Power Supply and National Development, 1980-2012: The Nigeria Experience

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Abstract

Over the past three decades or so, Nigeria has been confronted with deep-seated socio-economic crisis evident in high level of poverty, inflation, closure of industries, budget deficit, absolute lack of good governance at all level, environmental degradation, high unemployment and epileptic power supply among others. At the start of the century, there was high hope among Nigerians that the emergence of democracy and the increasing global capitalist markets feasible in the oil and telecommunication sectors will result in high level of accelerated development. The focus of this paper is whether the huge expenditure made yearly in the power sector has translated into greater electricity generation. The study which has three objectives examines what impact annual government expenditure in the power sector has on electricity supply. It also scrutinizes the impact of electricity supply on two indexes of growth, namely the real GDP, a proxy for economic growth and index of industrial production for the period 1980 -2012. The econometric methodology is basically co-integration and parsimonious error correction model. Results show that long run relationship exists between the dependent and the independent variables employed in the study. The short run results reveal that while recurrent expenditure exerts positive impact on electricity generation, the reverse is the case between the later and capital expenditure in the power sector. It was also discovered that mega watts of electricity generation which is the variable of interest exerts positive influence on real GDP and negatively impacted on index of industrial production all of which are statistically insignificant. The paper recommended that corruption prevalent in the power sector must be checked, official found to have diverted money meant for given project should be punished while the right technology and expertise engaged.

Keyword: Electricity Generation, Government Expenditure on Power Sector, Economic Growth, Index of Industrial Production and Error Correction Model

1. Introduction

With the collapse of the World Bank and International Monetary Fund' policy on Structural Adjustment Programme (SAP) in Africa, many questions have been raised by scholars on the factors impeding economic development in leading African nations including Nigeria (Jega, 2003). They argued that economic liberalization in other parts of the world have continued to yield anticipated results, increasing global trade and technological advancements such that by the end of the 21st century some emergent economies have appeared on the global capitalist markets. It is no gainsaying the fact that the likes of Indonesia, China, Japan and Malaysia are now making new waves in the global markets.

While this thinking continues about global capitalist development, researches conducted by the United Nations and the World Bank has shown that Nigeria's economic development is routinely constrained by some inherent cultural factors (NISER, 2000).

Although Nigeria is rich in human and material resources, its economic and political developments have been fraught with crises since independence in 1960. Indices of the failure of the Nigerian state are today evident in the pervasive cases of hunger, inflation, budget deficits, debt overhang, street begging, prostitution, frauds, high crime rates in major cities, collapse of manufacturing industries, corruption in public service, stagnation in entrepreneurial development and epileptic power supply (Fadeyi and Adisa, 2012). In the face of these crises it becomes difficult for sustainable development to take place in the country (NISER, 2000 and UNDP, 2006). Our interest in this paper is not all the problems measured, but the huge expenditure injected annually into the power sector without a corresponding increase in power supply.

Nigeria’s power sector had operated for several decades as a state monopoly then called National Electric Power Authority (NEPA) until 2005. NEPA controls electricity generation, transmission and distribution facilities with all the profound problems inherent in public monopoly. This over centralization made it impossible for electricity supply to keep pace with the growth in population and economic activities. Nigeria has the biggest gap in the world between electricity demand and supply, providing its population of over 160 million with less than 4000 megawatts of electricity. In contrast, South Africa with a population of less than 50 million people generates more than 40,000 megawatts while Brazil, an emerging economy like Nigeria, generates over 100,000 megawatts for its 201 million citizens (FG, 2013). Indeed, the gap in the power sector has far reaching implications for improving the business climate, sustaining economic growth and the social wellbeing of Nigerians. About 45 percent of the population has access to electricity, with only about 30 percent of their demand for power being met. The power sector is plagued by recurrent outages to the extent that some 90 percent of industrial customers and a significant number of residential and other non-residential customers provide their own power at a huge cost to themselves and to the Nigerian economy. Installed capacity is 8,000 megawatts, but only 4,000 megawatts is operable of which about 1,500 megawatts is available to generate electricity. At 125 kWh per capita, electricity consumption in Nigeria is one of the lowest in the world (AfDB, 2009).

