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AN EXAMINATION OF THE IMPACT OF POWER SECTOR REFORM ON MANUFACTURING AND SERVICES SECTOR IN NIGERIA: AN EMPIRICAL ANALYSIS

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Abstract:

The main objective of this study is to empirically examine the impact of Power Sector Reform on Manufacturing and Services Sectors in Nigeria between 1999-2016. The study employed secondary annual time series data sourced from World Bank database (2016). The methodology adopted for this study was Augmented Dickey-Fuller (ADF) and a test for long-run relationship using ARDL Bounds Testing approach with analysis of long-run and short-run dynamics in the model. A striking revelation from the study is the inverse relationship that exists between manufacturing output and electricity consumption in Nigeria within the period referenced. This negative relationship is not unconnected with widespread allegation of misappropriation of budgeted funds for the Power Sector by successive administrations in Nigeria since 1999. It must be stated in clear terms that constant and consistent electricity generation, transmission and distribution is sine-qua-none for the growth of the national economy. Virtually all sectors of the economy depend on the supply of electricity to do business and so the lack of this vital ingredient of growth contributes in no small measure in stagnating economic growth and development. Efforts at reforming the power sector can only be fruitful when ALL stakeholders in the power sector, including the political class, put away their personal

agendas and take the bull by the horn towards rescuing the nation from the looming danger of stagnant economic growth. Furthermore, there is the need for the Nigerian government to come up with new, better and alternative ways of improving energy generation and supply, as well as proper maintenance of electricity infrastructure in the country.

Keywords: Power Sector; Reform; Electricity consumption, Manufacturing; Services; ARDL

INTRODUCTION

Electric energy is an important factor of production and crucial for industrialization and economic growth of any nation. The quest for rapid and sustainable economic growth of an economy is a function among other variables, of not just adequate power supply but a sustainable and reliable distribution of energy, particularly electricity for economic growth and development (Ogunjobi, 2015). In fact, no economy will develop without having an efficient and functioning energy consumption platform. In Nigeria, energy serves as the pillar of wealth creation. It is the nucleus of operations and engine of growth for all sectors of the economy. The output of electricity in the country usually consolidates the activities of other sectors which provide essential services to direct production activities in agriculture, manufacturing, mining, commerce, etc. Nigeria is endowed with abundant energy resources but suffers from perennial energy crisis which has defied solution. Successive administrations in Nigeria have invested humongous amount of money (in billions of American dollars) towards revitalizing this all-important sector upon which the economic success and prosperity of Nigeria depends, with little or nothing to show for it (Adegbemi et al, 2013).

Statement of the Problem

The disagreement on the association connecting electricity consumption with gross domestic product (GDP) was adequately investigated in energy economics literature Ocal et al. (2013) cited in Ismail and Sallahuddin (2016). Diverse empirical findings were maintained and in many instances found to be contradictory. A lot of factors have contributed to these disagreements and discrepancies, among which are methodologies adopted and the period of study chosen. In some cases, such works studied the energy sector overall without giving definite and particular attention to electricity consumption which is the core index for measuring energy consumption in Nigeria. It is in view of these inconsistencies that this paper seeks to empirically examine the impact of Power Sector Reform on Manufacturing and Services Sector in Nigeria

The study is deliberately designed to cover the period 1999 – 2016, a seventeen years period for specific emphasis on the Fourth Republic democratic dispensation. The choice of scope is further motivated by the fact that it was during these periods (1999 – 2016) that Nigeria invested billions of US dollars in investment to make the power sector efficient and effective towards contributing to overall economic growth and development. The value of the federal government's investment in these enterprises for the period studied is mind-boggling and it is not an exaggeration to state that the power sector has steadily absorbed a large share of public finances without commensurate benefits to the economy, hence this study is timely. The following research questions are expected to be answered at the end of the study (a) what is the effect of power sector reform on manufacturing output in Nigeria? (b) what is the impact of electricity consumption on services sector of the Nigerian economy?

