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Cross-sectional comparison of public-private partnerships in transport infrastructure development in Nigeria

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# Cross-sectional comparison of public-private partnerships in transport infrastructure development in Nigeria

# 1. Introduction

Infrastructure has long been identified as a catalyst for economic growth. The demand for infrastructure development and the maintenance of existing infrastructure caused by economic growth and population increase has in many instances, overtaken the capacity of national governments to provide the necessary finance (Howes and Robinson, 2005). The estimates of investment needs for global infrastructure development ranges as high as US\$3 trillion per year, of which approximately US\$1 trillion per annum needs to be spent in developing countries (World Economic Forum, 2010). Howes and Robinson (2005) asserted that the estimate for developing the Asian region ranges from US\$1 to US\$2 trillion, US\$600 billion for Latin America while Eastern Europe and Africa also need heavy capital infusions for infrastructure development. The inadequacy of infrastructure in Africa is widely recognised, particularly in Sub-Saharan Africa (SSA). The finance required to raise infrastructure to a reasonable level within the next decade is estimated at US\$93 billion per year in Sub-Saharan Africa (World Bank, 2011).

Nigeria is one of the key economies in the Sub-Saharan Africa, having one of the fastest growing populations of about 150 Million. However, the state of infrastructure challenge is enormous. This becomes acute with the transport sector comprising roads, rails, airports, seaports and the country requires US\$10 billion annually for the next ten years to achieve the infrastructure requirements (Sanusi, 2012). Also, Nigerian government budget deficits and the inefficient management of large infrastructure projects and services within the public sector are some of the reasons why the traditional procurement method of funding public infrastructure projects through fiscal budgets is increasingly considered unviable (Alitheia, 2011). The Nigerian government in recognition of the large investment required for infrastructure provision and upgrading necessitated the government to put in place an enabling environment to drive private sector finance for infrastructure provision, led the Nigerian government to establish the Infrastructure Concession Regulatory Commission (ICRC) law in 2005 (Ahmed, 2011; World Bank, 2011). The ICRC law provided the legal and institutional framework for PPPs to operate successfully in the country (Ahmed, 2011).

Thus, the recent government agenda indicates that infrastructure development is gaining momentum with up to 51 infrastructure projects being undertaken through PPPs between 1990 and 2009 (Vetiva, 2011). Most of these PPP projects started within the last five years with the transport sector being the major beneficiary, where about 24 PPP projects were undertaken within the sector between 2005 and 2009. In 2013 and 2014, about 66 PPP projects were in the pipeline (ICRC, 2014). This is similar to what is happening in Europe. For instance, Roumboutsos (2015) stated that the transport sector has taken extensive advantage of the PPP delivery model in Europe. Moreover, in a globalising world, there is a considerable interest in identifying CSFs that made PPP projects successful. This triggered a number of researchers toward identifying CSFs that are responsible for the successful implementation of PPP projects in different countries (see Tiong, 1996; Qiao *et al.*, 2001; Li *et al.*, 2005; Zhang, 2005; Dulaimi *et al.*, 2010; Chan *et al.*, 2010; Ismail and Ajija, 2011; Cheung *et al.*, 2012; Babatunde *et al.*, 2012; Gupta *et al.*, 2013; Zou *et al.*, 2014; Osei-Kyei and Chan, 2015; Babatunde *et al.*, 2016) among others. Few researchers have also identified the means of measuring project success in PPPs (see Liyanage and Villalba-Romero, 2015).

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In spite of these studies on CSFs for PPP projects very few studies attempted to identify CSFs for PPP infrastructure projects in the transport sector using multiple case study approach in developing countries, especially in Nigeria. It is against this backdrop that this study employed a multiple case study approach to identify CSFs for PPP projects in transport sector comprising road, airport, and seaport. Considering this phenomenon from multiple case studies will provide richer and more practical knowledge of CSFs for PPP projects in the Nigerian transport sector and developing countries at large.

