

# PERFORMANCE RISKS ALLOCATION IN BOT INFRASTRUCTURE IN NIGERIA: A CASE STUDY OF LAGOS INFRASTRUCTURE PROJECT

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## Abstract

*The study assessed allocation, criteria and allotment effectiveness of performance risks in Build-Operate-Transfer (BOT) transportation infrastructure in Nigeria using Lagos Infrastructure Project (LIP) as a case study. LIP is the only BOT-procured tolled road that has attained 'operate' stage of BOT cycle in Nigeria. It revealed that more operating risks were actually allocated to the concessionaire than the grantor and most of the risks were preferred retained by the allottee. Significant fraction of the risks was effectively allocated between the concessionaire and grantor except those that involve close interface between participants. While grantor rated nine risks high and seven risks very high; the concessionaire assessed nine risks to be high and five risks to be very high; the grantor rated the effectiveness level to be seventy three per cent and the concessionaire assessed it to be sixty four per cent. The study recommended that the evolving knowledge from Lagos Infrastructure Project (LIP) should be documented to guide future BOT transactions in Nigeria.*

**Keywords:** Concession, Infrastructure, Nigeria, Performance, Risk, Transportation.

## 1. INTRODUCTION

The adoption of PPPs for infrastructure development is increasingly gaining prominence in both developing and developed economies. In PPP contracts, the public and private partner share tasks and risks to achieve value-added benefits and payments are usually structured in a way that public authority and/or users pay only for the services satisfactorily rendered. PPP is a generic concept encompassing numerous forms of collaboration between the public and private sectors with the goal of producing an asset or delivering a service (PIFS, 2006 and Dominic *et al.*, 2015). The major models of PPP are contract, concession and divesture (Thomsen, 2005). These models are differentiated according to the scope of obligations allocated to the private sector and duration of contract. Concession combine two or more of these obligations - build, finance, own, operate and transfer; and the contract duration is usually between 25-30 years after which the facility is transferred back to the public (Asian Development Bank Institute; ADBInstitute, 2009).

Build-Operate-Transfer (BOT) is a sub model of concession model of PPP. It involves private sector (concessionaire) undertaking responsibilities of design, build, finance, operate and maintain a new or an existing infrastructure asset which deliver a service to the public clients (grantor) or private individual clients (Demirag *et al.*, 2011 and Sanni, 2012). The public partner transfers most risks involved in operating obligations to the private company and this may cover some unpredictable risks, such as those associated with war, terrorism, or any other unexpected scenario (Vassallo, 2004).

Effective risk allocation is crucial for effective performance of BOT projects (Glaister *et al.*, 2000; Carpintero and Helby, 2015). However, risks are often allocated to parties that do not have requisite knowledge, resources and capabilities to effectively manage the risks (Sanni *et al.*, 2016). For instance, Ng and Loosemore (2007) reported that there is considerable evidence to suggest that risk allocation is often poorly treated between parties in many PPP-procured projects. Inadequate risk allocation is supposed to have a corresponding impact on project performance. Ke *et al.* (2013) recorded a significant inverse relationship between project performance and risk misallocation. In corollary, the smaller the degree of risk misallocation is, the more successful the project would be. Carpintero & Helby (2015) study showed how inadequate risk allocation influences concession projects performance in Spain. These included cost overrun, poor quality of service delivery, demotivation of private sector participation in concession and increased criticism by its political opponents. These cited studies have provided an insight into the menace of improper risk allocation in BOT concessions. However, we considered our study on risk allocation and criteria in BOT transportation infrastructure in Nigeria necessary for the following reasons: (i) the studies did not focus Nigeria and this makes research in BOT transportation infrastructure to be scarce; risks exposure of BOT projects is influenced by the project location and prevailing macro and micro economic variables (Akintoye *et al.*, 1999). Furthermore, Nigeria is a developing economy and has its investment climate volatile in comparison to China, Australia and Spain where the studies were carried out. (ii) BOT risks differ according to propose/use of the facility. While the private sector has been involved in housing development, waste management and health services; the transportation infrastructure used as case study (toll road) is traditionally the exclusive responsibility of the government, hence it comes with a different risk outlook (Sanni, 2012). (iii) the project used as a case study is in operating phase and closer to completing build, operate, and transfer cycle. The empirical data and finding would have high reliability and guide partners on risks allocation and implications spanning preconstruction, construction and post construction phases of BOT projects.

