

**EVALUATION OF IMPEDIMENTS TO SUSTAINABLE
BUILD-OPERATE-TRANSFER HIGHWAY PROJECTS IN
NIGERIA**

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Evaluation of Impediments to Sustainable BOT Highway Projects in Nigeria.

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Abstract

Highway infrastructure is the lifeline of any nation. It is important that it is healthy, safe and efficient. Due to dwindling revenues and increasing expenditures of government, private sector participation was being sought by government to reduce the burden of infrastructure provision on government. This paper assesses factors impeding sustainability of BOT highway project in Nigeria. To achieve the main objective of this paper, one hundred and ten (110) were administered on major stakeholders in the highway sector, comprising government agencies, highway engineers, quantity surveyors and private sector participants using stratified random sampling technique. Seventy-six (76) questionnaires were retrieved and used for the analysis. The study employed descriptive and inferential statistics. The results indicated that the most important factor impeding the sustainability of BOT highway projects is high cost of finance. Other factors as rated by respondents have high mean scores which account for lack of visible success in the sustainability of BOT highway projects in Nigeria. A Mann-Whitney U test at 95% confidence level was carried out on the data obtained for the study to evaluate if there was difference in the ranking of the factors by the respondents. It was found that there is no significant difference in the ranking of factors between the public and private parties. The paper concluded that these impeding factors have affected the sustainability of BOT highway projects in Nigeria.

Keywords: Build-operate-transfer, development, highway, sustainable.

1. Introduction

FHWA (2016) described “*sustainable highways as an integral part of sustainable development*”. Therefore, it must satisfy life-cycle functional requirements which will bring about economic growth and development. Li (2015) linked sustainable development to economic growth which brings positive impact on the citizens. BOT procurement arrangement synthesizes the expertise and skills of the public and private parties for the provision of infrastructure through differing levels of engagement and responsibility (Ismail, 2013). This procurement method has made provision of highway infrastructure easier due to the inherent benefits therein (Babatunde et al, 2015). Gunnigan & Rajput (2010) posited that in the last decade, PPP/BOT has brought about a rapid interest in infrastructure provision in several

countries. BOTs are important in advancing a country's economic growth (Inderst, 2016), provision of infrastructure to achieve enhanced delivery of services and good governance through the collaboration of both public and private sector participants (Akintoye & Liyanage, 2011). BOT projects help to maintain social stability, improve peoples' quality of life and promote economic development (Zhu, 2016). Despite wider acceptance and adoption of PPP/BOT procurement method all over the world, only a few numbers of countries have reaped the full benefits of the procurement system (Levy, 1996). Most countries are still performing below expectation due to number of impediments. Hence, identifying barriers to sustainability of BOT highway provision is pivotal for the advancement of future construction developments in the sector (Chan, Lam, Cheung, and Ke, 2010). Hence, this paper is timely to recognize the constraints associated with sustainability of BOT highway projects in developing countries like Nigeria. This paper aims to evaluate impeding factors to the sustainability of BOT highway projects in Nigeria with a view to bring about sustainable development through meeting human needs as enshrined in the United Nation charter.

2. Literature Review

2.1 Impeding Factors to Sustainable BOT Highway Projects

Major problems associated with BOT highway projects have been researched on by many authors. Chan et al (2010) posited that misallocation of risks could endanger sustainability of BOT projects. Wrongful allocation of risks beyond the capacity of either party will lead to project failure. The need for both parties to have full knowledge of the risks to generate better outcomes and achieve project success is very important (Chan et al 2006; Sun et al, 2008; Xenidis and Angelides, 2005). Private sector failure is another major problem to BOT/PPP sustainability in Nigeria. Lack of sufficiently competent private parties' technical and financial wise has impacted negatively on the sustainability of BOT highways in Nigeria. The case of Lagos-Ibadan expressway is a good example whereby after three years of signing agreement, the project was yet to commence.