Following the Electricity Power Sector Reform (EPSR) Acts of 2005, NEPA ceases to exist and in its place a transitional company named Power Holding Company of Nigeria (PHCN) unbundled into six generation companies, one transmission firm and eleven distribution companies as first step towards partial divestment of government assets emerged. Between 2005 and 2013 when PHCN was sold to new owners there were no remarkable improvements in power supply in Nigeria but at the same time government continue to inject several billions of naira into the sector annually. Power supply in the country is so epileptic that Nigerians spend enormous sums on self generated power, making the country’s cost of electricity consumption one of the highest in the world. This is beside health hazard effect as many families have died of emission from generators. The high cost of power generation has made it difficult for many businesses to operate and this has further worsened the unemployment and poverty levels in Nigeria. The present administration on 1st November, 2013 handed over the unbundled PHCN to 18 successor companies made up of 6 Generation, 11 Distribution and 1 Transmission companies to new owners and thus signaling the end of PHCN. With this reform, government hopes that the power sector will drive GDP growth so that Nigeria will generate more than the irreducible 40,000 megawatts needed to make the nation become one of the world’s twenty largest economy by 2020.

The objective of this paper thus is to investigate whether annual government huge expenditure on the power sector actually worth it by measuring the impact of power supply on some indices of growth in Nigeria. Consequently, the sequence of the paper is clear. Following the introduction, section two contains brief review of related literature. In section three, the method of study is unveil. Whilst section four presents and analyses result of findings, section five concludes the paper with brief policy remarks.

2.1Brief History of Power Generation in Nigeria

Electricity generation in Nigeria began in 1896, fifteen years after its introduction in England while the Nigeria Electricity Supply Company (NESCO) commenced operations as an electric utility company in Nigeria in 1929 with the construction of a hydroelectric power station at Kurra near Jos. The Electricity Corporation of Nigeria (ECN) was established in 1951, and the first 132KV line was constructed in 1962, linking Ijora Power Station to Ibadan Power Station. The Niger Dams Authority (NDA) was established in 1962 with a mandate to develop the hydropower potentials of the country.

However, ECN and NDA were merged in 1972 to form the National Electric Power Authority (NEPA). The law which established NEPA stipulated that it should develop and maintain an efficient, coordinated and economical system of electricity supply for all parts of Nigeria. As at 1973, only five of the then 19 state capitals were connected to the national transmission grid system. Today, practically all state capitals are being served from the national grid (Babatunde and Shuaibu, 2008).

According to Babatunde and Shuaibu (2008), the National Electric Power Authority was partially commercialized in 1988, supported by an upward review in tariffs. As part of the restructuring effort of the power sector, the Electric Power Sector Reform Act 2005 was enacted. Consequently, the defunct National Electric Power Authority (NEPA) was then known as Power Holding Company of Nigeria (PHCN). The law paved the way for the unbundling of NEPA into the 18 companies– 6 generating companies, 1 Transmission Company and 11 distributing companies. The generating companies were made up of 2 hydro and 4 thermal (gas based) stations. These 18 companies were again sold to new core investors with the former handover ceremony on 1st November, 2013. The Nigerian power sector is marked by low generating capacity relative to installed capacity and much of the country's citizens do not have access to uninterrupted supplies of electricity. This is despite the fact that Nigeria is endowed with massive reserves of hydro energy, petroleum reserves and one of the largest gas reserves in the world.

Government policy for the sector during the 1980s and the 1990s and until recently did not properly anticipate national needs. For example, the last major electricity generation installation in Nigeria was in 1990 when the Shiroro power station was commissioned. Since then no new units have come on stream and none of the existing ones have had a major overhaul over the last two decades. The Kainji Hydro electric plant in operation since 1968, for instance, was designed to generate 960mw of power out of its 12 turbines, but only 10 of those turbines have been installed. Today the Kainji plant can only generate 760mw of power. The per capita consumption of electricity is 0.054kw making Nigerians one of the least electricity consumption in the world.