BOT transportation infrastructure risks encompassing design, construction, finance, commissioning and operation were derived from the literature (Loosemore and McCarthy, 2008; Xu *et al.*, 2010; Khazaeni *et al.*, 2012 and Valipour *et al.* 2014). Although BOT have been acknowledged as popular alternative procurement strategy for heavy infrastructure, but 'one of the key issues in PPPs is the extent to which they can overcome inherent conflicts of interest between their partners' (Bovaird, 2004). The conflict of interest basically comprises risk/reward allocation between the partners. While the private sector participation in public infrastructure provision is driven by profit (maximum returns on investment), the public sector tends to be more concerned about quality service delivery (maximum profit at minimum cost) of the infrastructure (Liu and Wilkinson, 2014; Sanni *et al.*, 2016). The aim of the study was to evaluate risks in BOT transportation infrastructure in Nigeria using Lagos Infrastructure Project (a BOT-procured tolled road) as a case study. The study objectives were to assess: (i) risk allocation in LIP, (ii) criteria for allocating risks, and (iii) the effectiveness of the allocated risks; with a view to enhancing BOT infrastructure performance. The finding provided a framework for enhanced strategic risk management of BOT transportation infrastructure in Nigeria.

## 2. LITERATURE REVIEW

### ***Infrastructure Procurement***

Traditionally, infrastructure were financed (design, construction, operation, and maintenance) by government from public taxes and other state funds in annual budgets (PIFS, 2006). This was an era of statutory control or state monopolies for all production activities including construction activities (planning, design, construction, finance, operation and maintenance functions). The reasons for changing to private sponsorship included limited government financing resources in embarking on new facilities and maintenance of existing ones, mismanagement, lack of accountability and weak maintenance culture (Demirag *et al.*, 2011). In traditional design-bid-build procurement, the main financial implication is that government is the owner and always assumes directly all the financial risks and obligations inherent in the project. Many innovative methods based on distribution risks were developed to overcome the challenges incidental to deep and direct involvement of governments through BOT. It involves private parties providing primary support for provision of infrastructure for public use. In contrast to traditional public procurement which involves the public sector purchasing an asset, BOT sub model involves the purchase of certain services from the private sector. Private corporations participate in PPP projects in varying approaches with the view of obtaining a return on their investment through generating sufficient future cash flows to cover initial capital costs and finance charges, thereby allowing for enough profit to be invested in future projects and pay shareholders dividends (Gramlich, 1994; Beckers *et al.*, 2013).

In construction contract administration, funding is one of the major determinants of project delivery. The funding obligation is ceded to the private sector in concessions. According to Oyegoke (2005), the funding approaches for the private sector are: (i) equity, (ii) recourse (limited recourse or non-recourse financing schemes) and (iii) debt investment. Equity in joint ventures is a mode of PPP project financing and it represents ownership of the corporation. Limited recourse schemes comprised bank loans that allow the creditor to take over the project that the borrowed finance was used to fund and extend the recovery to other assets of the debtor. Non-recourse loans can only be repaid from the revenues or cash flows generated by the project or from sale of the assets if the project fails. Debt investments are bonds. Bonds are fixed income securities usually issued by governments and purchased by institutional investors. Non-recourse financing schemes and debt investment approaches are DBO (design-build-operate), DBOM (design-build-operate-maintain), BOT (build-operate-transfer), BOO (build-own-operate), DBOT (design-build-operate-transfer), BOOT (build-own-operate-transfer), BBO (buy-build-operate), and LDO (lease-develop-operate). Combinations of project tasks and responsibilities can yield limitless number of forms. The combination of important project activities required in both facility construction and operation determines the form of procurement method (ABDInstitute, 2009). The aim of public sector is to render a level of service to their citizen that is timelier, more cost efficient and, higher in quality than if the public sector had retained the provision responsibility. While the advocates of PPP and its models claim it can serve the community better than traditionally procured infrastructure citing successful PPP projects, its antagonists continue to cite cases where it has failed or encountered serious complications. The debate over the better option between PPP and public procured infrastructure will probably continue until sufficient number of projects has been empirically investigated (Jagboro *et al.*, 2014).

