AN ASSESSMENT OF THE CHALLENGES FACING POWER INFRASTRUCTURE FINANCING IN NIGERIA

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Abstract

Infrastructure is the absolute determinant of economic growth and development of developed and developing countries. Infrastructural financing addresses the decayed nature of power infrastructure. The purpose of this study is to determine the challenges facing financing of power infrastructure in developing countries. For this research study, data was collected through primary and secondary sources. For the primary source, data was collected through a questionnaire format, and was targeted to the respondents responsible for the development of power infrastructure in Nigeria. The challenges facing the financing of power infrastructure in Nigeria were found to be foreign exchange and currency differences, limited access to loans and other forms of investment, lack of affordable long-term funding, lack of quick returns on power investments were seen as some of the challenges facing power infrastructure financing in Nigeria. With the decayed nature of investment in the power infrastructure sector in Nigeria, there is great need to introduce effective policies to stifle the challenges facing power infrastructure investment in the region, for better economic growth and development. There will be great investment of private capital and concessionaries in the power infrastructure sector with the elimination of the challenges facing financing in the sector. This study contributes greatly to the development of power infrastructure in Nigeria and also enhances the development of power infrastructure that will boost economic liberation and sustainable growth in Nigeria and the entire continent.

Keywords
Challenges, Economic growth, infrastructural financing, Nigeria, power infrastructure

1. Introduction

Infrastructure development is the driver of long-term economic growth. Lack of adequate financing of power infrastructure, both in the developed and under-developed countries, has the ability of setting nations back economically (Ehlers, 2014). According to Pearson (2013), infrastructure financing cannot be funded solely by government's conventional means which is annual budgeting. Therefore the government can no longer finance infrastructure entirely; it is important to encourage private sector participation, which can be in the form of concessionaries for the efficient development of infrastructure in the regions (Smith et al., 2009). For the sake of the developmental and economic benefits that infrastructure brings to society, is important for adequate and efficient legislative policies to be channeled to encourage private investment in infrastructural development (Grimsey and Lewis, 2002). Effective legislative policies on infrastructure development that encourage positive participation in the financing of power infrastructure. (Estache, 2008). The application of the effective policies will definitely improve the quality of life of the community through the provision of a secured power supply and pipe-borne water (Oorganization of Economic Co-operations Development, 2016). In addition, telecommunication, good roads and transportation which faciliate efficient and effective business communication will ultimately improve the lives of the citizens (Eberhard and Shkaratan, 2012). Infrastructural development also facilitates movement of labour and capital, reduces costs and increases production Emenike (2016).

2. Methodology

The method used in this study was quantitative research approach with the motive of achieving the aim of the study, which is the challenges facing power infrastructure financing in Nigeria. Quantitative methods relate to positivism and factual data (Burns and Grove, 2005). The questionnaire was developed from a wide review of the literature and is not part of any existing survey instrument. Practicing power infrastructure professionals in the power sector of Nigeria were engaged in the collection of the primary data on the challenges facing power infrastructure financing in Nigeria.

The Likert scale (strongly agree = 5, agree = 4, neutral = 3, disagree = 4, strongly disagree = 5) Mean item score (MIS) was used to present the research findings from the Likert scale in a decreasing order.

Exploratory factor analysis (EFA) is one of the two types of factor analysis (FA), and is often deployed during the initial stage of research by researchers in order to collate information about the interrelationships within a set of variables (Pallant, 2011). The EFA of the results were obtained to comfirm the validity and reliabilty of the challenges facing power infrastructure financing in Nigeria, with the highest likelihood with an eigen value of more than one, together with the varimax rotation EFA was used specifically for this study. SPSS software version 21.0 was used to conduct the EFA for this research. The descriptive results show the rankings of all the factors from the first to last according to the variables, with the table representing the individual variables' mean score as well as the standard deviation of the variables.

2.1 Data analysis

Two descriptive statistics were carried out, which are in the form of mean item score and factor analysis. The ranking of the variables was done with mean item score, likewise factor analysis was carried out to outline the variables measuring same underlying effects (Ledwaba, 2012).

