. (2006). Public Enterprises and Privatisation Policy: *The Nigerian Experience in Nigerian economy: Essays on Economic Development edition*. (Feridun and Akindele), *Munich Personal Repec Archive, MPRA*: 293 – 394.
Ayodele, A. S. (2001): Improving & sustaining power (electricity) supply for socio-economic development in Nigeria, *http://www.cenbank.org/out/Publications/occasionalpapers/rd/2001/Owe-01-3.*
Bjornland, H. C.(2000). VAR Models in Macroeconomic Research. Technical Report. Statistics Norway Research Department; Statistisk sentralbyra. Oslo. October.
Barros, C. P. Ibiwoye, A. & Managi, S. (2011): Nigeria' Power Sector: Analysis of productivity. *Working Paper No. WP 10/2011/DE/UECE,* School of Economics and Management, Technical University of Lisbon. *http://www.repository.utl.pt/bitstream/10400.5/3052/1/WP_DE_CESA2011.pdf*
Barros, C. P., Ibiwoye, A. & Managi, S. (2011). Nigeria' Power Sector: Analysis of productivity. *Working Paper No. WP 10/2011/DE/UECE,* School of Economics and Management, Technical University of Lisbon. *http://www.repository.utl.pt/bitstream/10400.5/3052/1/WP_DE_CESA2011.pdf*
Central Bank (2006). *Annual Report and Statement of Accounts*. Abuja: Central Bank of Nigeria Publication.
Development In Nigeria." *Community Research and Development Centre.*
Dinkelman, T. (2008): The Effects of Rural Electrification on Employment: New Evidence from South Africa. PSC Research Report No. 08-653. August, *http://www.psc.isr.umich.edu/pubs/abs.html?ID=5389*
Ekpo, A. H. (2009): The Global Economic Crisis and the Crises in the Nigerian Economy, Presidential Address to the 50th Conference of the Nigerian Economic Society, September,Abuja-Ngeria.
Etiosa, U.(2007). "Renewable Energy and Energy Efficiency and Sustainable
Johnson, B. (2007): Odds against Yar'Adua. *The News*, May 21, 2007 pp.18-23. National Planning Commission 2004. *Nigeria: National Economic Empowerment and Development Strategy.* Abuja: National Planning Commission.
Khan, A. A. & Khan, M. (2010): Pakistan Textile Industry Facing New Challenges, *Research Journal of International Studies,* 14: 21 – 29.
Liitkepohl, H. (1993): *Introduction to Multiple Time Series Analysis,* 2nd. ed., Berlin: Springer-Verlag.
Mark, O.and Tonye N. (2009). "Overcoming Nigeria's Energy Crisis".Towards Effective Utilization of Associated Gas and Renewable Energy in the Niger Delta. *Social Action Briefing. www.saction.org.*
Morimoto, R.,and Hope, C. (2001). The impact of electricity supply on economic growth in Sri Lanka. Judge Institute of Management Res. *Paper. National Bureau of Statistics.*
National Technical Working Group (2009): Nigerian Vision 2020 Program, July, http://www.npc.gov.ng/vault/NTWG%20Final%20Report/employment%20ntwg%20report.pdf
Ndebbio, J. E U. and Ekpo, A. H (1991). The Nigerian Economy at the Crossroads. Policies and their Effectiveness. University of Calabar Press, Calabar Nigeria.
Ndebbio, J. E. U (2006). The Structural Economic Dimensions of Underdevelopment, Associated Vicissitudes and Imperatives: Agenda for Positive Change, 33rd Inaugural Lecture, University of Calabar-Nigeria, Saesprint Publishers-Nigeria.
Ndebbio, J. E. U (2006): The Structural Economic Dimensions of Underdevelopment, Associated Vicissitudes and Imperatives: *Agenda for Positive Change, 33rd Inaugural Lecture, University of Calabar-Nigeria, Saesprint Publishers-Nigeria.*
Ndebbio, J.E.U (2006).' The structural Economic Dimensions of Underdevelopment, Associated Vicissitudes and Imperatives: Agenda for Positive Change', 33rd Inaugural Lecture, University of calabar-Nigeria, *saesprint publishers-Nigeria.*

Ndiyo, N.A (2003). On Production and Technological Diffusion in Nigeria, *South African journal of Economic and Management science 6(848-862)*

Nwankwo, O.C (2013). The Effect of Electricity Supply on Industrial Production Within The Nigerian Economy (1970 – 2010). *Journal of Energy Technologies and Policy. 3(4).*

Odiaka, P. (2006): Power Sector reforms: Still a reign of blackout. *The Guardian,* August 24, 2006 p. 15.