## **Private Sector investment in public infrastructure**

Private sector investment in infrastructure has increased both in quantity and quality terms over the years. This is evident in strategic management of large investment organizations by the private sector to the applause of government. These privately run entities have been providing high quality service to consumers with efficiency that exceed public-run organizations and this managerial expertise is been employed for a fee by the governments. According to International Institute for Sustainable Development (IISD) (2015), PPP model should be employed if the private sector involvement would allow an infrastructure project to generate greater value for money (VfM) or a greater positive net gain to society than if the project were to be procured via a conventional approach. VfM is achieved when a PPP project is able to generate (i) cost efficiencies, through lower construction, operational and/or maintenance costs; (ii) time savings, through an earlier completion of the project; and/or (iii) quality enhancements, through enhanced service provision. PPP has also been used as a construction procurement technique. Economy-induced rural-to-urban migration has created high urban population leading to utility consumption strain on public infrastructure. Given the high infrastructure investment needs of nation and governments' limited resources, government is incorporating the private sector through PPP in enhancing its infrastructure stock. Investment-driven orientation enables the private sector to actualize what budgetary and bureaucracy would not have made possible (European Commission, 2003). PPP models are procurement mechanisms where contract payments are structured in such a way that public authority and/or users pay only for services rendered to standards by private sector. Project-related risks are largely transferred to the private entity that recoup their investments and transferred the facility back to government after the contract period at no cost. Government typically have these objectives amongst others when building infrastructure: getting good VfM, timely delivery, meeting public need (Liu and Cheah, 2009). . The procurement model that best addresses it is the one that is based on the circumstances of individual cases/projects and PPPs have shown its potential of meeting these objectives and address infrastructure shortage as seen in Nigeria telecommunications sector.

## **Risks in BOT projects**

“Risk! Construction projects have an abundance of it, contractors cope with it and owners pay for it” (Flangan and Norman. 1993). No human activity is free from risks. Hyunchan *et al.* (1997) described risk as “unintended or unexpected changes or events which: (1) delays the schedule of the project or stops the project completely, (2) causes a cost overrun or revenue shortage of the project, (3) deteriorate the quality or reduce the quality of final output of the project”. In BOT projects, risk is perceived from the public sector's view as ‘any event which jeopardizes the quality or quantity of service that they have contracted for’, and from the private sector's view as ‘any event which causes the cash flow profile of the project to depart from the base case and jeopardize the debt servicing ability of the project or its ability to generate a dividend stream for shareholders’ (Arndt, 1999). Our study adopted this definition as further corroborated by Froud (2003), Hardcastle and Boothroyd (2003) and Bokharey *et al.* (2010) assertion that the consequences of a risk occurring can be negative or positive and may affect the partners differently. It is necessary for public sector to note that while it is ineffective for the public sector to retain inappropriate risks, it is also ineffective to cede inappropriate risks to the private sector (Arndt, 1999). This is because transfer of risks to the private sector comes at a contractual responsibility despite its position as key VfM driver in a BOT transaction. The strategy of risk allocation is pertinent to assessing the VfM potential of a PPP project as distinct

from other procurement methods. Jin and Doloi (2007) reported that ineffective risk allocation has the capacity to damage the VFM proposition of a BOT deal because approximate measures of the life cycle cost [Public Sector Comparator (PSC) and Private Financing Predictor (PFP)] are highly sensitive to risks allocation. If contractual risks are absorbed inappropriately by the public sector, government would raise taxes or reduce services to pay for its obligations when the risks occur. In contrast, if risks are inappropriately absorbed by the private sector, excess premiums would be charged to the government or even directly to the end users.

The ability of the government to cede appropriate risk to the private sector is one the main merits of Concessions. This is due to the impression that the private sector is more positioned to manage those risks better, at cheaper cost and higher-quality infrastructure services may be provided than if the government develops the project in conventional way. According to Jin and Doloi (2007), managing risks in PPP projects are becoming more complex as social infrastructure projects, including courts, hospitals, prisons, schools and public housing, have are now procured via PPP. The participants are increasingly getting large (Demirag *et al.* 2012) comprising international financial institutions, insurance companies, construction organisations, operating & maintenance organisations in different legal jurisdictions. The complexity of the arrangements has led to increased risk exposure for all the parties involved. Factors such as duration of the loan, susceptibility to political and economic risk, low market value of the security package and limitations on enforcing security all contribute to the complex risk profile of PPPs.