2.2 Review of Related Literature

The literature is beset with studies on the relationship between energy consumption and economic growth. Ebohon (1996) examines the impact and causal directions between energy consumption and economic growth (proxied by GDP) and reports a simultaneous causal relationship between energy and economic growth for Tanzania. Shiu and Lam (2004) employ the error-correction model to examine the causal relationship between electricity consumption and real GDP for China during 1971–2000. Their estimation results indicate that real GDP and electricity consumption for China are co-integrated and there is unidirectional granger causality running from electricity consumption to real GDP. Esso (2010) investigates the long-run and the causality relationship between energy consumption and economic growth for seven Sub-Saharan African countries during the period 1970–2007. Using the Gregory and Hansen testing approach to threshold co-integration, the study indicates that energy consumption is co-integrated with economic growth in Cameroon, Cote d'Ivoire, Ghana, Nigeria and South Africa. The test suggests that economic growth has a significant positive long-run impact on energy consumption in these countries before 1988; and this effect becomes negative after 1988 in Ghana and South Africa. Furthermore, causality tests suggest bi-directional causality between energy consumption and real GDP in Cote d'Ivoire and unidirectional causality running from real GDP to energy usage in the case of Congo and Ghana.

The investigation of the relationship between the consumption of crude oil, electricity and coal in the Nigerian economy 1970 to 2005 was conducted by Odularu and Okonkwo (2009). The result obtained after applying the co-integration technique shows that there exists a positive relationship between energy consumption and economic growth. However, with the exception of coal, the lagged values of these energy components were negatively related to economic growth. Dantama, et al. (2012) examine the impact of energy consumption on economic growth in Nigeria over the period 1980-2010 using the autoregressive distributed lag (ARDL) approach to co-integration analysis. The results indicate a long-run relationship between economic growth and energy consumption. Both petroleum consumption and electricity consumption are statistically significant on economic growth but coal consumption is statistically insignificant. Also, the speed of adjustment in the estimated model is relatively high and contains the expected significant and negative sign.

Babatunde and Shuaibu (2008), examine the residential demand for electricity in Nigeria as a function of real gross domestic product per capita, the price of electricity, the price of substitute and population between 1970 and 2006. The authors employ the bounds testing approach to co-integration within an autoregressive distributed framework and find that in the long run, income, price of substitute and population emerge as the main determinants of electricity demand in Nigeria, while electricity price is insignificant. They also found that relationship among variables is more stable and significant. Tendler (1979) finds in his research on some developing countries that the promotion of rural electrification projects in development assistance programmes of the World Bank would promote integrated rural development significantly by encouraging productive municipal as well as traditional household in electricity usages. In a similar joint research project, Butler, et al., (1980) discover in Bolivia that the positive impact of rural electrification project was social and that electrical power did not appear to play a catalytic role in economic development nor was it a precondition for it. He however fails to note that electrification projects should be linked to other development activities.

Onakoya et al. (2013) evaluate the causal nexus between energy consumption and Nigeria's economic growth for the period of 1975 to 2010. Secondary time-series data were analyzed using co-integration and ordinary least square techniques. The study shows that in the long run, total energy consumption had a similar movement with economic growth except for coal consumption. The empirical results revealed that petroleum, electricity and the aggregate energy consumption have significant and positive relationship with economic growth in Nigeria. The study recommends that government should encourage a level- playing field for all energy forms available in the country by diversifying its power-generation portfolio. Uzochukwu and Nwogwugwu (2012) analyze federal government spending on the energy sector with special emphasis on the electricity sub-sector using descriptive statistics. The study finds that despite the significant reforms and increase in spending in the sector, the outcome in terms of its reflection on production, transmission and distribution of electricity is far from the realization of the reform objectives. The study argues that the country lags behind other countries like Libya, Kenya and Ghana in per capita power production and consumption and this lack of access to electric power, and modern energy in general has a negative effect on productivity and has limited the economic opportunities available to Nigeria.