Study Objectives

In specific terms, the study aims at achieving the following objectives:

(i) Examine the effect of Power Sector Reform on manufacturing output in Nigeria;

(ii) Examine the impact of Electricity consumption (proxy for power sector reform) on services sector in Nigeria;

Research Hypotheses:

The study shall examine the veracity of the following hypotheses:

H_{o1}: Power Sector Reform has no significant effect on manufacturing output in Nigeria;

H_{o2}: Electricity consumption has no positive impact on services sector in Nigeria;

This study proceeds as follows. Section II reviews previous literature on Power Sector Reform in Nigeria, Economic Growth, etc. Section III develops an empirical model for analyzing the effect of power sector reform on economic growth in Nigeria and describes the data utilized in this study. Section IV presents and discusses the results of the empirical model, while Section V provides conclusion and policy recommendations.

Historical overview

Electric power came to Nigeria in 1898 with the establishment of the first generating plant by the British colonial government (Okoro & Chikuni, 2007 in Okolobah & Ismail, 2013 and Aminu and Brown (2014). The management of the generating plant was named the Public Works Department (PWD). Thereafter, the then Federal Government of Nigeria passed an ordinance in 1950, establishing the Electricity Corporation of Nigeria (ECN) which was saddled with the responsibility of generating, transmitting, distributing and sale of electricity in Nigeria. Other bodies like the Native Authorities and the Nigeria Electricity Supply Company (NESCO) had licenses to produce electricity in some locations in Nigeria (Okobolo and Ismail, 2013). In 1962, the Federal Government by an act of Parliament established the Niger Dam Authority (NDA). The authority was responsible for the construction and maintenance of dams and other works in the River Niger and elsewhere, generate electricity by water power, improve navigation and promote fisheries and irrigation. The electricity produced by NDA was sold to ECN for distribution and sales at utility voltages. In April 1972, by a decree, Electricity Corporation of Nigeria and Niger Dam Authority were merged to form National Electric Power Authority (NEPA). The reasons given for this merger include: vesting of production and distribution in one company and that it will bring about more efficient utilization of the human, financial and other resources available to the electricity supply industry in the country (Babatunde & Shaibu, 2008).

In 1973, NEPA became operational and was responsible for generating, transmitting and distributing of electricity to all parts of the federation. Starting with only four power stations namely, Ijora, Delta, Afam thermal stations and Kainji hydro power station, with a total installed capacity of 532.6MW serving more than two million customers, which has grown to 5,958MW in year 2000 with the establishment of additional power stations namely Jebba, Shiroro hydro power station Egbin, Sapele, Delta thermal power station in the early eighties having a combined installed generating capacity of 2940MW (PHCN, 2010. Nigeria @ 50: Status of Power sector). In 1988, NEPA was partially commercialized and supported by an upward review of the tariffs. This was aimed at attracting investors to the sector. Due to increase in the population of the country and the absence of additional power plants, the available facilities became overstretched and this led to the reform of the power sector.

Power sector reform in Nigeria

With the return of civil rule in 1999, the federal government embarked on power sector reform. This culminated in the Electric Power Sector Reform (EPSR) Act 2005. This is contained in a Federal Government of Nigeria Gazette and it stipulates the reforms in the electricity power sector and how they are to be implemented. The Power Sector Reform was embarked upon on March, 2005 due to the inadequate supply of electricity, high demands and issues with bills. The main goal of the reform is to accomplish full deregulation of the Electricity Supply Industry (ESI) in two years after its implementation. The objectives include making electricity generation and supply available to consumers, making the sector investor-friendly and dismantling NEPA's monopoly. This was achieved through the passage of the Electric Power Sector Reform (EPSR) Act which came into being on the 11th of March, 2005. The reasons given for the reform include: introduction of competition in the industry as a means of improving industry efficiency that will result in providing lower energy prices to end users, lack of price transparency in utility operations, hence consumers and regulators demand price transparency and declaration of cross subsidies among different users. Like many other public owned institutions, corruption, inefficiency and managerial incompetence prevailed and the electricity industry showed inconsistent policy direction and lack of strategy framework for its sustainable development. Policy decisions by past government in the ESI were based on political or administrative interest instead of efficient resource allocation and cost recovery necessary for economic development and the strategic energy policy for the country was never implemented (Okobolo and Ismail, 2013).