### ***Risk Allocation in BOT Projects***

BOT risk allocation involves the distribution of contractual obligations guiding the procurement among the partnering entities. Anderson (2000) study of seventeen PPP projects revealed that optimal risk allocation contributed sixty per cent cost savings in comparison to conventionally procured projects. The key factor in BOT participation is value for money, and driven by this requirement, the government has to decide how risk should be optimally distributed between the parties to the contract. Quiggin (1996) described the BOT risk allocation in concept, theory and reality. Conceptually, it may be assumed that the private sector should bear all project risks because the public is a service recipient paying only for satisfactory services. In theory, the idea of transferring a risk is that some parties are provided with an incentive to effectively manage it at relatively reduced premium. In reality, the government has to determine, on a value for money basis, what risk it should take to achieve effective risk distribution. Moreover, a particular pattern of risk allocation may be criticized as ineffective in certain scenarios while being considered effective in other scenarios. Some PPP risks should be apportioned differently from project to project, some risks may be common to all projects that share similar allocation in general (Rahman and Kumaraswamy, 2002).

The optimality of BOT risk allocation may also vary with experiential knowledge of the decision-makers. Improper allocation of risks among stakeholders may lead to sub-optimality and result in higher-than-necessary prices for risk transfer. It is therefore necessary for private and public sectors to critically analyze their strategic aims and relative abilities to manage risks and control unintended outcomes. Optimal allocation of risks are intended to minimize both project costs and the risks to the project by allocating particular risks to the party with the highest capability to control them. This is based on the principle that the party with the greatest control or possessing the best capability of management with respect to a particular risk, has the best opportunity to reduce the likelihood of the risk eventuation and to control the consequences of the risk, if it materializes, and thus should assume it (Rahman

and Kumaraswamy, 2002; Jin and Doloi, 2007, Vu *et al.* 2015). The principle of optimal risk allocation is often not followed in many BOT projects because of inadequate analysis of the outcomes of some events. Sometimes, risks will inevitably be allocated to the party least able to refuse them rather than the party best able to manage them, especially when the government maintains maximum competitive tension. Major reasons may include: (1) each party holds its own subjective views as to the likelihood and consequences of certain risks, the ability of the respective parties to manage various risks, and the costs that other parties may incur when managing various risks; (2) many risks are not wholly within the control of one particular party and thus its risk management ability and costs may depend more or less upon the behaviour of other related party(s); and (3) many influential factors affect risk allocation, such as commercial requirements and bargaining power.

### **Case study project**

Lagos Infrastructure Project (LIP) was jointly contracted by the Lagos State Government (LASG) and the Lekki Concession Company (LCC) using BOT concession model as the procurement medium. LIP (also informally known as (Lekki-Epe Expressway) is the pioneer tolled road BOT-procured project in Nigeria and was intended to provide sustainable transportation solutions to the challenges caused by heavy traffic congestion along the Lekki-Epe corridor of Lagos Island, Lagos State. The contract between LASG and LCC was finally signed on April 24 2006, and included the expansion of 50kilometres long existing dual carriage way to three-lane highway and the construction of a new approximately 20km of the coastal road on the Lekki peninsula, vehicular ramp bridge linking LIP to Falomo Way in Ikoyi. The contract sum was fifty five billion Nigeria naira, its equivalent is USD 145 million (Daily Independent, 2013) and was commissioned to open to vehicular traffic in 2010. The LCC is an arm of Asset & Resources Managers (ARM) and partnered to form a Special Purpose Vehicle (SPV), to deliver essential road infrastructure and service along the Lekki Peninsula of Lagos. While the SPV consisted of construction companies (Hi-Tech Construction Nigeria Limited), Toll Service Company (Lagos Toll Company), design and IT installation firm, legal and regulatory advisers; its local investors comprised of First Bank of Nigeria, Stanbic IBTC, and African Infrastructure Investment Managers (Dominic *et al.*, 2015). The project was considered suitable for this study because it the build (construction) phase has been completed and is currently in operating phase of the BOT cycle.

## **3. RESEARCH METHODOLOGY**

### **Research Design**

This is a case study research. Its methodology comprised; (i) literature review to identify risks associated with BOT-procured road; (ii) structured survey questionnaire to determine risks allocation and the criteria for allocating the risks between the grantor (public sector) and concessionaire (private sector); and (iii) assessment of the risk allocation effectiveness. According to Yin (1994), 'case study research method is appropriate where the case in question represent an extreme, unique, isolated or has not previously been a subject of detailed scientific investigation. It is suitable for investigating complex social phenomenon'. Case study especially in construction field yields deep in profile and narrow in spread results (Fellows and Liu, 1997). Some studies (Kreydieh 1996, Arndt 1999, Wang *et al.* 2000, Jefferies *et al.* 2002, and Ghazali

and Kabir 2009) on BOT employed case study using one project. Aggregating the research design of these listed necessitated the researchers' choice of case study for this research. Due to the research design of the studies, the research population is also very few; they range from one to fourteen.