Akpokerere and Ighoroje (2013) investigate the effect of government expenditure on economic growth in Nigeria using a disaggregated approach. Data for the period (1977 - 2009) was used. The study finds that government total capital expenditure (TCAP), total recurrent expenditures (TREC), government expenditure on education (EDU) and power (POW) have negative effect on economic growth and are significant in explaining this relationship. On the contrary, rising government expenditure on transport and communication (TRACO), and health (HEA) results to an increase in economic growth. The authors therefore advised that there should be public private participation in critical sectors of the Nigerian economy such as in power and transport with high degree of transparency and accountability in government spending. Ubi and Effiom (2013) explore the relationship between electricity supply and economic development in Nigeria using annual time series data spanning 1970-2009. The paper employs co-integration technique and testing the results using ordinary least squares in the context of error correction mechanism (ECM). The results show that per capita GDP, lagged electricity supply, technology and capital are the significant variables that influence economic development in Nigeria and further argued that despite the poor state of electricity supply, it influences economic development with a very relatively low impact. The study recommended among other things that the various power projects should be completed with state of the art technology as this will ultimately reduce power loss and boost electricity supply vis-à-vis economic development.

2.3 The Perspective of Power Generation and Government Expenditure in Nigeria

The situation of electricity supply inadequacy, especially at the eve of the fourth republic which began in 1999, was that of persistent electric power outages at alarming frequencies in the face of abundant primary electricity resources - coal, natural gas, geothermal, tide, solar, biogas, biomas etc. This is even more worrisome when one considers huge amount of money expended in the sector in the last fourteen years of democratic governance in Nigeria as shown in fig 1 and 2 below.

Fig 1: Power Sector Recurrent and Capital Expenditure and Mega Watts of Electricity Generated

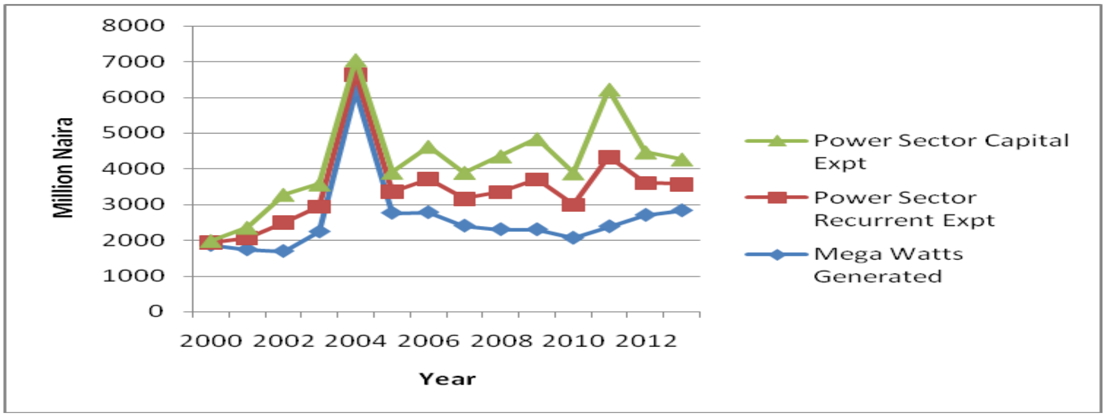
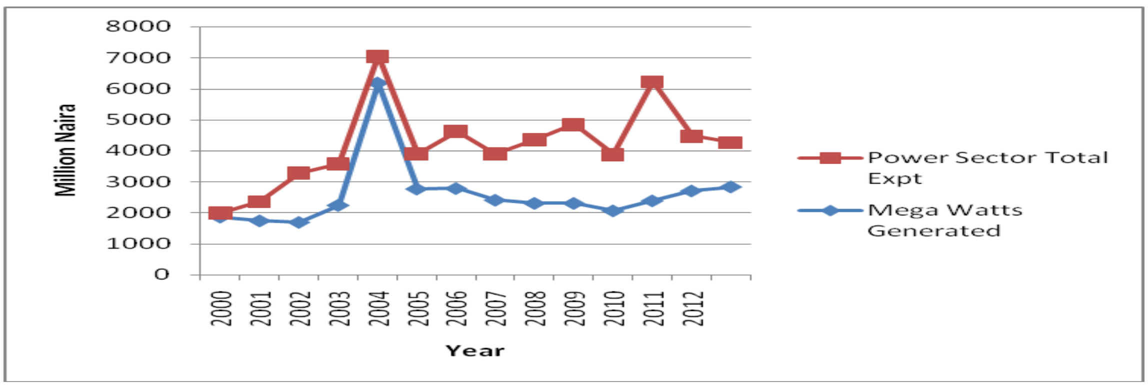


