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Assessment of Private Sector Financing of Electricity Infrastructure in Nigeria

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Abstracts: *There is a huge deficit in the infrastructure sector of the Nigerian economy. The country generates less than 4000 Mega Watts of electricity for a population of about 160 million people. Because of the low generation of electricity in Nigeria, load shedding is the order of the day. Consumers are forced to do without grid supplied electricity for the most part of the day. All governments' efforts to reverse the dismal performance of the industry failed to produce the desired effects. In 2005, government introduced market reform through the Electric Power Sector Reform Act (EPSR) to reform and restructure the industry to allow for private sector participation in the financing of electricity generation infrastructure as a way of boosting electricity supply to the national economy. However private investment flow to NESI has been slow. The research sought to find out the reasons for the slow pace of private sector investment flow to the industry. Structured questionnaires using Likert scale were distributed to top management of privately licensed firms to generate data for analysis. Multiple regressions were used for data analysis. The analysis reveals a significant influence of the independent variables on the DV with p =0.000< 0.005. This therefore shows that government policy of meeting the generation needs of the electricity industry could be met through the participation of the private sector. However a lot needs to be done to fast track the flow of private investment to the industry.*
Key words: *Electricity Generation, Private Investment, Infrastructure, Power Project Finance and Government Incentives.*

I. Background

Infrastructure facilities are crucial to the operations of the contemporary economy. For example transport infrastructure facilitates the movement of raw materials and people necessary for the organization of production and finished goods to end users. Infrastructure availability and its quality determine the success or otherwise of an economy (Merna & Njiru, 2002; Todaro & Smith, 2006). With a population of about 160 million people and an electricity generation level of less than 4000 megawatts, there is a pronounced electricity supply deficit in Nigeria and closing the gap is going to be a daunting task. That is why in almost every forum and in every household the usual topic of discussion has been the failure of the Power Holding Company (PHCN) to provide stable electricity supply for residential, commercial and industrial consumptions. Because the success of the contemporary economy depends on the continuous supply of electricity, it becomes necessary for massive and sustained investment to be made in order to develop the infrastructure base of the Nigerian Electric Supply Industry (NESI).This will enhance the contribution of NESI to the national economy (Adenikinju, 2005; Iwayemi, 2008b).

To deal with the growing supply deficit, the Nigerian government promulgated the Electric Power Sector Reform (EPSR) Act (2005) which recognizes the participation of the private sector as the key strategy to energy infrastructure development in Nigeria. The Act seeks to infuse competition into NESI and change the monopolistic structure of the market .This is ultimately expected to enhance electricity supply which will promote economic development of the nation. Many private sector firms have been licensed to generate electricity in Nigeria. A few of them have already built generating infrastructure and have started contributing to the national grid. Some of them are at various stages of building the infrastructure. However other licensed private generators are yet to start the development of the generation infrastructure after they have been granted license for many years. This research work has been designed to find out why private investors are reluctant to invest in the Nigerian electricity supply industry.

1.2 Problem Statement

Nigeria's desire to attain an economic super power status by the year 2020 will greatly depend on her ability to enhance her power generation, transmission and distribution infrastructures among others (FGN, 2010). Today consumers of electricity (domestic, commercial and industrial) have to generate substantial portion of their requirements due to low supply of electricity by PHCN (Adenikinju, 2005). It is estimated that up to 20% of investment cost of industrial projects in Nigeria is used to provide alternative source of electricity (Adenikinju, 2005; Iwayemi, 2008a). The impact of this on the business sector has been the increasing costs of

production and loss of business competitiveness among Nigerian firms (at both domestic and international markets). The dismal performance of the energy sector has also adversely affected the living standard of the people and has exacerbated income and *energy poverty among Nigerians* (Iwayemi, 2008b).

The electricity industry dominated by the PHCN (which is entirely owned by the government) has been characterised by poor service delivery in the forms of recurrent 'black-outs' and 'brown –outs, high energy losses (both technical and non-technical) due to poor transmission and distribution infrastructure and low capacity utilization (around 40% of installed capacity). There is also lack of investment in the industry's infrastructures despite the fact that most of the infrastructure in the industry have remained old and subserviced (Adenikinju, 2005; Iwayemi, 2008b; Federal Ministry for Energy, 2008, Obadote 2009,). Ilori, (2002) links the poor performance of the sector to the public ownership of PHCN, inadequate and inefficient delivery of services relative to the demand for such services, excessive regulation, obsolescence /poor equipment maintenance and investment, political interference among others. To address the problems in the sector the government introduced electric power sector reform captured in the EPSR Act (2005). The reform seeks to re-structure the industry and allow private sector participation in those parts of the industry which are open to competition (NERC, 2008). The private sector operators which largely exist as Independent Power Projects (IPPs) operate at the generation segment of the industry where it is possible to introduce competition. The IPPs produce power and sale to the national grid through a contract known as power purchase agreement (PPA). As at November 2011, NERC has licensed more than 50 firms who have signified their intention to invest in the generation of electricity in Nigeria. However, despite the incentives and other promotional efforts of the government only few licensed firms have completed Engineering, Procurement and Construction(EPC) and are producing electric power for both grid and non- grid consumptions.