### **Study population and survey instrument**

A pilot investigation using survey questionnaire was conducted to primarily determine the project stakeholders of LIP and congruity of responses of the private and public sector personnel. The congruity was necessary because the public and private sector view risks from different perspective due to conflicts of interest. Using snowball sampling technique, the study population was twelve (five personnel of public sector organisations and eight personnel of private sector organisations). These are organisations or individuals who have contractual obligations in LIP at 'operating' stage of the project. The pilot study revealed that responses of the private and public sector personnel were highly incongruent. Incongruity was higher in responses of the personnel who were not in managerial positions; while it was almost none existent in responses of personnel in managerial positions who are responsible for strategic decision making. It was deduced that personnel in managerial cadres were more privy to some intricate contract details than those in non-managerial positions. Due to the finding of the pilot investigation, three (3) most senior personnel in the public and private sector were purposively selected for the study. The population was six (6); comprising three (3) core management staffs each for Lagos Office for Public Private Partnerships (LA-PPP) (representing the grantor) and Lekki Concession Company (LCC) representing the concessionaire. Out of the six copies of questionnaire distributed to the personnel, two copies were retrieved from LA-PPP personnel and one copy was retrieved from LCC personnel. Unstructured interview was further conducted to supplement survey questionnaire where clarifications were considered necessary. The retrieved questionnaires were synthesized and presented in Table 1. In LA-PPP where two copies of questionnaire were retrieved, the most valid one was chosen considering respondent's years of working experience, professional qualification, number of years spent with employer, and least incongruity.

### **Measurement scale**

Twenty two (22) facility performance risks specifically associated with BOT road infrastructure were obtained from PPPIRC (2008) and used for the study. Criteria for allocating BOT risks were extracted from Loosemore and McCarthy (2008). The level of effectiveness of risk allocation by the concessionaire and grantor were individually assessed using 5-point likert scale of Very Low (VL), Low (L), Moderate (M), High (H) and Very High (VH). It was individually assessed due to conflicting perception of both partners resulting from conflict of interests. While the grantor focus is service delivery at lowest cost possible, concessionaire primary consideration is profit because its involvement is investment-driven. The preferred allocation was determined using Two-Stage Delphi Method due to initial differing views of the grantor and concessionaire. Delphi Method is an established technique for obtaining consensus estimates from several experts or stakeholders involved in the project and are applicable to managing construction-related risks (Smith *et al.*, 2006).

The general procedure for this technique is that an estimate of the variable or risks is obtained from each of the experts and this estimate can relate to risk allocation between the private and public sector.

The experts are then informed of all the estimates and asked to give a revised estimate. This process continues until a consensus estimate is produced reflecting the opinions of all parties concerned.

#### 4. DISCUSSION OF FINDINGS

Table 1 presents the allocation of performance risks between the private and public sector in LIP. It comprises the party that the risks were actually allocated to in the Memorandum of Understanding (MOU), the preferred party it should have been allocated, criteria employed for risk allocation and level of effectiveness of allocation by the grantor (LA-PPP) and concessionaire (LCC) individually assessed.

##### 4.1 Risk Allocation

Figure 2 shows that concessionaire was actually allotted thirteen (13) risks but preferred to be allocated sixteen (16) out of the twenty two (22) risks evaluated. This finding conforms to BOT principle that more risks should be allocated to the private partner; and risks preferred allocated to the public sector comply with PPPIRC (2008) for enhanced PPP road project. It also supports Demirag *et al.* (2011) report that over the last four years, the amount of risk transferred from the public to the private sector in United Kingdom PPP projects has increased. The grantor was allocated five risks but preferred to be allotted three. The two risks were actually allocated to the grantor were preferred to be shared between the grantor and concessionaire. This is in tandem with PPPIRC recommendations. Four risks were actually shared prior to project operation but three out of the four risks were preferred shared. Vandalism is preferably allocated to the concessionaire but it differs from IISD (2015) advice using rail transport infrastructure as an illustration. Furthermore, seven (7) out of the twenty two (22) risks were considered to be ineffectively allocated.