2.2 Mean item score

The mean ranking of the variables presented depicts the individual views reached on by the respondents. The result for the test is shown in the table below. The mean table represented below also include the standard deviation of the variables.

Table 1. Challenges facing financing of power infrastructure in Nigeria

Challenges facing power infrastructure financing	**Mean**	Standard deviation	Rank (R)
Foreign exchange and currency differences	4.70	0.461	1
Limited access to loans and other forms of financing	4.60	0.064	2
Lack of affordable long-term funding	4.38	0.599	3
Lack of quick returns on investment	4.30	0.739	4
The time profile of cash flow by financial institutions in financing power infrastructure	4.23	0.716	5
Higher risk of power infrastructure investments	4.23	0.675	6
Low tariffs of electrification	4.14	0.749	7
Risk distribution in contracts between public and private investors	4.14	0.644	8

Cost of doing business in Nigeria	3.58	1.382	9
Political instability	3.47	1.521	10
Lack of government support	3.22	1.484	11
Deficient regulation in the sector	2.67	1.417	12
Inefficient investment laws	2.59	1.331	13
Unfavourable legal framework	2.42	1.426	14
Tight power generation plan	2.37	1.322	15
Market failures on power investment	2.22	1.451	16

3.3 Results from exploratory factor analysis

The EFA results on the challenges facing the financing of power infrastructure are depicted in tables 1, 2, 3, 4, 5, 6 and fig. 1 With the sixteen variables outlined, two (2) of the variable were missing which are the 'higher risk of power infrastructure financing' (CF7) and 'market failures on power investment'. The following were the fourteen variables identitified with the potential of meeting the challenges facing the financing of power infrastructure in Nigeria.

Table 2. Definition of identified challenges facing the financing of power infrastructure

Variable	Variable name	Definition
CF1	Cost of doing business in Nigeria	The capital involved in setting up investments in Nigeria.
CF2	Lack of affordable long-term funding	Lack of adequate capital
CF3	Foreign exchange and currency differences	Fluctuations in foreign currencies
CF4	Risk distribution in contracts between public and private investors	Contractual discrepancies between investors
CF5	Political instability	Instability in regime change
CF6	Unfavourable legal framework	Unfriendly laws on power infrastructure development
CF8	Limited access to loans and other forms of financing	No access to external capital for investment
CF9	The time profile of cash flow by financial institutions in financing power infrastructure	Timely availability of capital for investment by financial institutions
CF11	Lack of government support	Institutional negligence
CF12	Deficient regulations in the sector	Lack of adequate acts
CF13	Low tariffs of electrification	Low utility fees
CF14	Tight power generation plan	Constraints on power generation
CF15	Lack of quick returns on investment	No quick profit returns on investment
CF16	Inefficient investment laws	Ineffective Acts on investments

3.4 Factor Analysis

Factor analysis is vital in breaking down numbers of large variables and breaking them into more simple clusters for better interpretations (Ahadzie et al., 2008). Table 3-6 and fig. 1 below shows (table 3) Kaizer-Meyer-Olkin (KMO), the measure of sampling adequacy attained a high score of 0.748. (Table 4) The Bartlett test of sphericity also was important, this suggest that the matrix of population is not an identical matrix. Also, the Cronbach alpha which measures internal consistency is 0.748, thus suggest that the reliability of the instrument used by the researcher in the research is quite good.

Table 3. KMO and Bartlett's test

Kaiser-Meyer measure of sampling adequacy.		.748
Bartlett's test of sphericity	Approx. chi-square	698.249
	df	91
	Sig.	.000

The data was regulated with principal component analysis (with varimax rotation). The eigen values has a high value of more than 1. As represented in table 5 and aslo see figure 1, the factor loading extracted extracted was eight components with the eigenvalue more than 1 and 0.5 (also see fig. 1 scree plot). For the total variance (see table 6), as explained by each component extracted; component 1 (27.977), component 2 (15.528), component 3 (12.840) and component 4 (9.028). Therefore, the result from the principal component analysis (PCA) and the factors extracted amounted to 65,373% of the total cumulative variance.