High cost of finance, transaction cost and lengthy lead time have also hindered development of BOT projects in Nigeria. Though, the fact that BOT projects arrangement is complex and involving many parties is not helping matter. These parties, however, have conflicting objectives and interest (Carrillo et al, 2008), which if not harmonized in an appropriate manner will jeopardize the achievement of project objectives (Li, 2003). Since BOT requires extensive expertise input (Corbett and Smith 2006), may incur high cost

because the fees for lawyers, technical and other professionals, private sector finance and other advisory fees would be included in the cost of the projects (Li et al, 2005). Through this, high bidding costs is incurred by the private sector (Askar and Gab-Allah, 2002; Li, 2003) due to consideration of client's and financier's objectives (Li et al, 2005; Chan et al, 2006) and protracted procurement process (Chan et al, 2010; Xenidis and Angelides, 2006). One other reason impeding sustainable BOT highway development is political/social obstacles due to insufficient justification to initiate and encourage stakeholders to embrace the procurement system. It could be in the form of public opposition as result of funding the project (El-Gohary et al, 2006; Grimsey and Lewis, 2004). Issues like town planning, environmental protection, heritage (Chan et al, 2010), fewer employment due to innovation of the private sector, high tariff (Li, 2003), fear of job loss in the public sector also impedes BOT highway projects sustainability (Li et al, 2005).

Furthermore, poor or inadequate legal framework is impeding BOT development in Nigeria. PPP/BOT regulatory framework is not definitive and that is why stakeholders use the loopholes therein as excuses for poor delivery of projects. More than ten (10) projects were terminated due to this single factor between 2005 and 2010 (ICRC, 2013). Nigeria do not have a long-standing regulatory framework for BOT/PPP as the current one lacks the capacity to bring about the desired improvement but is only based on the traditional command and control model. Also, the framework was adapted from other developed countries without recourse to our own peculiarity as a nation. Worthy to note is that without a well-established legal framework, there would recurring disputes (Grimsey and Lewis, 2004; Satpathy and Das, 2007). Furthermore, insufficient instruments and strength to meet the long-term equity and debt financing needs of infrastructure project is a major problem hindering the development of BOT highway projects in Nigeria. Conducive financial market is vital for project success, lack of which is abysmal failure (Grimsey and Lewis, 2004). Lack of matured financial markets and difficulties in securing credit characterizes developing countries (Gidado, 2010; Zhang et al, 2010). In this part of the world, securing a financially strong partner is difficult because of unattractive financial market, due to high interest rate. Other factors include: global credit and financial crisis limiting foreign investment in above opportunities (Ikpefan, 2015).

3. Research Method.

The population for this study includes; client organizations (government agencies) especially those in charge of BOT/PPP projects, consultancy firms, concessionaires, registered contractors, academia and selected financial institutions who have participated in BOT projects in Lagos and Abuja. A 5-point Likert scale on the level of agreement was adopted in the study. Data were collected personally by the researchers through a cross-sectional survey using stratified random sampling. The data collected was analysed using SPSS. Mean Item score was used for the descriptive statistics and the factors were ranked accordingly while Mann-Whitney U test was adopted for the inferential statistics. This test is the non-parametric equivalent of the independent *t*-test.

The sample size for the survey is estimated to be 110 respondents, using the Krejcie and Morgan's formular. The questionnaires will be administered in Abuja (FCT) and Lagos (commercial capital of Nigeria).

$$S = \frac{\chi^2 N P (1 - P)}{d^2 (N-1) + \chi^2 P(1 - P)}$$

S= sample size

χ^2 = chi-square value for 1 degree of freedom at desired confidence level =3.841

N= population size =150 experts

P=population proportion (assume 0.5 for maximum sample size)

d=degree of accuracy, or standard error (assume 0.05).

Applying the above equation,

$$S = \frac{3.841 \times 150 \times 0.5 \times 0.5}{0.05 \times 149 + 3.841 \times 0.5 \times 0.5}$$

= 108.06 \approx 110 experts

The sample size for the study is 110 experts

Sampling unit is “the geographic or physical or area the target population is located from where the sample was drawn”. Since this study targeted at the BOT highways in Nigeria, the organizations in which the targeted respondents work form the sampling unit. The sampling unit comprises of government agencies in charge of PPP/BOT, contracting organizations, concession companies, consultancy firms, selected financial institutions and

academia. Simple random sampling technique was used in selecting the samples. This method of sampling is widely used and very useful when the target population is heterogeneous. Then, random samples were taken in proportion to the population from each group.