1.3 Objectives of the Research Work

The objective of the study is to assess the role of power project finance in stimulating the flow of private investment for the development of electricity generation infrastructure in the Nigerian electricity supply industry.

1.4 Hypothesis

The work has been structured on the following hypotheses:
Hypothesis 1
Ho: Power project finance does not have significant impact on the flow of private investment to the Nigerian electricity supply industry.

II. Review of Related Literature

The term infrastructure has its origin in the military where it was used to describe the buildings, installations and communication networks necessary for sending supplies and messages (Scheneider and Jager 2003). The term was borrowed from the Romans languages where it was used to describe immovable parts of the transportation system such as the structure of railways and air ports. According to Hirschman (1958: 83) infrastructure refers to "those services without which primary, secondary and tertiary production activities cannot function. In its widest sense, it includes all public services from law and order through education and public health to transportation, communication, power and water supply as well as such agricultural overhead capital as irrigation and drainage systems" (Hirschman, 1958:83). Hirschman's definition of infrastructure is broad. They however demonstrate the necessity of infrastructure to the wellbeing of the economy and society.
Oyeranti (2001:1) sees 'infrastructure as the basic inputs required for the functioning of an economy'. Cameron (2006) sees infrastructure as the skeleton of the economy which supports the flesh and muscle of the economy . Cameron's definition also emphasises the input nature of infrastructure and its necessity to the process of production in particular and the general operation of the entire economy.
OECD (2007:13) sees infrastructure as the "means for ensuring the delivery of goods and services that promotes prosperity and growth and contribute to quality of life including the social well-being, health and safety of citizens, and the quality of their environments"

2.1 Functions of Infrastructure

Infrastructure plays vital roles in the functioning of the economy through multifarious channels. Infrastructure impacts on investment and firm level performance (Reinikka and Svensson, (1999, 2002), impacts on output and welfare of the people (Arrow and Kurz, (1970). Infrastructure has been shown to have direct effect on total factor productivity (Aschuer, 1989). Studies by Estache, Foster and Wodon, (2002), Estache ,(2003), Calderón and Servén, (2008) show the link between infrastructure and income distribution. Infrastructure availability therefore reduces income inequality by expanding access by the poor to infrastructure services. There is also a growing evidence of infrastructure's effects on poverty reduction, where investment in

infrastructure especially road infrastructure has been shown to improve local community and market development (Escobal and Ponce, 2002; Lockshin and Yemtsov, 2005; Khandker, et al , 2006, Mu and van de Walle, 2007). Estache, Specialle and Veredas, (2005) discusses the developmental of infrastructure. The importance of infrastructure to the proper functioning of the economy is aptly captured by President Goodluck Ebele Jonathan at the CBN Infrastructure Finance Conference in December ,2010 where he observed that ***that huge infrastructural deficits have, over the years, constrained the production of goods and services, functioning of industries, movement of goods and persons, trade and commerce, marketing, banking, health, education and adversely affected other aspects of lives'.***