Fig 1 reveals that while both recurrent and capital expenditure budgeted for the power sector are rising continuously, electricity generated per mega watt does not keep pace with the expenditure increase in Nigeria.

Fig 2: Total Power Sector Expenditure and Mega Watts of Electricity Generated



It can be seen from both figures that electricity generation in Nigeria is in the range of 3000 mega watts between 1999-2012 and this explains why majority of the citizens does not have access to power supply while most firms operating in Nigeria do not fair better

3.0 Model Specification

Three models were specified for the study and the first was intended to capture how government expenditure on the power sector influences power generation in Nigeria for the period 1999-2012. The short period covered was due to lack of reliable data of government expenditure in the power sector. The second and the third aspects of the study investigate impact of electricity supply on economic performance in Nigeria for the period 1980-2012, using two indicators of growth namely: real gross domestic product (GDP) and index of industrial production. The data which were in million of naira unless otherwise stated were culled from the central Bank of Nigeria annual report and statement of account for various years and World Bank development indicators database. Thus:

Model 1

MWT = f(PSRE, PSCE)…………………………………………(1)
The log stochastic form of equation (1) thus,
$InMWT = \alpha_0 + \alpha_1 InPSRE + \alpha_2 InPSCE + \varepsilon$……………………...(2)

Where:

MWT = Mega watts of electricity generated
PSRE = Power sector recurrent expenditure
PSCE = Power sector capital expenditure
ε = error term
α_0, α_1 and α_3 = constant and parameters to be estimated respectively
In = logarithmic form

The regression models below were anchored on simple growth theory and for simplicity, we assume that:

Y = Af(L, K)…………………………………(3)

Where:

Y = Output
A = Total factor productivity or efficiency parameter
L = labour
K = Capital

For the purpose of this study, we again assumed that the impact of electricity supply on output operates through total factor productivity. Since this research work intends to investigate the impact of electricity supply on economic development in Nigeria by correctly specifying the model, it is further assumed that total factor productivity (A) is a function of electricity supply (MWT). Thus,

A = f(MWT, L, K)……………………………(4)

Combining equations 3 and 4 and substituting for A. We have

Y = f(MWT, L, K)……………………………..(5)

Thus, Y is then replaced in model 2 and 3 accordingly

Model 2

GDP = f(MWT, L, K)…………………………………………(6)

In log form, equation (6) becomes:

$InGDP = \beta_0 + \beta_1 InMWT + \beta_2 InL + \beta_3 K + e$………………(7)

Where:

GDP = Real gross domestic product at 1990 constant price
L = population (proxy for labour force)
K = capital (measured by gross fixed capital formation)
β_0, $\beta_1 - \beta_3$ = constant and parameters to be estimated

Model 3

IIP = f(MWT, L, K)…………………………………………(8)

Thus, equation (8) becomes:

$InIIP = \lambda_0 + \lambda_1 InMWT + \lambda_2 InL + \beta\lambda_3 K + V$…………….(9)

Where:

IPP = Index of industrial production
λ_0, $\lambda_1 - \lambda_3$ = constant and parameters to be estimated

3.1 Unit Root Test

The Augmented Dickey Fuller (ADF) and the Phillips-Perron tests were used to test for unit roots as in the equation below.

$$\Delta Yt = Ci + \omega Yt - 1 + C2t + \sum_{t=1}^{p} di\Delta Yt - 1 + \varepsilon t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(10)$$

yt = relevant time series
Δ = an operator for first difference
t = a linear trend
εt= error term

The null hypothesis of the existence of a unit root is Ho: ω=0. Failure to reject the null hypothesis leads to conducting the test on further differences of the series. Further differencing is conducted until stationarity is reached and the null hypothesis is rejected. Akaike Information Criteria (AIC) and the Schwarz criterion (SC) were employed to determine the lag length.