The Act repealed the earlier law establishing NEPA, consequently, the Power Holding Company of Nigeria (PHCN) was set up and charged with the responsibility of providing power supply. It also restructured the power sector from a vertically integrated structure into eighteen unbundled autonomous companies comprising one transmission company called TransCo, six generation companies known as GenCos and eleven distribution companies- DisCos respectively. The Act focused on the liberalization and privatization of the sole power provider-PHCN while introducing Independent Power Producers IPPs. The EPSR Act nurtures a wholesome market starting with a single buyer of electricity produced by PHCN and the IPPs for onward sale to the eleven DisCos that would also be offered for sale. Eventually, the single model would be discarded for a bilateral contract model with suppliers and buyers free to contract between themselves (www.mbendi.com).

The Act further provides for the establishment of the Nigeria Electricity Regulatory Commission (NERC) which is charged with the following: (Inugonam, 2005). Regulate tariffs and quality service; oversee the activities of the industry for efficiency; institutional and enforcement of the regulating regime; licensing of Generation, Distribution, Transmission and Trading companies that result from the unbundling of NEPA; legislative authority to include special conditions in licenses; provision relating to public policy interest in relation to fuel supply, environmental laws, energy conservation, management of scarce resources, promotion of efficient energy, promotion of renewable energy and publication of reports and statistics; providing a legal basis with necessary enabling provisions for establishing, changing, enforcing and regulating technical rules, market rules and standards.

In November 2005 Nigeria Electricity Regulatory Commission was inaugurated and took full responsibility. Other aspects of the reform provided for the management of the Rural Electrification Agency (REA), the National Electric Liability Management Company (NELMCO) which is a special purpose entity created to manage the residential assets and liability of the defunct NEPA after privatization of the unbundled companies. The Act also provided for the establishment of a Power Consumer Assistance Fund (POLAF) to subsidize under-privileged electricity consumers (Balogun, 2010).

Empirical Studies on Electricity Supply and Demand in Manufacturing Sector in Nigeria

For any meaningful improvement in the productivity of manufacturing sector to take place in any economy, the supply and demand of electricity must remain uncompromising elements of the process. This submission was corroborated by Iwayemi (1998) and Odell (1995) as cited in Olayemi (2012). While Iwayemi (1998) argued that, for Columbia as a nation to industrialize, electricity supply and demand are crucial factors in the process. Odell (1995) also averred the importance of energy sector in the socio-economic development of Nigeria. He further submitted that strong demand and increased supply of electricity would stimulate increased income and higher living standards in Nigeria.

Ndebbio (2006) agreed with this contention, noting that electricity supply drives the growth of manufacturing sector. He argued that one important indicator to show whether a country's manufacturing sector is growing or not is the megawatt of electricity supplied and consumed. According to him, a country's electricity consumption per capita in kilowatts per hour (Kw/H) is proportional to the state of the growth of the industrial sector of the country.

In another study, Adenikinju (2005) also supported the various arguments from Iwayemi (1998), Odell (1995), as well as Ndebbio (2006), by providing a strong argument to further support the overwhelming importance of energy supply to the Nigerian economy. The poor nature of electricity supply in Nigeria, according to him, has imposed significant cost on the manufacturing sector of the economy. This argument is also in line with the survey of the Manufacturers Association of Nigeria (MAN) in 2005, where it was revealed that the cost of generating power constitute about 36 percent of production cost in the sector. Accordingly, Ekpo (2009), in his own opinion, elaborated on the cost of running a generator economy and its adverse effects on investment. He strongly opined that for Nigeria as a nation to accelerate the pace of the growth of manufacturing sector, the country should consider fixing power supply problem.

Furthermore, Adenikinju (2005) examined the cost of electricity shortages on the Nigerian manufacturing sector using the data obtained from a nationwide survey. The study confirms that the cost of electricity failures to the Nigerian manufacturing sector is quite high and very alarming. Nigerian firms were found to incur costs on the provision and maintenance of expensive back-up such as generators and other diesel-powered machines to minimize the expected outage costs. This constitutes high cost diesel and gas with the average costs as huge as three times the cost of government-supplied electricity. The marginal cost estimates also indicates that the cost of Kwh of unserved electricity is very high. These teething challenges in the sector have led to lot of multinational corporations closing their firms and relocating to nearby countries that enjoy uninterrupted electricity supply.