2.2Private Investment in Electricity Infrastructure

The history of private sector participation in the financing of electricity infrastructure dates back to the early spread of electricity in the 1800s.They were however considered strategic industries and taken over by the government. However governments have gradually begun to withdraw from the business of infrastructure service provision including electricity generation and are being replaced by the private sector. The key drivers of private sector participation in the electricity sector include government's fiscal difficulties and their(governments') failure to meet investment and operational resource needs of their SOEs, poor performance of SOEs, policy changes in the multi lateral lending institutions, massive liquidity and tight domestic returns in Europe and America (Zhang, Parker and Kirkpatrick 2002),technological advancement in the infrastructure sector and the ideological explanations (Dailami and Klien, 1997: Estache, 2005:, Woodhouse, 2005, 2006). Private infrastructure projects are developed through project finance (UNCITRAL, 2001) which is an arrangement where projects are developed through a special entity different from its promoters often referred to as the *project company or special purpose vehicle(SPV)* which provides the avenue for raising funds for financing the projects. Lenders look to the project's cash flow as the basis of the security of their lending. The projects are referred to as either as non-recourse or limited recourse projects (Babber and Schuster, 1998; Dailami, Lipkovich and Van Dyck, 1999).Private power projects are usually developed through power project finance an arrangement where the promoters of the projects put the project entity and raise the funds needed for the project largely through long term debt. Most of the investments are made by Independent Power Producers(IPPs) and are structured through a long term contractual relationship known as Power Purchase Agreement which describes the off take arrangement between the power producers and the off taker(usually an SOE).

Sources of raising funds for power project finance include equity capital (ranging between 20 to 40%), short term commercial loans, subordinated debt /mezzanine capital, institutional investors, the capital market and Islamic Financial Institutions.

2.3 The Nigerian Electricity Supply Industry

The historical background of electricity supply in Nigeria dates back to 1896 with the installation of the first electricity generating plant in Lagos by the then Colonial administration (Okoro and Chikunu, 2007). This was managed by the Public Works Department. The first Electricity Corporation Ordinance (ECO) was enacted in 1950 which created the Electricity Corporation of Nigeria (ECN). This was followed by the 1962 Niger Dam Authority (NDA) Act which created regional electricity bodies that later metamorphosed into NEPA through Decree 4 of 1972.

Nigeria's electricity supply is very low even on Africa's standard. For example Egypt with a population of 77 million generates about 23,000 MW. South Africa with a population of about 49 million generates about 36,000 MW. Because of the low generation of electricity of the sector Nigeria's electricity, consumption per head measured as kilowatts hour per capita is among the lowest in the world (Lawal 2008, Okafor 2009).

Table 1 Comparative Analysis of Electricity Consumption World Wide

Country	*Population*	*Power Generation*	*Per Capita Consumption*
United States	250.00 Million	813,000MW	3.20KW
Cuba	10.54 Million	4,000MW	0.38KW
United Kingdom	57.50 Million	76,000MW	1.33KW
Ukraine	49.00 Million	54,000MW	1.33KW
Iraq	23.60 Million	10,000MW	0.42KW
South Korea	47.00 Million	52,000MW	1.09KW
South Africa	44.30 Million	45,000MW	1.015KW
Libya	5.50 Million	4,600MW	1.015KW
Egypt	67.90 Million	18,000MW	0.265KW
Nigeria	140.00 Million	4,000MW	0.03KW

Source:Agbo ,(2007) as cited by Okafor, (2008:2)

As can be seen Nigeria's per capita consumption is 0.03KW hour. This does not compare with 0.265KW for Egypt, 1.015 for South Africa and Libya respectively. Because of the poor electricity supply to the Nigerian economy, private provision by consumers has become the norm (Adenikinju, 2005). For example firms allocate

substantial proportion of their capital to provide backup generating facility due to poor and unreliable electricity supply from the grid (Ajayi, 1995:, Iwayemi ,2008).

2.4 Power Sector Reform in Nigeria

As a way of reversing the dismal performance of the sector, government introduced the power sector reform through the promulgation of Electric Power Sector Reform Act (2005) to open the market for private sector investment for the generation and sale of electricity. The reform of the sector led to the unbundling of NEPA (into 6 generation companies, 11 distribution companies and 1 transmission companies), creation of the industry regulator (NERC), establishment of the bulk purchaser (NBETC) and the legacy company (NELCOM). To attract the private sector to the industry, government introduced certain incentives which include stable securitization, power purchase agreement (PPA), tariff review (MultiYear Tariff Order) provision of data on electricity demand of the country, provision of data on energy resources of country, electricity transmission infrastructure upgrade and complementary reform in the gas industry. Other incentives include 3-5 years tax holidays, tax exemption on dividend paid during pioneer status, exemption from duty taxes on imported equipments, capital and investment allowances.

3.1 Research Methodology

The research adopts a cross sectional survey research design to undertake the study in line with the work of Adenikinju, (2005); Jamasb ,(2005); Kerekezi ,(2002); Lee and Anas, (1998) ; Renieka and Svenson, (1999, 2002); Wallsten, Clarke , Haggarty, Kaneshiro, Noll, Shirley and Xu , (2004) ; Woodhouse ,(2005), (2006) among others

The research draws sample from the population of managers of the licensed private firms (often referred to as IPPs). Data was gathered from the selected sample through the use of structured questionnaire.