3.2 Co-integration Test and Vector Error Correction Model

Engle and Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. If such stationarity exists then, time series are said to be co-integrated. The stationary linear combination is called the co-integrating equation and may be interpreted as a long-run equilibrium relationship between the variables. The co-integrating equation is

$$y_{1,t} = \beta_1 y_{2,t} + \varepsilon_t$$

$$y_{2,t} = \beta_2 y_{1,t} + \varepsilon_t \quad \ldots\ldots(11)$$

and the Vector Error Correction (VEC) form is

$$\Delta y_{1,t} = \gamma_1 (y_{2,t-1} - \beta_1 y_{1,t-1}) + \nu_{1,t}$$

$$\Delta y_{2,t} = \gamma_2 (y_{2,t-1} - \beta_1 y_{1,t-1}) + \nu_{2,t} \quad \ldots\ldots(12)$$

In equation (12), the only right-hand side variable is the error correction term. In the long run equilibrium, this term is zero. However, if y_1 and y_2 deviated from long run equilibrium in the last period, the error correction term is non-zero and each variable adjusts to partially restore the equilibrium relationship. The coefficients Y_1 and Y_2 measure the speed of adjustment.

4.0 Presentation and Analysis of Results

Table 1 presents the results of unit root test. The results in panel A and B which include trend and intercept reveal that all the variables were non stationary at level but at integration of first or second order differencing stationarity were achieved. The level of stationarity however was either at 5 or 1 percent confidence level as indicated by the asterisk (*). This enabled us to conduct co-integration test as shown in table 2 below.

Table 1: Results of Stationarity

A.	ADF (Trend & Intercept (1980-2012))			Phillips-Peron (PP) (Trend & Intercept)		
Variable	Level	1st Diff	2nd Diff	Level	1st Diff	2nd Diff
LGDP	-1.7173	-4.2605*	-6.8675**	-8.9617**	-33.2762**	-49.0047**
LMWT	-3.0676	-4.9322**	-6.6091**	-3.6443*	-7.7653**	-14.9992**
LIPP	-2.7701	-3.3819	-5.7074**	-2.7956	-5.7455**	-13.5107**
LL	-1.3217	-3.8526	-6.1110**	-1.2772	-5.7255**	-11.4356**
K	-2.8037	-4.0925*	-4.6328**	-3.6632*	-8.9517**	-16.0572**
Critical Value						
1%	-4.2949	-4.3082	-4.3226	-4.2826	-4.2949	-4.3082
5%	-3.5670	-3.5731	-3.5796	-3.5614	-3.5670	-3.5731
10%	-3.2169	-3.2203	-3.2239	-3.2138	-3.2169	-3.2203
B.	ADF (Trend & Intercept (1999-2012))			Phillips-Peron (PP) (Trend & Intercept)		
LPSRE	-3.4167	-4.1049*	-2.832657	-4.5134*	-4.5558*	-5.3546**
LPSCE	-3.8103	-4.4461*	-2.911087	-4.9756**	-4.4822*	-4.7419*
Critical Value						
1%	-4.9893	-5.1152	-5.2735	-4.8870	-4.9893	-5.1152
5%	-3.8730	-3.9271	-3.9948	-3.8288	-3.8730	-3.9271
10%	-3.3820	-3.4104	-3.4455	-3.3588	-3.3820	-3.4104

**(*) Stationary at 1%(5%) respectively

Thus, it can be seen from table 2 that there is a long run relationship between mega watts of electricity generated and government expenditure in the sector over the last one decade. However, the long run results normalized on mega watts of electricity generated shows that while recurrent expenditure in the power sector exerts negative impact on electricity generation the relationship between the later and power sector capital expenditure in Nigeria is positive.