Okonkwo (1998), submitted that regular supply of all forms of energy in an economy is regarded as essential oil for lubricating or propelling the wheels of economic activities, aimed at increasing growth of aggregate output. Energy, apart from serving as a pillar of wealth creation in developing economies, serves as an engine of growth for all sectors of the economy; electricity development and utilization therefore has pervasive impact on industrial development of every nation.

Finally, in an attempt to explore the area of the impact of electricity, numerous literatures only revealed the relationship between economic growth and electricity supply, with some only on manufacturing output, with little empirical attention on the effect of electricity on the various sectors of the economy. This could lead to fallacy of composition because economic growth is only a function of the performance of different sectors which certainly differ in their need for electricity. In response to this perceived gap, this study explores the effect of Power Sector Reform on manufacturing output and services sector in Nigeria.

STUDY METHODOLOGY

The analysis began with the unit root test to determine whether the time series data were stationary at levels or first difference. The unit root test was conducted on each variable in the model, namely, MAN, Serve and E-consump. The Augmented Dickey Fuller (ADF) unit root test were used to test for the stationarity of the variables. A stationary time series refers to the series with a constant mean, constant variance, and constant autocovariances for each given lag (Brooks, 2008). After determining the order of integration of each of the time series, and if the variables were integrated of the same order, the ARDL Bounds Testing approach to cointegration test was used in this study to determine whether there is any long-run or equilibrium relationship between E-consump and the other independent variables in the model. If the variables were found to be cointegrated, then an error correction mechanism (ECM) through ARDL approach would be estimated to model the short-run dynamics.

Model Specification

Augmented Dickey-Fuller Unit Root Test Model

To study the stationarity properties of time series, the Augmented Dickey-Fuller test (ADF) (Dickey & Fuller, 1981) is employed in this study. The test involves estimating the regression. The model for the ADF unit root framework is as follows: $\Delta X_t = \alpha_1 + pt + \beta X_{t-1} + \sum_{i=1}^{k-1} \gamma_i \Delta X_{t-1} + \varepsilon_t$ .... (3.1)

In the above equation, α is the constant and ρ is the coefficient of time trend. X is the variable under consideration. In this study, the variables include log(FDI), log(GDP-pc), log(INVT), and log(MAN). Δ is the first-difference operator; t is a time trend; and ε_t is a stationary random error. The test for a unit root is conducted on the coefficient of X_{t-1} in the above regression. If the coefficient, β, is found to be significantly different from zero ($\beta \neq 0$), the null hypothesis that the variable X contains a unit root problem is rejected, implying that the variable does not have a unit root. The optimal lag length is also determined in the ADF regression and is selected using Akaike information criterion (AIC).

Estimation Techniques: ARDL Modelling Approach

The estimation technique adopted for this work is based on Auto-regressive Distributed Lag (ARDL) approach and Error Correction Mechanism (ECM). The ARDL modeling approach popularized by Pesaran and Pesaran (1997), Pesaran and Smith (1998), Pesaran and Shin (1999), and Pesaran et al. (2001) has numerous advantages. The main advantage of this approach lies in the fact that it can be applied irrespective of whether the variables are I(0) or I(1) and that none of the variables is stationary at 1(2) and beyond (Pesaran and Pesaran 1997, pp.302- 303). Another advantage of this approach is that the model takes sufficient numbers of lags to capture the data generating process in a general-to-specific modelling framework. Moreover, a dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation (Banerjee et al. 1993, p.51).

The ECM integrates the short-run dynamics with the long-run equilibrium without losing long-run information. It is also argued that using the ARDL approach avoids problems resulting from non-stationary time series data. This study illustrates the ARDL modelling approach by considering the following equation:

$$Ln(E\text{-}consump) = \delta_o + \delta_1 Ln(MAN) + \delta_2 Ln(Serv) + \mu_t \ldots \quad 3.2$$

Where

E-consump	=	Electricity consumption (proxy for Power Sector Reform) (1999-2016)
MAN	=	Manufacturing sector output (1999 – 2016)
Serv	=	Services sector (value added, % of GDP)
μ_t	=	Stochastic error term / time trend

Moreover, δ_0, δ_1, δ_2 are the respective parameters.