The sample size of the study was determined using Yamane (1967) formula for normal approximation at 95% confidence level and 5% error margin. Thus the sample size was arrived at using the below formula:

$n = N/1+Ne^2$

Where;

N = the population size (540)

n. = the sample size (230)

e. = level of precision (0.05)

1 = constant

Sample Size $n= N/1+N (e)^2 = 540/1+540(0.05)^2 = 540/2.35 = 230$ respondents. Therefore the sample size for the research is 230 out of the population of 540 managers.

The above sample size meets the sample size requirements for multivariate analysis as recommended by Green, (1991): Hair, Anderson, Tatham, & Black, (1995): Oppenheim, (1996): Tabachnick and Fidell, (2007) and Pallant, (2011).

Sample for the study was selected through the use of simple stratified random sampling from the population of managers in the licensed private companies in Nigeria. The stratified sampling procedure allows the researcher to draw a sample in such a way that the researcher is assured that certain sub-groups in the population will be represented in proportion to their numbers (Borg and Gall, 1978).

Data was collected through the use of structured questionnaire which were administered to the sampled respondents. The questionnaire was designed using the Likert Scale format. The questionnaire consists of 6 sections capturing the 6 constructs of the study which are Power project finance (FP), Industry Operational Environment (OPE), Government's Incentive Package (GIP), Industry Tariff Structure (ITS), Policy Option (PO) and the Flow of Private Investment (FPI). The sample size of the research is 230 respondents. However a 30% non response rate was assumed due to the declining rate of survey research response (de Leeuw and de Heer, 2002) especially where top level managers of private organizations are the respondents and the need to ensure the generation of the adequate data needed for the conduct of the analysis in line with the recommendations of Hair, et al, (2006); Hinton, (2010); Tabbachnic and Fidel, (1996); Pallant, (2011) among others

Scale validation and reliability tests were conducted to establish the validity and reliability of the measuring instruments. The research instrument was exposed to content and face validity. The content of the instrument were developed through extensive literature search. Additionally the instrument was sent to some scholars, industry practitioners and regulators who made important input into the instrument. The instrument was also exposed to construct validity to establish convergent validity (which is explored by investigating the relationship between the construct with other constructs) and discriminant validity (which is measured by establishing the extent to which the construct diverges or differs from other construct of the study) using the Pearson Correlation Matrix.

Table 1: Correlation Matrix :Dependent Variable :FPI

		PF	OPE	GIP	ITS	PO	FPI
PF	Pearson Correlation	1	.128	.857**	.249**	.086	.575**
	Sig. (2-tailed)		.104	.000	.001	.277	.000
	N	162	162	162	162	162	162
OPE	Pearson Correlation	.128	1	.225**	.180*	-.109	.031
	Sig. (2-tailed)	.104		.004	.022	.168	.698
	N	162	162	162	162	162	162
GIP	Pearson Correlation	.857**	.225**	1	.380**	-.059	.503**
	Sig. (2-tailed)	.000	.004		.000	.453	.000
	N	162	162	162	162	162	162
ITS	Pearson Correlation	.249**	.180*	.380**	1	-.197*	.161*
	Sig. (2-tailed)	.001	.022	.000		.012	.040
	N	162	162	162	162	162	162
PO	Pearson Correlation	.086	-.109	-.059	-.197*	1	.169*
	Sig. (2-tailed)	.277	.168	.453	.012		.032
	N	162	162	162	162	162	162
FPI	Pearson Correlation	.575**	.031	.503**	.161*	.169*	1
	Sig. (2-tailed)	.000	.698	.000	.040	.032	
	N	162	162	162	162	162	162

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In addition to the validity test conducted, the instrument was also exposed to reliability test to determine their reliability i. e. the extent to which repeated application of the instrument will produce similar result. The Cronbatch alpha was used to estimate the degree of reliability of the measuring instrument.

Table 1 shows the result of the construct reliability test conducted

Table 1: Construct Reliability.

Constructs	Questionnaire Item	Cronbach Alpha	Reliability Status
PF	8	.77	High Reliability
OPE	5	.58	Moderate Reliability
GIP	12	.88	High Reliability
ITS	7	.67	Moderate Reliability
PO	8	.66	Moderate Reliability
FPI	**9**	**.87**	**High Reliability**

Source: Field Survey Data, 2012

Three constructs have high reliability with PF construct having 77% reliability, GIP construct having 88% reliability and FPI construct having 87% reliability. The remaining constructs have moderate reliability. Construct OPE has 58% reliability, constructs PO has 66% reliability while construct ITS has 67% reliability.