# 2. Literature review

#### 2.1. Procurement methods in use

The development of infrastructure in Nigeria has primarily been through the traditional form of the contract awarded by national, regional, and local governments through budgetary allocations (AfDB, 2010). Babatunde et al. (2010) concluded that both the traditional and non-conventional procurement methods are currently embraced for delivering of transport infrastructure projects in Nigeria. For instance, Babatunde et al. (2010) found that approximately half (48.08%) of infrastructure projects are executed using variants of traditional procurement method, 32.69% are through variants of PPPs, and 19.24% are executed through design and build method. It can be deduced that the procurement methods in use are still much of variants of the traditional method. This is corroborated by several researchers in Nigeria that found the variants of traditional procurement method as most prevalent methods of executing construction projects in Nigeria (see Idoro et al., 2007; Ojo, 2009; Dada, 2013). In spite of the fact that the traditional method has been criticised for what are regarded as its shortcomings over time, its continued dominance in the procurement of both private and public works in Nigeria remains paradoxical (Dada, 2013). For example, a survey conducted in the year 2000 revealed that before 1999, Nigeria was losing an average of US\$270 million annually through various kinds of manipulations of the procedure for award and execution of public contracts (Wahab, 2000). These manipulations are in the forms of inflating the contracts costs, use of contracts system to divert public funds to private pockets, award of contracts for non-existent projects, use of inexperienced contractors, overinvoicing, influence peddling, award of contracts to friends, relations, and family members, and award of contracts without adequate planning and budgetary provisions (Wahab, 2000).

In addition, Jin and Doloi (2007) asserted that the conventional provision of infrastructure funded by the government has led to inefficiencies and subjected infrastructure development to the availability of government funds. Public infrastructures delivered through the traditional procurement have faced some challenges. These include: persistent cost overruns; construction delays; poor workmanship; contractor claims for additional payment; operational performance shortfalls among others (Flyvbjerg *et al.*, 2003; Van Wee, 2007; Siemiatycki, 2009). Further, Flyvbjerg (2007) and van Wee (2007) averred that poor outcomes occur in the traditional model of infrastructure delivery due to inappropriate allocation of risks among the parties involved. Gidado (2010) claimed that the public sector lacks skill and expertise to develop solely infrastructure, most especially transport infrastructure in Nigeria. Thus, the inadequate capacity in managerial and technical expertise in the public sector is continuously hindering the ability of the Nigerian government to meet her transport infrastructure requirements. This accounts for the failed; abandoned or collapsing infrastructure in many parts of the country and made it more difficult by competing for demands from other sectors for government's limited resources (AfDB, 2010).

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Therefore, the development of a good transport infrastructure is characterised by significant investment requirements. Thus, to avoid cost and time overrun, and benefit from innovative project structuring and implementation strategies, private sector participation in the development of transport infrastructure is extremely critical (Ernst and Young, 2012). Many studies have been conducted regarding governments' inability to raise massive funds for large-scale infrastructure projects that can be mitigated by private participation (Cheung et al., 2009). The only approach to addressing this challenge is to facilitate the increase of private provision of transport infrastructure projects through PPPs. For instance, PPP forms of procurement are recognised as an effective way of delivering value-for-money in public infrastructure or services (Li et al., 2005b). Moreover, PPP seeks to combine the advantages of competitive tendering and flexible negotiation, and also allocate risk on an agreed basis between the public and private sectors (Li et al., 2005b). Akintoye et al. (2011) asserted that PPP is commonly used to accelerate economic growth, development and infrastructure delivery, and to achieve quality service delivery and good governance. It is against this backdrop that many scholars across the globe advocate for PPPs in procuring transport infrastructure projects that provide synergy for both public and private sectors.