The equation of ARDL is as follows:

$$\Delta Ln(E\text{-}consump)_t = \alpha_o + \alpha_1 Ln(MAN)_{t-1} + \alpha_2 Ln(Serv)_{t-1} +$$

$$\sum_{i=1}^{m} \beta_1 MAN_{t-i} + \sum_{i=1}^{m} \Theta_2 Serv_{t-i} + \varepsilon_t \ldots\ldots\ldots \quad 3.3$$

where:

The null and alternative hypotheses are as follows:

H_0: $\lambda_0 = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4$ (No long run relationship exist)

Against the alternative hypothesis:

H_0: $\lambda_0 \neq \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4$ (Long run relationship exist)

The ARDL approach to cointegration involves three stages. In the first stage, the hypothesis that cointegration is absent is tested. More specifically, the null hypothesis is that the coefficients of lagged regressors (in levels) in the underlying ARDL error correction model are jointly equal to zero. The null hypothesis is defined by: H_0: $ƛ_0 = ƛ_1 = ƛ_2 = ƛ_3 = ƛ_4$ (No long run relationship exist) and it is tested against the alternative hypothesis that $β_0 ≠ β_1 ≠ ƛ_2 ≠ ƛ_3 ≠ ƛ_4$ (Long run relationship exist).

The ARDL approach uses the F-test to determine the presence (or not) of a cointegrating relationship between variables, although the asymptotic distribution of the F-statistic in this context is not standardized without taking account of whether the variables are I(0) or I(1). The critical values of this distribution are given in Pesaran and Pesaran (1997), and Pesaran et al. (2001). Two sets of values are presented in the form of a table. The first set assumes that all the variables are I(1), while the second set assumes that all the values are I(0). This makes it possible for the variables to be stationary and first-order integrated. If the value of the calculated F-statistic is higher than the highest value of this region, the null hypothesis is rejected, thus indicating the presence of cointegration between variables without taking account of whether they are I(1) or I(0). If the value of the F-statistic falls below this region, the null hypothesis of no cointegration cannot be rejected, whereas an F-value lying within the region implies that the result of the test is indeterminate.

If the existence of a long-run relationship between the variables is borne out, the second stage in the analysis consists in estimating the short-run and long-run parameters, using the ARDL approach. Once the long-run relationship between the variables is determined, then the estimates of the long-run ARDL can be obtained. If a long-run relationship between the variables exists, then there also exists an error-correction representation. Consequently, the error correction model is estimated in the third step; it indicates the speed of adjustment to long-run equilibrium following a short-run shock.

A general error-correction representation of equation is formulated as follows:

$$\Delta Ln(E\text{-}consump)_t = \beta_o + \sum_{i=1}^{m} \delta_1 \Delta MAN_{t-i} + \sum_{i-1}^{m} \Pi_2 \Delta Serv_{t-i} + \varphi_1 ECM_{1t-1} + \varepsilon_t \quad .... \quad 3.4$$

Where,

ϕ = Speed or rate of adjustment; $\boldsymbol{\delta}_1$, Π_2, $\boldsymbol{\alpha_3}$, represents the coefficients of the variables respectively; Δ is the difference operator, *m* is the lag length of the variables; ect_{t-1}denotes the residual from the cointegration equation (the error correction term), and $\boldsymbol{\varepsilon_t}$ is the uncorrelated white noise residuals.

Economic a priori

This specifically has to do with sign expectation set by economic theory and it is expected that parameters in this model have the correct signs and sizes that conform to economic theory. If they carry the expected signs, then the hypothesis is accepted otherwise they are rejected. Explicitly put, it is expected a priori that an increase in electricity consumption will result to a rise in manufacturing output and more result-oriented services sector, *ceteris paribus.*

Diagnostic / Stability Test

At the end of the study, the VECM would be subjected to the statistical diagnostic tests, namely, normality, serial correlation, heteroskedasticity and the inverse root of Auto-Regressive characteristic Polynomial tests to ascertain its statistical adequacy.