Table 4. Correlation matrix of factor analysis

Correlation	CF1	CF2	CF3	CF4	CF5	CF6	CF8	CF9	CF11	CF12	CF13	CF14	CF15	CF16
CF1	**1.000**	-.136	-.119	.206	.535	.340	-.133	-.295	-.256	.132	-.091	.212	-.071	.312
CF2	-.136	**1.000**	.253	-.004	-.079	-.082	.424	.118	.060	-.042	.307	-.063	-.134	-.034
CF3	-.119	.253	**1.000**	.097	-.002	.116	.108	.002	.154	.058	.076	.143	-.049	.058
CF4	.206	-.004	.O97	**1.000**	.250	.066	.052	-.072	.039	.060	.291	.125	.279	.203
CF5	.535	-.079	-.002	.250	**1.000**	.552	-.250	-.232	.005	.408	-.063	.441	-.077	.398
CF6	.340	-.082	.116	.066	.552	**1.000**	-.102	-.282	.399	.700	-.105	.625	-.040	.631
CF8	-.133	.424	.108	.052	-.250	-.102	**1.000**	.283	.176	-.065	.358	.016	.200	.041
CF9	-.295	.118	.002	-.072	-.232	-.282	.283	**1.000**	.053	-.130	.155	-.066	-.041	-.174
CF11	-.256	.060	.154	.039	.005	.399	.176	.053	**1.000**	.630	-.048	.495	.010	.479
CF12	.132	-.042	.058	.060	.408	.700	-.065	-.130	.630	**1.000**	-.116	.697	-.024	.674
CF13	-.091	.307	.076	.291	-.063	-.105	.358	.155	-.048	-.116	**1.000**	-.044	.547	-.074
CF14	.212	-.063	.143	.125	.441	.625	.016	-.066	.495	.697	-.044	**1.000**	-.043	.656
CF15	-.071	-.134	-.049	.279	-.077	-.040	.200	-.041	.010	-.024	.547	-.043	**1.000**	.023

CF16	.312	-.034	.058	.203	.398	.631	.041	-.174	.479	.674	-.074	.656	.023	**1.000**

Table 5. Rotated factor matrixa

Rotated factor matrix for the challenges facing power infrastructure financing in Nigeria	**Factors**			
	1	2	3	4
Deficient regulations in the sector	**.901**			
Tight power generation plan	**.825**			
Inefficient investment laws	**.794**			
Lack of government support	**.790**			
Unfavourable legal framework	**.764**			
Cost of doing business in Nigeria		**.835**		
Political instability		**.742**		
The time frame of cash flow by financial institutions in financing power infrastructure		**.582**		
Low tariffs of electrification			**.831**	
Lack of quick returns on investment			**.827**	
Risk distribution in contracts between public and private investors			**.582**	
Lack of affordable long-term funding				**.842**
Limited access to loans and other forms of financing				**.593**
Foreign exchange and currency differences				**.590**
Extraction ethod: Principal component analysis. Rotation method: Varimax with Kaiser Normalization.[a] a. Rotation converged in 7 iterations				

Table 6. Total variance explained

Factors	Initial eigenvalues			Extraction sums of squared loadings			Rotated sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**3.917**	27.977	27.977	3.917	27.977	27.977	3.511	25.081	25.081
2	**2.174**	15.528	43.505	2.174	15.528	43.505	2.204	15.742	40.823
3	**1.798**	12.840	56.345	1.798	12.840	56.345	1.889	13.492	54.315
4	**1.264**	9.028	65.373	1.264	9.028	65.373	1.548	11.058	65.373
5	.971	6.937	72.310						
6	.828	5.911	78.221						
7	.695	4.968	83.188						
8	.550	3.925	87.114						
9	.395	2.825	89.939						
10	.344	2.457	92.396						
11	.324	2.316	94.721						
12	.277	1.978	96.690						
13	.261	1.865	96.555						
14	.202	1.445	100.000						
Extraction method: Principal component analysis									