# 2.2. Current state of infrastructure in the Nigerian transport sector

The state of Nigeria's infrastructure, especially in the transport sector has been a subject of debate by stakeholders in the economy in recent times (Lucas, 2011). For instance, Nigeria currently has a total road network of 194,200 kilometres which comprise 34,123km federal roads, 30,500km state roads, and 129,577km local government roads (Vetiva, 2011). Only about 30% of Nigeria's 194,200 km total road network is paved, relative to an average of 70% and 58% for frontier and emerging markets respectively (Ahmed, 2011; Vetiva, 2011; Sanusi, 2012). The gap is wider when compared with advanced economies with an average paved road network of 100% (Vetiva, 2011). Thus, there is a great opportunity for road infrastructure development in Nigeria, given that approximately 70% total road network is unpaved and perhaps un-motorable. In Nigeria, road development has historically been the government's responsibility. Recently, the private sector through PPP is beginning to participate in road infrastructure development.

Deficiency in rail infrastructure is even worse, as Nigeria's existing 3,500km rail network is grossly insufficient (AfDB, 2010). Rail transportation is generally in a dilapidated state and most of the available wagons and locomotives are defective and in poor conditions. This mode of transportation currently accounts for less than 1% of the land transportation in the country; thereby, putting the roads under significant pressure from heavy haulage (Vetiva, 2011). In the last four years, the government appears to have taken major steps in developing rail transportation by commissioning several projects in rail construction. In addition, despite the improvement made over the last 10 years in airport infrastructure, particularly Nnamdi Azikwe airport Abuja and Muritala Mohammed Airport Terminal 2 (MMA 2) Lagos, airport infrastructure in Nigeria cannot be compared to few selected African countries, especially Egypt and South Africa. For example, Nigeria has four international airports (out of 22 airports) and South Africa has three international airports. Based on 2009 figure, South Africa's Johannesburg airport and Egypt's Cairo airport had annual passenger traffic of about 16 million and 14 million respectively compared to combined annual passenger traffic of about 10.2 million for Nigeria's four international airports (Vetiva, 2011).

The infrastructure availability in the Nigerian transport sector compared to few selected countries is presented in Table I as follows:

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In the case of seaports, there are 13 major ports; 11 oil terminals; and 128 jetties with a total annual cargo handling the capacity of about 35 million tonnes (Vetiva, 2011). Given the problems of inefficiency and the resultant port congestion, the government commenced the reform and restructuring of the ports to introduce private sector participation in 2001. In April 2006, private operators took over as terminal operators of the sea ports, after a competitive bidding process, with the Nigerian Ports Authority (NPA) focusing on its role as the "Landlord". The port reforms gave birth to the first major concession in infrastructure development and currently there are 25 terminal operators managing Nigerian seaports in partnership with the Nigerian Ports Authority. Having highlighted the current state of transport sector infrastructure in Nigeria, particularly roads, rails, airports, and seaports; the Nigerian governments are making unrelenting efforts to ameliorate the key infrastructure challenges in transport sector through PPPs. This is corroborated by Adetola *et al.* (2011) that PPPs have become increasingly popular in delivering large transportation projects such as roads, railways, seaports, and airports across the globe.

## 2.3. Comparisons of PPP transport infrastructure projects

Over the last two decades, Europe has the largest PPP transport infrastructure in terms of road and rail project costs, followed by Asia. North America (Canada, Mexico, and the United States) have been third in terms of the cost of road and rail projects financed or delivered through PPP arrangement (US Department of Transportation, 2007). Globally, between 1984 and 2010, more than five times as many road projects were delivered as PPPs than rail schemes. In cities, 70% of all urban transportation PPPs delivered globally have been roads, bridges, and tunnels that support greater dependence on the automobile, compared with 30% of projects being urban and commuter rail lines that provide viable travel alternatives to the automobile (Siemiatycki, 2012). This is affirmed by Farrell and Roumboutsos (2013) that rail projects found it harder to attract private finance, particularly for track and other basic infrastructure. This has been partly attributed to the scale of investment required, the complexity of rail networks, uncertainties surrounding the interface with rail services, and the high level of regulations. Moreover, seaports and airports find it easier than roads to attract private finance because of the ease with which profitable terminal operations can be separated from expensive items of infrastructure from which it is difficult to generate revenues, like channels, breakwaters, and runways (Farrell and Roumboutsos, 2013).