3.1 Hypothesis Testing

This paper has put up the following hypothesis:

H₀: There is no significant difference in the rating of scores between the public and private parties on the impediments to sustainability of BOT highway projects

H₁: There is significant difference in the rating of scores between the public and private parties on the impediments to sustainability of BOT highway projects

4. Results

Description of Respondents' Demographic Information

The demographic details of the respondents. 17% of the respondents are HND holders, 44% are BSc holders, 26% are MSc/MBA holders while 03% are PhD holders. 64% of the respondents are corporate members of their respective professional bodies. The respondents comprise of 25% highway engineers, 17% quantity surveyors, 18% concessionaires, 19% contractors, 8% are in academia and 13% bankers. 52.6% of the respondents are public sector participants while 47.4% are private sector participants. 75% of the respondents have over six years' experience in BOT highway projects. Over 50% of the respondents have handled 3 projects and above. This shows that the information supplied by the respondents can be considered appropriate and adequate.

Table 1: Ranking of impediments to sustainable Development of BOT Highways by Public-Private Parties

Problems	Public party (MIS)	Rank	Private party (MIS)	Rank
High cost of finance	4.20	2 nd	4.56	1 st
Incomplete risk transfer	3.99	5 th	4.05	5 th
Higher costs to direct users	3.70	9 th	3.38	13 th
Very few schemes reached contract stage	4.40	1 st	4.10	3 rd
Lengthy delays in negotiations	3.82	6 th	4.20	2 nd
Lengthy delays due to political debate	3.80	7 th	4.00	7 th
Participants' lack of appropriate knowledge and skills	4.16	3 rd	4.10	3 rd
Low competition due to high bidding cost	3.46	10 th	3.58	11 th
Public oppositions	3.08	14 th	3.80	9 th
Complex negotiations	3.20	13 th	3.66	10 th
Non-accountability due to little public information	3.30	12 th	3.40	12 th
Excessive risks associated with BOTs	4.10	4 th	3.94	8 th
High participation cost	3.76	8 th	4.03	6 th
High risks relying on private sector	3.32	11 th	3.10	14 th

Source: Fieldwork (2018).

Inferential statistics

Table 2: *Mann-Whitney U Test*

	Party	N	Mean Rank	Sum of Ranks
Impeding Factors	Public	40	4.17	166.80
	Private	36	3.96	142.96
	Total	76		

Test Statistics^b

	Impeding Factors
Mann-Whitney U	168.000
Wilcoxon W	115.800
Z	-1.826
Asymp. (2-tailed)	.160
Exact Sig. [2*(1 tailed Sig.)]	.182 ^a

- a. Not corrected for ties
- b. Grouping variables: Impeding factors

The results indicated that high cost of finance (4.56) is the most important factor impeding sustainable development of BOT highway projects by the private party while few schemes reached contract stage is the most important factor by the public party (4.40) in Nigeria. This agrees with the studies of (Carrillo et al, 2008; Corbett and Smith 2006; Gidado, 2010; Li, 2003; Li et al, 2005). Developing countries like Nigeria have not fared well in BOT highway development because fund sourced locally are not always enough to meet the huge financial requirement needed to sustain it. Others are; participants' lack of appropriate knowledge and skills and lengthy delays in negotiation are also major impediments to sustainability of BOT highway projects. This result agrees with Chan et al (2006), Sun et al (2008), and Xenidis and Angelides (2005). Wrongful allocation of risks beyond the capacity of either party will lead to project failure. The need for both parties to have full knowledge of the risks to generate better outcomes and achieve project success is very important. The ratings by the respondents (most mean scores greater than 3.50) showed that most of the impeding factors have high mean scores which accounts for poor sustainability of BOT highway development in Nigeria (Babatunde et al, 2015). A Mann-Whitney U Test revealed no significant difference in the rating levels of the factors between public and private parties, the z value is -1.86 with a significance level $p = 0.16$. since the probability value (p) is greater than .05. Therefore, we fail to reject the null hypothesis. There is no statistically significant difference in the ranking scores of public and private parties at 95% level of confidence. Hence, the need to work on these impeding factors of BOT highway infrastructure in Nigeria is crucial and must be taken seriously to bring about sustainable development as being canvassed by United Nations.

7. Conclusion

The ratings by the respondents (most mean scores greater than 3.50) show that most of the impeding factors have high mean scores which accounts for poor sustainability of BOT highway development in Nigeria. The results obtained from the Mann-Whitney U test indicated that there is no statistically significant difference in the ranking scores of public and private parties at 95% level of confidence. This implies that there is an agreement in the ratings by the respondents. Hence, the need to work on these impeding factors of BOT highway infrastructure in Nigeria is crucial and must be taken seriously to bring about sustainable development as being canvassed by United Nations.

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