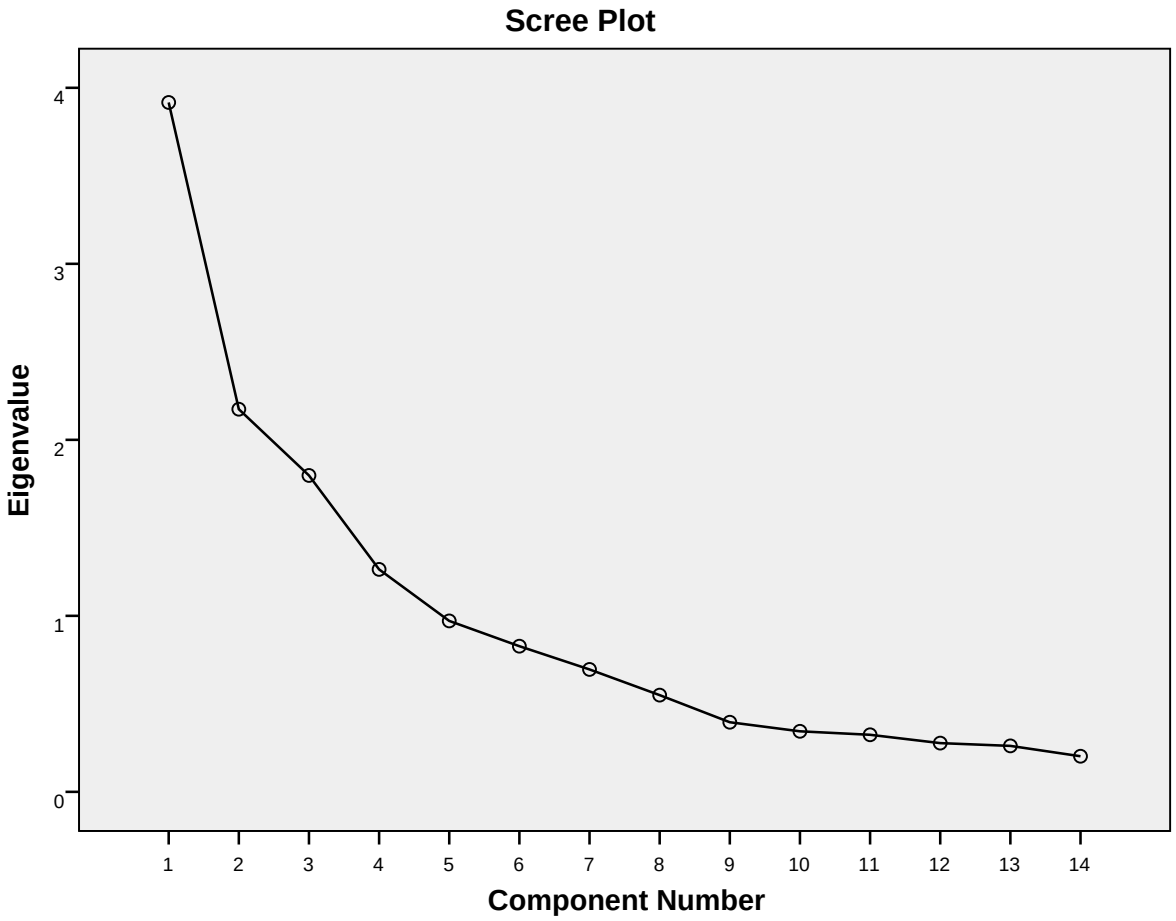

Fig 1. Scree plot for factor analysis

The principal axis factoring used showed that four (4) were present with eigenvalues greater than 1 as represented in the table table 6 and the figure 1 above. Owing to the careful observation of the inherent connections among each of the variables under each factor, the following assessments were made: Factor 1 was described as **policy frame-work constraints**; factor 2 was described as **government acts;** factor 3 was termed **long-term profit constraints** and finally, factor 4 was termed **long-term financial constraints.** The terms used in describing these factors was obtained as a result of closely observing the variables within each of the factors. The two factors extracted and its constituents indicators are explained below, together with a comprehensive description of how the two factor sections were described.