Table 1: Performance risks of BOT road infrastructure

S/N	Performance Risks	Actually Allocated to	Preferably Allocated to	Allocation Criteria	#Allocation Effectiveness	*Allocation Effectiveness
1	Equipment used becomes prematurely obsolescent	Conc're	Conc're	g	H	VH
2	Labour and material availability	Conc're	Conc're	b	M	H
3	Interface with sub-contractors	Shared	Conc're	a	VL	VH
4	Change in scope of service specifications by public sector	Shared	Grantor	d	L	M
5	Expansion for traffic accommodation at ramps & interchanges due to growth	Conc're	Conc're	f	H	H
6	Future interchanges or additional lanes	Grantor	Shared	d	VH	VH
7	Damage caused by unauthorised tyres e.g. spikes	Grantor	Shared	d	H	M
8	Damage/injury to third parties	Conc're	Conc're	e	H	VH
9	Damage to works, however caused, except as excluded	Shared	Conc're	b	M	H
10	Water/air/soil pollution	Conc're	Conc're	f	VH	VH
11	Third party claims and accidents	Conc're	Conc're	c	H	H
12	Overloaded vehicles	Grantor	Shared	g	L	H
13	Increased legal load limits	Grantor	Grantor	d	H	M
14	Traffic accidents	Conc're	Conc're	e	L	VH
15	Off road incidents	Conc're	Conc're	b	H	M
16	Meeting transfer (to grantor) standards	Conc're	Conc're	g	VH	VH
17	Workplace Health and Safety	Conc're	Conc're	e	VH	H
18	Obtaining and maintaining licenses to comply with regulatory requirements	Conc're	Conc're	c	H	M
19	Labour disputes	Conc're	Conc're	a	M	H
20	Vandalism	Shared	Conc're	e	H	L
21	Development around project site requiring further over bridges or under passes	Grantor	Grantor	f	VH	H
22	Traffic management	Conc're	Conc're	b	M	H

<sup>†</sup>Concessionaire,

<sup>#</sup>Concessionaire's assessment,

<sup>\*</sup>Grantor's assessment



These were: interface with sub-contractors, change in scope of service specifications by public sector, future interchanges or additional lanes, damage caused by unauthorised tyres e.g. spikes, damage to works, overloaded vehicles, and vandalism. On interface with subcontractors, unstructured interview revealed that some of the subcontractors were politically-exposed persons. This created delays in decision making by the concessionaire and ultimately led to cost overruns in operation costs and payment of damages to the grantor. This underscores Demirag *et al.* (2012) finding that ‘transferring risk to sub-contractors’ is the major methods organisation used to limit risk in PFI over the past 5 years in United Kingdom.

‘Change in scope of service specifications by public sector’ risk was shared because the private sector commissioned the consultants and allocating the risk to the grantor would indemnify the concessionaire from political risk of policy reversal that is prevalent in Nigeria. ‘Future interchanges or additional lanes’ and ‘damage caused by unauthorised tyres’ were preferably shared because it exposes the concessionaire to loss of revenue through reduction in tolling volume. Sharing the risks would enhance concessionaire revenue stream and monitoring responsibility while also relieving the grantor damages incidental to toll shortfalls. This finding conforms to IISD (2015) report that ‘partial risk allocation may create greater incentives for the private party’.