Farrell and Vanelslander (2015) asserted that PPP transport infrastructure comprised roads, rails, seaport, and airports act as modes in transport networks and their functions are broadly similar, but their economic and institutional structures are often significantly different. For instance, Dion *et al.* (2002) examined seaport and airport divestiture in Canada and found that although the policy goals are similar, airport transfers have been able to proceed faster, partly because of more favourable local conditions and attitudes. Cruz and Marques (2010) identified that the USA has developed a governance model for airports which is remarkably similar to the landlord port model which dominates seaport PPPs. In addition, Farrell and Vanelslander (2015) concluded that there is no uniform methodology for making structural comparisons between seaport and airport PPPs, partly because of the difficulty of obtaining comprehensive sets of comparable data. Notwithstanding, Vanelslander *et al.* (2014) averred that it is important to identify similarities in PPP's project development that may form the grounds for knowledge transfer and improved understanding of the particularities of the various PPP transport sub-sectors with mutual benefits. Unfortunately, such comparisons are not found in the literature (Vanelslander *et al.*, 2014). Until recently that such analysis was

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attempted by few studies (see US Department of Transportation, 2007; Roumboutsos, 2010; Roumboutsos *et al.*, 2013; Roumboutsos and Liyanage, 2013; Vanelslander *et al.*, 2014; and Farrell and Vanelslander, 2015).

These few significant studies, particularly Roumboutsos (2010), Vanelslander *et al.* (2014) present a methodology of comparing characteristics across PPP transport modes (subsectors). This methodology is called "the eight "Ws"-as the basis for the analysis, comparing PPP transport infrastructure projects in terms of "What", "When", "Where", "Why", "Whole", "Who", "Whom", and "Which way". Thus, the contextual "eight "Ws" PPP transport project characteristics and their descriptions are presented in Table II as follows:

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It is evident that Table II provided the specific characteristics to the sequence of events as to the PPP transport infrastructure projects from conception/development phase to operation phase. This forms the basis for comparisons in different PPP transport infrastructure projects. Thus, the comparison in different PPP transport infrastructure projects follows a "granular Ws contextual" (see Table II) was adopted in earlier studies. For instance, Vanelslander *et al.* (2014) used "granular Ws contextual" when comparing three different PPP transport projects comprised a road development project, a city tramway project, and a port lock construction initiative. Farrell and Vanelslander (2015) employed the same approach when examining the similarities and differences in PPP airports and seaports infrastructure projects. In this present study, the concept of "granular Ws contextual" was adopted when investigating the three different PPP transport infrastructure projects comprised road, airport, and seaport in Nigeria. This led to the development of Table V in section 4 of this study (see Table V for details).

## 2.4 Selected literature on success factors

The potential application and importance of CSFs are now being recognised in a growing number of organisations. Ram and Corkindale (2014) stated that CSFs require the constant and careful attention of management with a view to achieving organisation performance goals. It is on this premise that earlier researchers have directed their attentions in identifying CSFs that are responsible for successful implementation of PPP projects. Thus, the outcome of a rigorous review of literature produced 26 success factors presented in Table III as follows:

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Table III shows that considerable studies have been conducted on success factors for PPP projects. For example, the normative literature on CSFs mostly focused on the success ingredients for PPP projects from geographical locations and project phases (see Qiao *et al.*, 2001; Li *et al.*, 2005a; Chan *et al.*, 2010; Ismail and Ajija, 2011; Babatunde *et al.*, 2012; Cheung *et al.*, 2012; Gupta *et al.*, 2013; Babatunde *et al.*, 2016) among others. Few studies paid attention to CSFs for PPP social infrastructure projects such as a stadium, Superdome, housing, and urban water supply (see Jefferies *et al.*, 2002; Jefferies *et al.*, 2006; Abdul-Aziz and Kassim, 2011; Meng *et al.*, 2011). In spite of the wide coverage of PPP CSFs, clearly there are research gaps in the existing normative literature, particularly specific CSFs for PPP transport infrastructure projects. In addition, regarding the comparison of CSFs for PPP transport infrastructure projects, such comparisons are hardly found in the literature. For instance, few earlier significant studies that compared PPP transport projects (see