3.2 Data Analysis

Descriptive statistics such as frequency distribution , measures of central tendencies (means, mode and median) and measures of dispersion (range, variance, standard deviation ,inter quatile) were used in data cleaning and data preparations preparatory to inferential data analysis as recommended by Coakes ,(2005) , Hair, (2006) , Pallant (2011) and Tabachnick and Fiddel, (2007). Other descriptive statistics used include skewness and kurtosis (for establishing data normality) QQ Plots, NPP Plots, histograms, box plots and Kolmogrov- Sminov (for inspecting compliance with all the multiple regression assumptions).

Standard multiple regression analysis was used to conduct the data analysis and test the hypotheses of the research. Multiple regressions is a dependency technique used to describe the extent of linear relationship between a dependent variable and a number of other independent variables (Frankfort-Nachmias & Nachmias, 1996; Cooper and Schindler, 2011; Hair, etal, 2006). Standard multiple regressions is used to evaluate the relationships between a set of independent variables (IVs) and a dependent variable (DV). In standard multiple regressions all the IVs are entered into the regression equations at the same time and the multiple R and R^2 are used to measure the strength of the relationship between the IVs and the DV. An ***F*** test is used to determine if the relationship can be generalized to the population as represented by the sample while a ***t*** test is used to determine the relationship between each individual IV and the DV. A multiple regressions model is expressed as;

$\grave{Y} = ß_0 + ß_1 x^1 + ß_2 x^2 + ß_3 x^3 + ß_4 x^4 + ß_5 x^5 + e$..... (1)

Where

ßo - is a constant, the value of Ỳ when all values of X are zero
ßi- the slope of the regression surface (the regression coefficient associated with each X).
e- an error .

The use of multiple regression models requires compliance with certain assumptions. These assumptions include sample size requirements, absence of multicollinearity and singularity, detection of outliers, and the assumption of normality, linearity, homoscedascity and independence of residuals. The sample size of the research at 161 (used for the final analysis after deletion of univariate, bivariate and multivariate outliers) has reached the sample size requirements as recommended by Steven, (1996); Hair et al, (2006); Tabachnik and Fiddle (2007); Pallant, (2001, 2011). Normality of the data distribution is assessed through physical and numerical means. The physical examination is done through the examination of graphs such as box plot, histogram, PP plot, QQ plot. On the other hand the numerical assessment is done through kurtosis and skewness. Box plot was used to detect and delete many univariate outliers. Additionally collinearity diagnosis was used to detect bivariate and multi variate outliers. An examination of the histograms of the two models indicates a fairly normally distributed data which implies the absence of substantial outliers. Additionally the normality of the variables distributions was examined through inspecting the residuals scatter plot and the Normal Probability plot of the regression standardised residuals as advocated by Osborn and Waters (2002), Pallant, (2011) and Tabachnick (2007). The Normal Probability Plot in figures 2 and 3 indicates that points reasonably lie on the straight diagonal lines indicating the absence of outliers in the model. Additionally an examination of the correlation matrix indicates the absence of multicolinearity among the independent variables as non of the constructs has an r up to or greater than .9 which indicates the presence of multicollinearity as suggested by Ahmad, (2009); Hair et al., (2006); Pallant, (2001), Pallant, (2011) and Tabachnick , (1996, 2007). An examination of the collinearity diagnostic statistics in table 69 indicates the absence of multicollinearity as the tolerance level for all the constructs are above the threshold of .10 which according to Hair et al, (2006), Pallant, (2011) indicates the presence multi collinearity in the IVs.