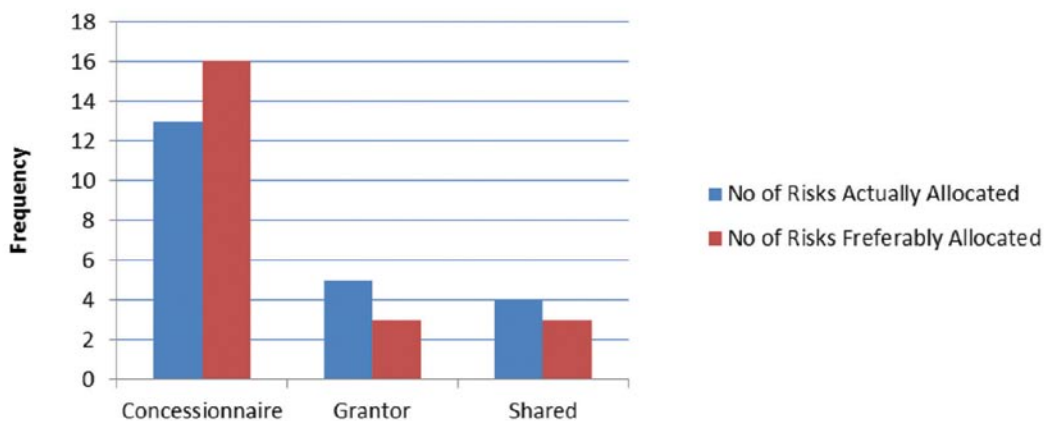


Figure 2. Risk Allocation between the private and public sector in LIP

#### 4.2 Criteria for risk allocation

Consideration for risk allocation was assessed using seven (7) criteria and this is presented in Figure 3. Three criteria (evaluation of risk, resources of risk control, and control the chance of risk occurrence) were used to allocate four (4) risks each. Two criteria (sustain the consequence of risk occurrence and risk attitude of grantor or concessionaire) were used to allocate two (2) risks each. It was further deduced that availability of resources for risk control was the highest consideration for risk allocation. This is in tandem with risk management principle that risk should be allocated to the party that is most suitable to mitigate it (Arndt, 1999; Akintoye *et al.*, 1999; PMI, 2000; Jefferies *et al.*, 2002; Demirag *et al.*, 2011; Jin and Doloi, 2007; & IISD, 2015). This implies twelve out of twenty two (55%) of risks were allocated based on this criterion. This also conforms to Valipour *et al.* (2014) that ranked the criterion as one of the common criterion for risk allocation in Malaysian PPP projects. Although the nature of the PPP project used for the study was not stated by Valipour *et al.* (2014), Sanni (2012) established that risk variables (probability of occurrence, impact of occurrence, mitigation techniques and

allocation criteria) depend on the type of the PPP (brownfields or greenfield) and composition of privates sector consortium. Transportation infrastructure is more exposed to risk due to larger acreage requiring close monitoring of operations and high volatility of forecast traffic volume. Two criteria (sustain the consequence of risk occurrence and risk attitude of grantor or concessionaire) were the consideration for allocating six risks. Also, foreseeing risk and capability of control risk were used for distribute four (4) risks. Risk is effectively allocated if the allottee has the capability to sustain the consequence of risk occurrence. BOT transfers more risks to the private sector than public sector, therefore risks like economic/financial risks are usually allocated to the private sector while political and legal risks are allocated to the public sector. Deviating from this would not uphold the principle of BOT that seeks to reduce government direct involvement in infrastructure provision.

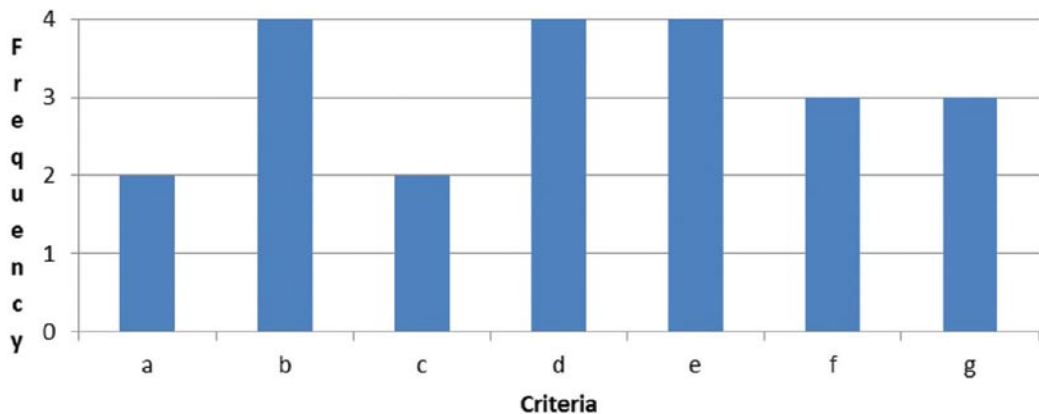


Figure 3. Criteria for allocating risks in LIP

<sup>a</sup>Foreseeing risk, <sup>b</sup>Evaluation of risk, <sup>c</sup>Capability of control risk, <sup>d</sup>Resources of risk control, <sup>e</sup>Control the chance of risk occurrence, <sup>f</sup>Sustain the consequence of risk occurrence, <sup>g</sup>Risk attitude of grantor or concessionaire.

### 4.3 Effectiveness of Risk Allocation

Figure 4 presents the comparative assessment of effectiveness of performance risk allocation between the interests between the grantor and concessionaire in LIP. Due to conflict of interests between the grantor and concessionaire, the level of effectiveness of risk allocation between the partners was different. While grantor rated nine out of twenty two risks (40.91%) to be highly effectively allocated and seven risks (31.82%) to be very highly effectiveness; the concessionaire considered nine risks (40.91%) to be highly effective and five risks (22.73%) were rated very high. In aggregate, the grantor rated the effectiveness level to be seventy three per cent and the concessionaire assessed it sixty four per cent. This conforms to BOT principles that the private sector is more exposed to risks than the public sector. Furthermore, the majority of risks rated Very High by the grantor and concessionaire was allocated to the concessionaire and was not preferred allocated otherwise. Risks rated High by the grantor and concessionaire was allocated to the concessionaire and not considered for preferred allocation. ‘Interface with subcontractors’ risk was rated very low by concessionaire and very high by the grantor. Unstructured interview confirmed that it has been the risk factor that is most susceptible to dispute and its resolution has been extensive and time consuming.