4. DISCUSSION OF RESULT

4.1 Factor 1: policy frame-work constraints

As shown in table 5 above, the four (4) were extracted as the challenges facing financing of power infrastructure. For factor 1 was 'deficient regulations in the sector' (90.1%), 'tight power generation plan' (82.5%), 'inefficient investment laws' (79.4.2%), 'lack of government support' (79.0%), and 'unfavourable legal framework for contracts' (76.4%). The numbers in the parentheses show the individual factor loadings. The definitions of these variables are explained in table 2. This cluster acounted for 27.977 per cent of the variance.

4.2 Factor 2: government acts

As shown in table 5 above, the four (4) were extracted as the challenges facing financing of power infrastructure. For factor 2 were 'cost of doing business in Nigeria' (83.5%), 'political instability' (74.2%), and 'the time profile of cash flow by financial institutions in financing power infrastructure projects' (50.8%). The numbers in the parentheses show the individual loadings. The definitions of these variables are explained in table 2 above. This cluster accounted for 15.528 per cent of the variance.

4.3 Factor 3: long-term pofit constraints

As shown in table 5 above, the four (4) were extracted as the challenges facing financing of power infrastructure. For factor 3 were 'low tariffs of electrification' (83.1%), 'lack of quick returns on investment' (82.7%), and 'risk distribution in contracts between public and private investors' (58.2%). The numbers in the parentheses show the individual loadings. The definitions of these variables are also explained in table 2 above. This cluster accounted for 10.840 per cent of the variance.

4.4 Factor 4: long-term financial constraints

As shown in Table 5 above, the four (4) were extracted as the challenges facing financing of power infrastructure. For factor 4 were 'lack of affordable long-term funding' (84.2%), 'limited access to loans and another form of financing' (59.3%), and 'foreign exchange and currency differences' (59.0%). The numbers in the parentheses show the individual loadings. The definition of these variables are also explained in table 2 above. This cluster accounted for 9.028 per cent of the variance.

5. IMPLICATION OF FINDINGS

The theoretical literature review is in agreement with the empirical findings of this research study. The empirical study which reveals that the challenges facing financing of power infrastructure financing in Nigeria from the four cluster factors are foreign exchange and currency differences which were ranked highest. This shows that the fluctuation of foreign currencies in Nigeria has significantly affected the rate of investment in the power sector, because most power equipment and facilities used for development are obtained with foreign currencies. From the findings, it was also revealed according to the respondents that limited access to loans and other forms of financing has greatly contributed to the challenges in the power sector in Nigeria. It is therefore important for the challenges as revealed by this study to be addressed with immediate effect to enable power infrastructure projects to flourish in the Nigerian environment for a better and more sustainable growth of lives and economy.

6. CONCLUSION

Results from the literature review established the following variables as the challenges facing financing of power infrastructure in Nigeria: larger amounts of capital are required, foreign exchange and currencies fluctuations, and higher risk of power infrastructure investment. However, literature further identified limited access to loans and other forms of capital and lack of affordable long-term financing as challenges facing the financing of power infrastructure in Nigeria.

Results from the findings of the secondary data i.e. questionnaire survey indicate that there are seven main challenges facing the financing of power infrastructure in Nigeria. These are foreign exchange and currency differences, limited access to loans and other forms of financing, lack of affordable long-term funding, lack of quick returns on investments, the time profile of cash flow by financial institutions in financing power infrastructure projects, higher risk of power infrastructure investments and low tariffs of electrification. It can be said conclusively that the research objectives for this study has been answered.

Biographies

AYORINDE Emmanuel Oikelomen is a passionate researcher and a writer with the minders touch. He got his bachelor of engineering degree in Civil Engineering (B.ENG) from Federal University of Technology, Akure, Nigeria, and master's degree from the department of Civil Engineering from the University of Johannesburg, South Africa. During his master's degree, he was employed by the department to help with position of Senior Tutor and also delivery lectures and research. The employment gave me the confidence and interest in research. He worked in the area of geometric design, Transportation engineering, project management. To his and other academia he has authored a number of conference papers both locally and internationally. He will be enlisted in august as a member of the Golden Key association in South Africa for his academic contribution.

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