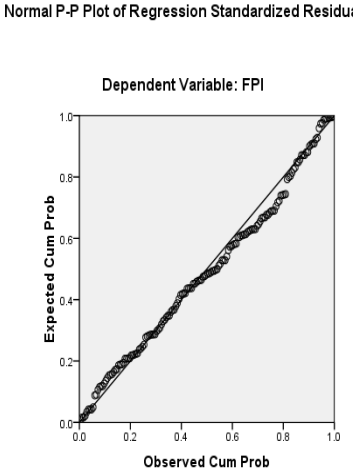


Figure 1: **Normal PP Plot: Dependent Variable FPI.**

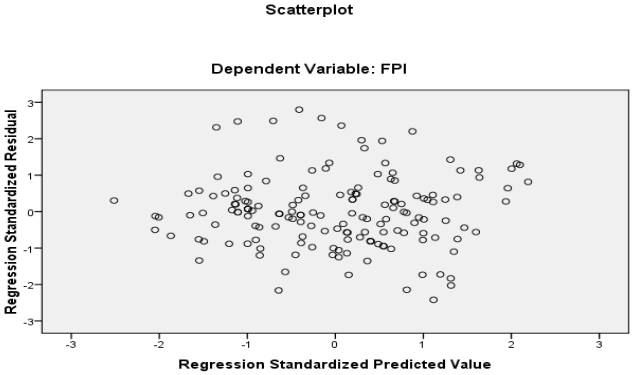


Figure 2: Scatter plot.

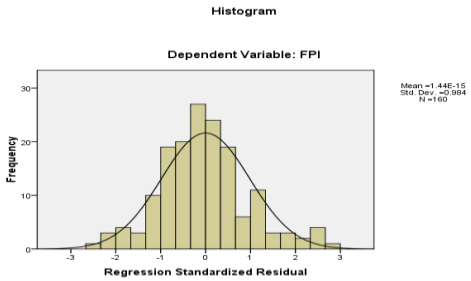
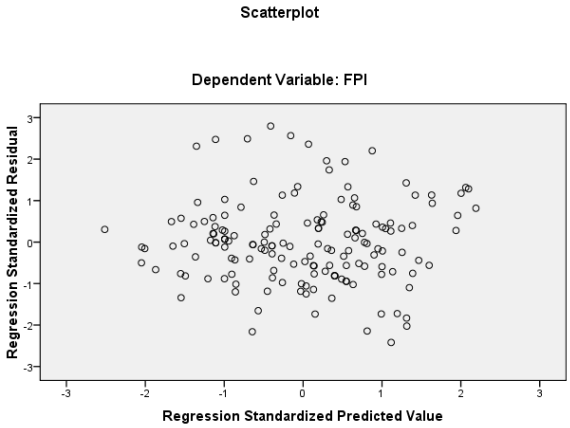
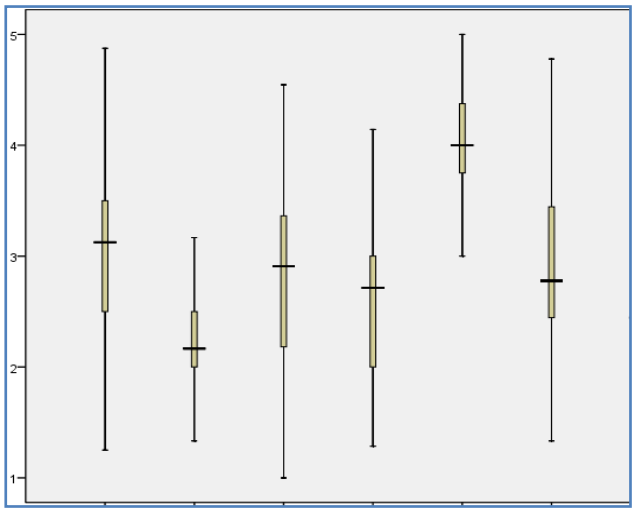


Figure 3: Histogram.





PF OPE GIP ITS PO FPI

Figure 3: Boxplot.

Data screening and cleaning were conducted to ensure that data was accurately entered into the data file, to detect missing data, and to ensure that outliers are detected and acted upon recommended by Frankfort-Nachmias and Nachmias, Hair et al, (2006); (2009); Pallant, (2001) The frequency table in appendix 4 provides a glimpse of relevant statistics that allow for error detections and missing data detection through the examination of out of range, scores (through the maximum and minimum scores) the mean, the median and the mode scores as well as the standard deviation scores and skewness and kurtosis as recommended by Coakes (2005), Palllant, (2011) and Hair et al, (2006). All out of range scores were corrected and consequently all scores for the variables were within 1-5 range. Missing data were detected and appropriate actions taken on them. 299 questionnaires to the respondents out of which 215 were returned representing about 72% of the total questionnaires distributed. Out of these about 3 questionnaires were returned unfilled. Closer examination revealed 5 morbidity cases where the respondents tick in one option throughout the questionnaire that is ticking

strongly agreed, agreed, undecided, disagreed or strongly disagreed throughout the questionnaire. A total of 207 questionnaires remained and were entered into the data file. Each questionnaire was given an ID number for easy identification and correction where necessary. Negatively worded questions (items) in the questionnaire were reversed before the commencement of the analysis as recommended by Cooper and Schindler, (2011), Hair et al (2006), Pallant, (2011), , and Tabbachnik and Fiddel, (2007)

Model Test

Table 67 : Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	678[a]	.460	.443	.58052

a. Predictors: (Constant), PO, GIP, OPE, ITS, PF

b. Dependent Variable: FPI

Table 67 depicts the model summary and shows the r and R^2 values of the model. The model shows that the IVs account together for 46% of variations in the dependent variable (FPI).