It validates the findings of this study that it should be preferably allotted to the concessionaire. It is assumed that allocation to the concessionaire would give it free hand to appoint its subcontractors and reduces bureaucratic bottleneck. This is in sync with Jefferies *et al.* (2002) report that ‘approval process efficiency’ (relationship and contractual arrangement) was one of the Critical Success Factors (CSFs) for Stadium Australia procured using Build-Own-Operate-Transfer (BOOT) concession model.

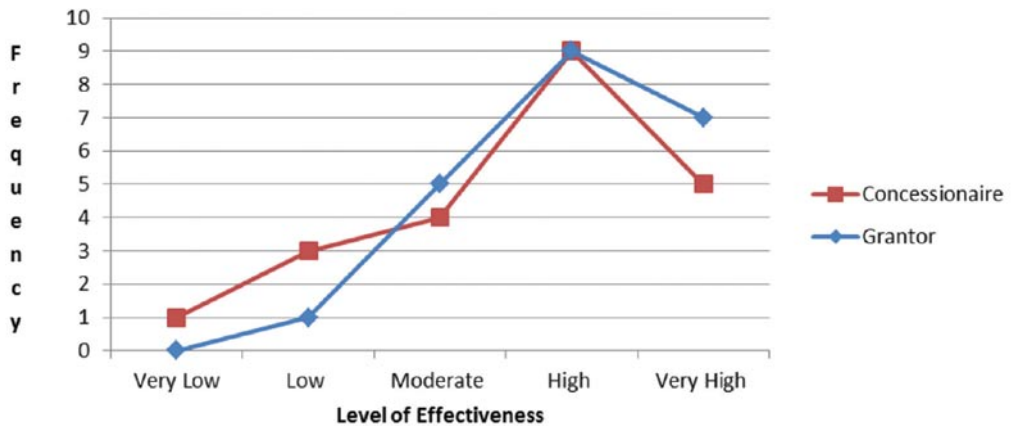


Figure 4. Effectiveness of Risk Allocation

## 5. CONCLUSION

This study evaluated performance risk allocation, criteria for the allotment, and the effectiveness of the allocation in BOT-procured transportation infrastructure in Nigeria. Most of the risks were actually allocated to the concessionaire in sync with BOT principle and preferred allocation of more risks to the concessionaire indicated that the grantor has confidence in the concessionaire capability to undertake the road infrastructure investment. In contrast to this finding, most of the risks actually allocated to the concessionaire were preferred to be retained by it. This demonstrates high level of risk averse of the grantor and further indicates grantor acknowledgement of improved delivery of public roads if the concessionaire is effectively co-opted into it. All risks allocated revolve round seven criteria with differing level of significance. The most commonly used criteria were resources of risk control by a party to the contract, ability to sustain the consequence of occurred risks, and capacity to adequately evaluate the risks. The moderately used allotment criteria were ability to sustain the consequence of risk occurrence and risk attitude of grantor or concessionaire. The least commonly used criteria were foreseeing risks and capability of control. This indicates ability to control risks occurrence is prioritised above the ability to forecast and control the impact of risk occurrence. This saves resources, time and enhances counterparty trust through preventive risk management mechanisms. Significant fraction of the risks was effectively allocated between the concessionaire and grantor and except risk that involves close interface between the partners. Counterparty-related risks are one of the primary tests of party’s tolerance and relationship management capability in BOT model. These are threats a partnering entity is exposed to in entering investment-driven contract with another party. Seventy per cent (the average rating of grantor and concessionaire effectiveness level) assessment of effective allocation of risks indicated that the contract design was good. Notwithstanding the likelihood of performance risks becoming more threatening in

distant future due to longer use of facility, macro-economic variables, technology innovation and corporations survival; using BOT to procure road in Nigeria is highly recommended using Lagos Infrastructure Project (Lekki-Epe Expressway) as baseline and contractual relationship modifications as the project Strength, Weakness, Opportunity and Threat (SWOT) analysis demands. The investment climate for BOT concession in transportation infrastructure is conducive.

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