DATA ANALYSIS AND INTERPRETATION

Augmented Dickey-Fuller Unit Root Test

In the first step of the analysis, we will use both the ADF unit root test to identify which variables in the models have a unit root. In other words, we would like to determine whether variables in the models are stationary or non-stationary. Prior to carrying out ARDL bounds test, it is expected to first test for the stationarity of all the variables in the model to determine the order of integration for each variable. This is a necessary step to ensure that variables are not second-order stationary (i.e., I(2)) and to avoid fallacious results. According to Ouattara (2006), the calculated F-statistics which Pesaran et al. (2001) provide are not valid in the presence of I(2) variables, since the bounds tests are based on the assumption that variables are either I(0) or I(1). Below is the table showing the order of stationarity of the series examined.

Table 1: Results of Augmented Dickey Fuller and Philip-Perron Unit Root Test

Variable	**At Level**			**1st Difference**		
	T-statistic value	***5% critical value***	***Decision***	***T-statistic value***	***5% critical value***	***Decision***
Log(E-consump)	2.450553	-3.065585	Non-stationary	-5.246409	-3.065585	Stationary
Log(MAN)	-0.613873	-3.052169	Non-stationary	-3.658665	-3.065585	Stationary
Log(Serv)	-0.212280	-3.052169	Non-stationary	-4.667351	-3.065585	Stationary

Source: Author's computation from E-views 9.0

The results of the Augmented Dickey-Fuller (ADF) unit root test as presented above revealed that no variable attained stationarity at its level form until it was differenced. Therefore, the null hypothesis of non-stationarity cannot be rejected at levels. However, at first difference, all variables were stationary. This means that at first difference the variables were integrated of order I(1), hence it is concluded that E-consump, MAN and Serv are first difference stationarity. Having met the prerequisite for estimating cointegration test, the study proceeds to estimate the ARDL Bounds Testing as popularized by Pesaran and Pesaran (1997), Pesaran and Smith (1998), Pesaran and Shin (1999), and Pesaran et al. (2001)

The ARDL Bounds Testing

To determine the existence (or not) of a long-term relationship between the variables, the ARDL technique is used to test for the presence or otherwise of a longrun relationship by applying Bounds test developed by Pesaran et al. (2001). The cointegration test results are reported below.

Table 2: Cointegration Test using ARDL Bounds Testing Approach

Test Statistic	**Value**	**K**
F-Statistic	6.430694	2
Critical Value Bounds		
Significance	***I(0) Lower Bounds***	***I(1) Upper Bounds***
5%	3.1**	3.87**
1%	4.13	5.0

Notes: The critical values are taken from Pesaran and Pesaran (1997: 478) with five regressors.

** denote rejecting the null at 5% level of significance. The range of the critical value at 5% and 1% are 3.1 – 3.87; 4.13–5.0 respectively.

Source: Author's Computation Using E-views 9

The ARDL Bounds testing approach to cointegration result above implies the rejection of the null hypothesis that no long-run relationship exists between the variables, thus concluding that evidence of a long-run relationship exists between electricity consumption in Nigeria, manufacturing sector output and services sector output respectively between 1999 to 2016. Precisely, cointegration is achieved if and only if it is reported that the calculated F-statistics of the joint null hypothesis that there is no long-run relationship between the variables is greater than the lower and higher bound of the 95 percent critical value interval. From the above table, the F-statistic value of 6.430694 is greater than the lower and higher bound of 95 percent critical value (3.1 – 3.87), thus leading to the rejection of the formulated null hypothesis of no cointegration.

ARDL Unrestricted Error Correction Model Estimate

The estimate of the generalized unrestricted error correction model is as shown in table 3. The choice of ARDL model (4,1,1) selected is based on Akaike Information Criterion (AIC). From the model, both the R-Squared and adjusted R-Squared are 90%. This means that the regressors can explain about 90% of the variation in the model within the model. The Durbin Watson test statistic of 2.5 indicates the absence of first-order autocorrelation of residuals in the model. The F-test for the model is equally significant at conventional significance levels. The model meets all specifications of the diagnostic tests (see table 4).