Table 68: Analysis of Variance of the Relation between the IVs and the DV.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	44.227	5	8.845	26.247	.000[a]
	Residual	51.898	154	.337		
	Total	96.125	159			

a. Predictors: (Constant), PO, GIP, OPE, ITS, PF

b. Dependent Variable: FPI

The ANOVA Table shows that the independent variables' influence on the dependent variable is significant with $p = .000$. Thus the p value is significant ($p < 0.05$).

Evaluating Individual Variable's Contribution to the Model.

Here we look at the individual variable's contribution to the model by looking at the standardized coefficients beta values against each variable.

Table 69: BetaCoefficients[a] and Collinearity Statistics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.063	.558		-.112	.911		
	PF	.505	.089	.447	5.666	.000	.564	1.774
	OPE	-.148	.113	-.080	-1.310	.192	.930	1.075
	GIP	.315	.092	.282	3.430	.001	.517	1.934
	ITS	.022	.079	.018	.280	.780	.828	1.208
	PO	.209	.106	.121	1.969	.051	.926	1.079

a. Dependent Variable: FPI

The beta table displays the contributions of each variable to the model.The construct PF (power project finance) makes the greatest unique contribution to the model by explaining about 45% of the variance in the dependent variable with a p value of .000 which is less than the significance level or 0.05 ($p<0.05$). Construct GIP (government incentive package) also makes a unique contribution by explaining about 28% of the variance in the dependent variable with a significance level of .001($p < 0.05$). Construct PO (policy option) contributes about 12% to the explanations of the variations in the dependent variable with a p value of .051which is not significant ($p > 0.05$). Construct OPE (industry operational environment) contributes -8 to the model with a p value of .192. Since $p > 0.05$ the construct influence is not significant. On the other hand the model ITS (industry tariff structure) contributes about 2% to the model's explanations on the dependent variable with a p value of .780 ($P > 0.05$) and thus it has an insignificant influence on the model.

Test of Hypotheses.

The hypothesis to be tested is

Ho: *Power project finance does not have significant impact on the flow of private investment to the Nigerian electricity supply industry*.

H1: *Power project finance has significant impacts on the flow of private investment to the Nigerian electricity supply industry*.

Table 2 presents the model summary which presents the r and R^2 values which are .678 and .460 respectively. This indicates that the model has a 46% explanatory power over the dependent variable. In other words the model explains about 46% variation in the dependent variable. Table 3 is the ANOVA table which shows the level of significance of the model on the dependent variable. The table shows a *p* value of .000. Thus the model has a significant effect on the dependent variable. Thus $p < 0.05$.

Decision rule:

Reject Ho if $P < 0.05$

Accept Ho if $P > 0.05$

Going by the decision rule therefore the null hypothesis which states that *power project finance does not have significant impact on the flow of private investment to the Nigerian electricity supply industry* is rejected and the alternate hypothesis which states that power *project finance have significant impact on the flow of private investment to the Nigerian electricity supply industry* is accepted.

The standard multiple regressions model therefore is represented as

$Y= bo+B_1X_1 +B_2X_2 +B_3X_3 - - - - +B_n X_n+ e$ (1)

Where Y is the dependent variable FPI, ***bo*** is the intercept, X_1, X_2, X_3 are the coefficients of the independent variables of the study.

Therefore

$FPI = bo+ b_1 PF+ b_2 OPE+b_3GIP +b_4ITS +b_5PO - - - - +e$ (2)

Where ***bo*** is the intercept i.e. the value of ***Y*** when the values of the IVs are all equal to zero, ***PF*** is the power project finance variable, ***OPE*** is the industry operational environment, ***GIP*** government incentive package, ***ITS*** is the industry tariff structure and ***PO*** is the policy options while ***e*** is the error term.