Offiong, D. A. (2001): *Globalisation: Post Neo-dpendency and Poverty in Africa*. Enugu: Fourth Dimension Publishing Co.

Ogunjobi, A. (2007): Succumbing to Imports. *TELL*, May 21, 2007 pp. 40- 41.

Okafor, E. O. (2008): 'Development Crisis of the Power Supply & Implications for Industrial Sector in Nigeria', *Kamla-Raj Journal*. 6, 83-92.

Okafor, E.E. (2011): Youth unemployment & implications for stability of democracy in Nigeria. *Journal of Sustainable Development in Africa*, 13(1), 358 – 373.

Oke, O. A. (2006). Impact of energy on the manufacturing sector in Nigeria. Retrieved July 08, 2013 from http://www.fypower.org/pdf/mfg_NAM_NASE.Pdf.

Oke, O. A. (2006): 'Impact of Energy on the Manufacturing sector in Nigeria', *www.fypower.org/pdf/mfg*

Okereke, O.C. An Analysis of the Failure of the National Power Project for the Supply of 6000MW in December (2009): Report on Projects & Project Management in Nigeria, *PM World Today* – January 2010 *http://www.pmforum.org/library/RegionalReports/2010/PDFs/jan/RR-NIGERIA.pdf*

Onogu, B. A. N. (2005): Small and medium entreprises (smes) in Nigeria: problems and prospects, being a dissertation submitted to the st. Clements university in partial fulfilment of the requirements for the award of the degree of doctor of philosophy in management, *http://www.stclements.edu/grad/gradonug.pdf*

Peter S.U et al, (2012). An Econometric Analysis of the Determinants of Electricity Supply in Nigeria. International *Journal of Business Administration. 3(4).*

Rabiu, A. (2009): The Cost of Electricity in Nigeria. *International Association for Energy Economics,* First Quarter: 15 -17.

Romer, P.M (1986). Increasing Returns and long -run Growth' *Journal of Political Economy,94,(1002-1037)*

Romer, P.M (1990). 'Endogenous Technological change *" Journal of political Economy Journal of Energy Technologies and Policy* www.iiste.org ISSN 2224-3232 (Paper) ISSN 2225-0573 (Online) .3, (4)

Sanchis, M. T. (2007): Quantifying the contribution of electricity to Spanish economic growth during the twentieth Century. Paper presented at the III Iberometrics Valencia, March 23-24.

Stern, N. (1991). 'The Determinant of Growth', *Economic Journal*, vol.101, pp 213-231

Stern,N. (1991). 'The Determinant of Growth' *Economic Journal,101(213-231).*

Subair, K. & Oke, M.D. (2008): Privatization and trends of aggregate consumption of electricity in Nigeria: An empirical analysis. *African Journal of Accounting, Economics, Finance and Banking Research* 3(3), 18 – 27

Subair, K. and Oke, M.D. (2008). Privatization and trends of aggregate consumption of electricity in Nigeria: An empirical analysis. *African Journal of Accounting, Economics, Finance and Banking Research* 3(3), 18 – 27

Subair, K. and Oke, M.D. (2008): Privatization and trends of aggregate consumption of electricity in Nigeria: An empirical analysis. *African Journal of Accounting, Economics, Finance and Banking Research* 3(3), 18 – 27

Timothy, E. Wirth (2005). "Forward to Rethinking the Energy Paradigm: Global Opportunities for Trade, Development and Sustainability*". The Proceedings of the Public Symposium of the World Trade Organisation (WTO)* held on 21st April, 2005 in Geneva.

Ubi P.S and Effiom L. (2013). The Dynamic Analysis of Electricity Supply and Economic Development: Lessons from Nigeria. *Journal of Sustainable Society* 2(1).

Udah, E. B (2010). "Industrial Development, Electricity and Economic Performance in Nigeria*". European journal of Economics, Finance and Administrative Sciences*. ISSN 1450 -2275 Issue.

Udeajah, G. (2006): Industrial firms lose N38 to power outage. *The Guardian*, August 24, 2006 p. 29.

Uzochukwu, A. Uche, C. N. (2012). Financing Electricity Development in Nigeria. Analysis of impact on the electricity sector. Australian journal of businessand management research 2 (3):54-61. www.fypower.org/pdf/mfg.

Uzochukwu, A. Uche, C. N. (2012): Financing Electricity Development in Nigeria. Analysis of impact on the electricity sector. *Australian journal of business and management research vol.2 no.03 [54-61].*