Table 2: Co-integration Result on Power Sector Expenditure

Null Hypothesis	Alternative Hypothesis	Statistical Value	5 percent critical value	1 percent critical value	Eigen value
Trace Statistics					
r = 0	r > 0	48.28	29.68	35.65	0.94
r > 1	r > 1	15.07	15.41	20.04	0.63
Max-Eigen Statistics					
r = 0	r = 1	33.22	20.97	25.52	0.94
r <1	r = 2	12.00	14.07	18.63	0.63
Long Run Regression Results Normalized on MWT					
LMWT = 1.00 – 9.55 LPSRE + 10.20 LPSCE (-5.9) (6.7) Log Likelihood = 23.2					

Both variables are statistically significant with coefficient of elasticity greater than unity. This means that a small change in government expenditure to the power sector will likely lead to more than proportionate change in electricity generation. With co-integration confirmed the over-parameterized error correction model estimates whose results were not shown revealed that although the models look fairly well estimated, they appear cumbersome to be interpreted in their present form. Thus, table 3 depicts the parsimonious error-correction model whose interpretation is easy and straight forward. It shows short run impact of the independent variables on the dependent variable.

Table 3: Parsimonious Error Correction Model

Method: Least Squares
Dependent Variable: DLMWT

Variable	Coefficient	Std error	t-statistic	Prob
Constant	0.087818	0.105657	0.831164	0.4437
DLMWT(-2)	0.251960	0.290789	0.866469	0.4258
DLPSRE	1.723018	1.466255	1.175115	0.2929
DLPSCE	-2.053642	1.505333	-1.364244	0.2307
DLPSCE(-1)	-0.274717	0.236088	-1.163620	0.2971
ECM(-1)	-0.945724	0.365538	-2.587212	0.0490
R^2 = 0.69; F-stat = 2.17; DW = 1.74				

Table 3 shows that both recurrent and capital expenditure in power sector explain about 69 percent of electricity generation. The F-stat shows that the model is significant while DW of 1.74 reveals absence of serial correlation. The ECM carries the usual negative sign and is statistically significant with a very high speed of adjustment of about 95 percent. This shows that whenever the system is out of equilibrium, it is returned back with a speed of about 95 percent as shown in the coefficient of the ECM. On the part of the variables, PSRE and PSCE have elastic coefficients while that for PSCE lag 1 is inelastic. Also, while the impact of PSRE is positive on electricity generation, PSCE and its lag are negative. However, lag 2 of mega watts of electricity is positively correlated with its current value. Finally, all the variables are statistically insignificant in explaining electricity generation in Nigeria between 1999 and 2012.

Table 4: Co-integration Result for Indices of Growth (Real GDP and IIP)

Null Hypothesis	Alternative Hypothesis	Statistical Value	5 percent critical value	1 percent critical value	Eigen value
Trace Statistics					
r = 0	r > 0	67.34	59.46	66.52	0.70
r > 1	r > 1	31.20	39.89	45.58	0.36
Max-Eigen Statistics					
r = 0	r = 1	36.13	30.04	35.17	0.70
r <1	r = 2	13.51	23.80	28.82	0.36

Table 4 shows that both trace and max-eigen-value tests indicate 1 co-integrating equation at both 5 and 1 percent levels respectively. This means that long run relationship exists between real GDP and mega watt of electricity generation (MWT), labour (L) and capital (K) on the one hand. Also, long run relationship exists between IIP and the same independent variables on the other hand.