Y (FPI) = -0.63+.505+.148+.315+ .022+.209- - - - (3)

Y = -0.63+.505PF+.148OPE+.315GIP+.022ITS+.209PO

III. Discussion

Nigeria's electricity sector has failed to meet the electricity needs of the nation(Adenikinju,2005; Ebherhard, 2012; Iwayemi, 2008b) due largely to the public ownership structure of the industry (Ilori, 2002) and government inability to expand investment in the sector to meet the growing demand for electricity services(Iwayemi, 2008a). Consequently government introduced the reform of the industry to pave way for private sector investment in the generation segment of the industry and to introduce competition to enhance power generation and supply. However despite the grant of licenses by the government to many private sector firms very few firms have invested in the development of electricity generation infrastructure. The study sought to find out the reasons for the low private sector investment in the NESI despite the granting of licenses to many private firms.

The independent variable PF indicates the immense potentials that power project finance has on the generation of private sector investment as a way of reversing the dismal performance of the Nigerian electricity supply industry. In other words private sector investment is critical to the development of the generation capacity of the Nigerian electricity supply industry. Thus power project finance significantly impacts on the flow of private sector investment to the Nigerian electricity supply industry. The finding therefore confirms the views of Babber and Schuster (1998) who argue that private power finance holds a lot of potentials for developing countries power sector. Private power financing according to Babber and Schuster (1998) has brought about significant contribution to the power sectors of developing countries by providing a significant share of the countries investment needs and by bringing new investors and efficiency to the markets with many of the projects structured on BOO and long term PPA(Babber and Schuster, 1998). The findings also corroborate Izaguirre (2004) who reports the significant improvement in the flow of private investment to developing countries power sector reporting that in 2003 alone about 14billion dollars investment flowed to the power sector of the developing countries with IPP projects accounting for about 85% of the total. This therefore confirms the property rights theories and the bureaucracy theories which argue for private sector participation in infrastructure business as the basis of enhancing operational and allocative efficiency in the infrastructure sector (Alchian, 1965; Niskanen, 1968). It is also consistent with the Averch-Johnson model which argues about the existence of regulatory bias in publically owned and run utilities which operate inefficiently as they do not

equate their marginal rate of factor substitution to the ratio of their factor cost. The firms are therefore inefficient and crowd out the efficient firms that may enter into the industry (Averch and Johnson, 1962). Thus the need for liberalization and private sector participation. The inefficient performance of developing countries power sector is also attributed to prevalence of political interference as discussed in the influence theories. Private sector financing of electricity infrastructure is therefore the remedy towards reducing political interference and influence which is expected to lead to enhanced efficiency (Milgrom and Roberts, 1990). The findings also tally with OECD/IEA (2007) for privately led power market to deliver the expected benefits competition must flourish across all levels of the markets.

However according to Heron, (1985), many developing countries have difficulty attracting foreign private finance for power projects and have difficulty in mobilizing domestic private finance for reasons specific to the sector and the fact that political pressure keeps tariff below cost recovery level and additionally because domestic savings is generally low and financial market not fully developed. However the findings contrast with (IFC, 1999) who caution against the use of project finance due to the way the 1997 East Asian crisis affected private financed projects in the East Asian countries and the resultant deterioration in the markets for project finance in many developing countries. The findings are also not in line with the work of Bayliss and Hall, (2000) who argue that private power projects are not a solution to power supply constraints in developing countries because of the experience of Philippines and the Dominican Republic where PPA payment commitments in foreign currencies crippled the SOE utilities in these countries.

The implication of these findings is that private power projects have significant potentials for the development of the Nigerian electricity supply industry and the opening up of the industry for private investment provides the opportunity for meeting the investment needs of the industry. However many challenges remain on the road towards private sector investment flow to the Nigerian electricity supply industry due to the undeveloped capital market in the country, investors lack of access to financial resources from both the local and international sources, investors fear of the risks and uncertainties in the Nigerian electricity supply industry, lack of credible off –taker and robust PPA market among others. Thus though there is the strong possibility of the private sector meeting the Nigerian electricity generation needs trough private power project finance, the right environment has to be created for the private sector to have confidence to invest in the Nigerian electricity supply industry.

Recommendations.

The following recommendations are deemed pertinent.

1. Establishment of macroeconomic stability as a way reducing uncertainties in the economy.

2. Encouragement of Local Entrepreneurs in order to reduce projects' exposure to instability and shock from the global economy.

3. Development of the Financial Services Sector to give opportunities to enhance opportunities for investors to raise funds from the financial services industry.

4. Creation of Industry Friendly Policies in order to reduce the challenges in the industry**.**

5. Implementation of Governments Policy Incentives in order to make the industry attractive to private investors.

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