Table 4: ARDL (4,1,1) Model Diagnostic Tests

Type of Tests	**P-Value**
Breusch-Godfrey Serial Correlation LM Tests	0.1308
Heteroskedasticity Test Breusch-Pagan-Godfrey	0.5382
Residual Normality Tests	0.632013

Source: Eviews version 9.0

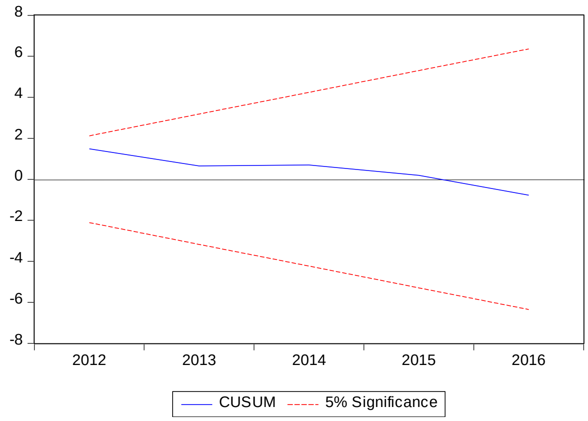

Figure 1: CUSUM Graph
Source: E-views version 9.0

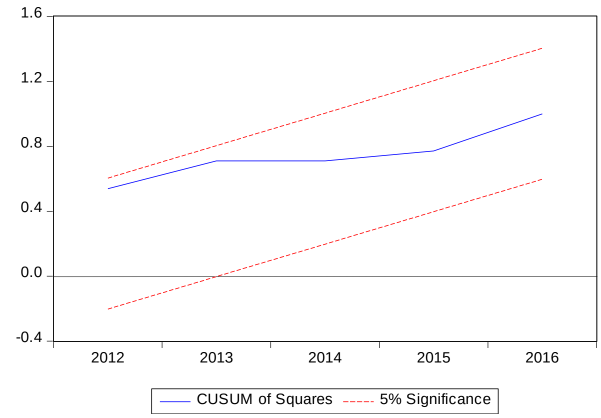

Figure 2: CUSUMQ Graph

The table and graphs above reveals that there is absence of first order serial autocorrelation in the model or the residuals are not serially correlated; there is the absence of heteroscedasticity, therefore, the errors are homoscedastic. Furthermore, the normality test adopted is the Jarque-Bera (JB) statistics, the study observes that the residual are normally distributed. The result of CUSUM/CUSUMQ stability test indicates that the model is stable. This is because the CUSUM/CUSUMQ lines fall in-between the two 5% lines.

Long-Run ARDL Results
Table 5: Extracts of Long-run Dynamics

Dependent Variable:*Electricity consumption (E-consump)*				
Variable	***Coefficient***	***Std. Error***	***t-statistic***	***Prob***
Constant	2.789872	0.382354	7.296577	0.0008
Log(MAN)	-0.276748	0.076976	-3.595251	0.0156
Log(Serv)	0.696851	0.134041	5.198796	0.0035

Source: E-views version 9.0

Estimate of Short-run Dynamics
Table 6: Extracts of Short-run Output

Dependent Variable:*Electricity consumption (E-consump)*				
Variable	***Coefficient***	***Std. Error***	***t-statistic***	***Prob***
DLog(MAN)	-0.293391	0.139629	-2.101219	0.0896
DLog(Serv)	0.365423	0.225604	1.619749	0.1662

ECM(-1)	-1.729164	0.269536	-6.415329	0.0014

Source: E-views version 9.0

The results of the estimated long-run and short-run dynamic estimates are shown in tables 5 and 6 above. All independent variables in the model (manufacturing output and service sector output) revealed a long-run significant relationship with electricity consumption in Nigeria. The reverse is however the case in the short-run as both variables (MAN and Serv) are statistically insignificant in relationship to the dependent variable (electricity consumption) in the short-run. The coefficient of MAN has an inverse relationship with the dependent variable both in the long and short-run while that of (Serv) appeared with a positive sign (i.e. it is positively related to the dependent variable – electricity consumption) also in the long-run and in the short-run within the period studied. The parameter estimate of (MAN) is statistically significant at 0.01 significance level with a long-run elasticity of -0.276748, that is, for every 1% decrease in electricity consumption in Nigeria, manufacturing sector output declines or falls by approximately 28%. This result is in agreement with the findings of (Olayemi, 2012) who opined that electricity generation and supply in Nigeria under the reviewed period impacted negatively on the manufacturing productivity growth, due to unnecessary government's spending on non-economic and unproductive sectors. On the other hand, the coefficient of service sector output (Serv) is positively related to the dependent variable and as well statistically significant in the model. Empirical evidence reveals that for every percentage rise in electricity consumption in Nigeria, there is approximately 70% rise or increase in output from the different services sector of the Nigerian economy in the long-run, all things being equal. Short-run dynamic analysis revealed similar outcomes.