Table 5: Parsimonious Error Correction Model

Method: Least Squares
Dependent Variable: DLGDP

Variable	Coefficient	Std error	t-statistic	Prob
Constant	0.038545	0.015162	2.542263	0.0179
DLGDP(-1)	0.255229	0.196461	1.299133	0.2062
DLMWT	0.047396	0.039520	1.199306	0.2421
DLL(-1)	0.151755	0.226769	0.669204	0.5098
DK(-2)	-2.170008	2.121008	-1.025103	0.3155
ECM(-1)	-0.165811	0.075934	-2.183637	0.0390
R^2 = 0.49; F – stat = 4.46; DW = 1.93				

It can be seen in table 5 that lag 1 of real GDP is positive and statistically significant. It shows that one percent increase in previous year real GDP increases current year GDP performance by about 26 percent as revealed in the coefficient of elasticity. Similarly, the impact of mega watts of electricity generation (MWT) on real GDP is positive but insignificant with a somehow low coefficient of elasticity of about 0.05 percent. Also, labour (lag 1) and capital (lag 2) were similarly insignificant but while the impact of labour on real GDP is positive that of capital is negative. The ECM takes the normal negative sign and is statistically significant with the speed of adjustment of about 17 percent. Finally, about 49 percent of real GDP is explained by the independent variables.

Table 6: Parsimonious Error Correction Model

Method: Least Squares
Dependent Variable: DLIIP

Variable	Coefficient	Std error	t-statistic	Prob
Constant	0.035029	0.016328	2.145369	0.0423
DLIIP(-2)	0.129666	0.191563	0.676884	0.5050
DLMWT(-1)	-0.066750	0.054926	-1.215285	0.2361
DLL(-1)	-0.297122	0.334566	-0.888084	0.3833
DK(-1)	-1.55E-08	3.46E-08	-0.447348	0.6586
ECM(-1)	-0.212362	0.100708	-2.108687	0.0456
R^2 = 0.18; F-stat = 1.04; DW = 2.22				

A cursory look at table 6 reveals that apart from lag 2 of IIP (index of industrial production) which exert positive impact on its current value, MWT, L and K exhibit negative impact on IIP with none of the variables statistically significant. Of interest are the mega watts of electricity generation which with a unit increase in MWT, IIP decreases by about 0.067 percent. As in the models above, the ECM observes the usual negative sign and also statistically significant. The R^2 is low which shows that the independent variables explained only about 18 percent of IIP.

5. Conclusion and Recommendation

Nigeria's power sector had operated for several decades as a state monopoly with huge expenditure commuted to it annually by the government. And yet the country has the biggest gap in the world between electricity demand and supply, providing its population of over 160 million with less than 4000 megawatts of electricity. With epileptic power supply in Nigeria and its attendant enormous sums on self generated power, cost of electricity consumption in Nigeria is one of the highest in the world. The fact that both variables are insignificant shows that their impact does not translate into greater mega watts generation while the impact of capital expenditure in particular on the power sector is even more worrisome with its negative relationship. This calls for urgent attention.

The study made up of three models is titled *Electricity Supply and National Transformation: the Nigeria Experience* is meant to examine what impact annual government expenditure in the power sector has on electricity supply (model 1). In what follows, it scrutinizes the impact of electricity supply on two indexes of growth, namely the real GDP, a proxy for economic growth (model 2) and index of industrial production (model 3). The econometric methodology encompasses test for stationarity, co-integration and parsimonious error correction model.

Consequently, results show that long run relationship exists between the dependent and the independent variables employed in the study. In the first place, findings reveal that while recurrent expenditure exerts positive impact on electricity generation, the reverse is the case between the later and capital expenditure in the power sector. In table 5 and 6 which capture model 2 and 3, it was discovered that mega watts of electricity generation which is our variable of interest exerts positive influence on real GDP and negatively impacted on index of industrial production. Neither situation is statistically significant. The negative relationship between IIP and mega watt generation (electricity supply) reflects the reality of the Nigeria situation where most industries have folded up due to high operational cost of doing business in the land. This has negatively affected economic growth that has tended to be in sympathy with declining industrial environment.

The major conclusion in this study is that the transformation agenda of the present administration in Nigeria is likely to be a mirage if epileptic power supply continues to prevail in the Nigerian economy. It is recommended therefore that corruption prevalent in the power sector must be checked. Any official found to have diverted money meant for given project should be punished to serve as deterrent to others while the right technology and expertise engaged. The new owners of the power sector must be constantly monitored and any one found wanting should have his ownership revoked and more competent investors take over.

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