The estimated coefficient of the error correction term ECM (-1) has the expected negative sign, and it is also statistically significant at 0.01 level. The speed of adjustment is too high, and leaves much to be desired. It shows that only about 172% of the disequilibrium within the model in the previous year is subsequently corrected in the current year. The speed of adjustment of the variables in the model in response to a deviation from its long-run equilibrium path is 172%. The result of the error correction term provides strong evidence that there is indeed a long-run equilibrium relationship between the exogenous variables (manufacturing sector output, and services sector output) and E-consumption which is a proxy for electricity consumption.

CONCLUSIONS

The main objective of this study is to empirically examine the impact of Power Sector Reform on Manufacturing and Services Sector in Nigeria. The study employed secondary annual time series data sourced from World Bank database (2016). The methodology adopted for the study was Augmented Dickey-Fuller (ADF); a test for long-run relationship (ARDL Bounds Testing), and an ARDL approach to long-run and short-run to examine the effect of the dependent variable (electricity consumption) on the explanatory variables (manufacturing sector output and services sector output). Evidence revealed that series employed in the model are stationary at first difference and exhibit long-run relationship within the period studied. That is, both dependent and independent variables (E-consump, MAN and Serv) can walk together without deviating from an established long-run path.

One striking revelation from the study is the inverse relationship that exists between manufacturing output and electricity consumption in Nigeria within the period referenced. This negative relationship is not unconnected with widespread allegation of misappropriation of budgeted funds for the Power Sector by successive administrations in Nigeria since 1999. At the advent of the present democratic dispensation in 1999, the then President, Chief Olusegun Obasanjo carried out massive reforms in the Power sector accompanied by huge budgetary allocations but with little or no visible results noticed. The late Umar Musa Yar'adua and Goodluck Jonathan continued in the reform process but darkness and gross darkness in our businesses / homes has remained our lot. In fact, the key sectors that drive economic growth such as industries and manufacturing have continued to groan and operate under an unfavourable climate of epileptic power supply for a larger portion of Nigeria's seventeen years of democratic experimentation, despite billions of US dollars appropriated to the Ministry of Power. Many manufacturing outfits have taken flight and relocated to neighbouring West African states as they could no longer cope with the exorbitant cost of running diesel-powered machines for the survival of their businesses. This is in line with the view of a survey by the Manufacturers Association of Nigeria (MAN, 2005), that the cost of generating power constitute about 36 percent of production. This huge cost is enough to discourage investors in the real sector of the economy.

It must be stated in clear terms that constant and consistent electricity generation, transmission and distribution is sine-qua-none for the growth of the national economy. Virtually, all sectors of the economy depend on the supply of electricity to do business and so the lack of this vital ingredient of growth contributes in no small measure to stagnating economic growth and development. It is also imperative to note that Nigeria's story of incessant power outages is not in any way connected to lack of funds; but to the endemic and systemic corruption that is threatening the corporate existence of the country. From year to year, very promising and enviable plans, policies and programmes are designed, aimed at taking the nation to the Promise Land of 24/7 era of electricity supply, but alas, the cankerworm of corruption, nepotism, lack of patriotism etc keep pulling us backward from achieving our goal of a stable power supply. The attitude of our leaders towards salvaging this catalyst of growth has remained lackluster and uninspiring, to say the least. Efforts at reforming the power sector can only be fruitful when ALL stakeholders in the power sector including the political class put away their personal agendas and take the bull by the horn towards rescuing the nation from the looming danger of stagnant economic growth.

Finally, there is the need for the Nigerian government to come up with new, better and alternative ways of improving energy generation and supply, as well as proper maintenance of electricity infrastructure in the country. Deliberate efforts by the government to improve power infrastructure will result in the country being able to increase electricity production threefold and thus optimally utilize its installed generating capacity to something in the region of 10,000 mega-watts. When this feat is eventually attained, Nigeria can then stand shoulder high with other emerging economies in the world in terms of growth in output in key sectors of the economy.

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