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Vanelslander *et al.* 2014; Farrell and Vanelslander 2015; Liyanage and Villalba-Romero, 2015) failed to pay attention to specific CSFs in PPP transport projects. It is against this backdrop that selected CSFs typical of any successful PPP project identified by earlier researchers were adopted and filtered to generate 26 CSFs (see Table III). Therefore, this study employed the 26 CSFs for further investigation with a view to assessing their criticality in three PPP transport project case studies comprised road, airport, and seaport in Nigeria. Thus, using similar CSFs would allow like-for-like comparison between the results of the present study. It is believed that this study is important in identifying specific CSFs that made PPP transport infrastructure projects successful in Nigeria and developing countries at large.

# 3. Research methodology

The study adopted literature review and three PPP infrastructure project case studies including structured interviews, personal observations and review of documentary reports in each case study (see Figure I). The study area is Lagos metropolis, Nigeria because of the following reasons: accessibility to conduct the case study to obtain required data; availability of substantive PPP experts; appropriateness of the PPP infrastructure projects in transport sector for the analysis; and Lagos state is the first state in Nigeria to promulgate roads, bridges, and highway infrastructure development board law in 2004, and the law provides an enabling PPP legislation to date in Lagos, Nigeria (Global Legal Group, 2007). Figure I shows the research methodology chart used in this study. The study employed a multiple case study approach comprised three PPP transport project case studies with a view to providing a richer approach to data collection, analysis, and interpretation (see Figure I). This is supported by a number of earlier researchers. For instance, Barkley (2004) stated that using a multiple case design allows generalisation of findings or replication within the cases. This is affirmed by Yin (2009) that the results generated through multiple case studies are considered more compelling and robust.

In addition, Amaratunga and Baldry (2001) claimed that cases selections unavoidably involved discretion and judgement. This is affirmed by Creswell (2009) that cases and participants are purposively selected by the researcher. Thus, the selection of the participants and cases does not necessarily involve a large number of participants and cases (Creswell, 2009). It is on this premise that three PPP transport project case studies were selected. These include concession of Lekki-Epe Expressway (road), the concession of Muritala Mohammed Airport (MMA2), and concession of seaport terminals. The rationale for chosen the aforementioned case studies are: (i) they are the first set of PPP transport infrastructure projects awarded by federal government and Lagos state government in Nigeria; (ii) the three selected case studies are in operation stage; (iii) it is apparent that the selected case studies exhibiting appropriate characteristics of CSFs that made the projects to be at operating stage; and (iv) the various stakeholders involved in these case studies are able to determine the CSFs that made the selected case studies successful.

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Data were collected using structured interviews, personal observation, and review of documentary reports in the three case studies (see Figure I). The structured interviews were designed to tap lived experience and interviewees were selected from the top management of different key stakeholders in both the public and private sectors in each case study. Thus, the criteria formulated by Chan *et al.* (2001) were modified to select the key stakeholders for the structured interviews in the three PPP case studies as follows:

• Having above 10 years working experience in the construction industry.

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- Involving directly in the selected PPP case studies from conception to completion.
- Having reached the managerial level in the public sector or managing director in the private sector or head of the unit in financial institutions/banks.

This approach was supported by some earlier researchers. For instance, Marshall (1996) asserted that purposive sampling technique enables the researcher to select actively the most productive sample to answer the research question(s). Badu *et al.* (2012) stated that purposive sampling technique enables a researcher to select the study participants consciously. Thus, a total of 18 key stakeholders were purposively selected after satisfying the criteria as mentioned earlier in the three PPP case studies. These key stakeholders comprised three from public sector organisations (i.e. ministries, department, and agencies), and three from private sector organisations to include consultants, concessionaires, lenders/banks, and contractors in each case study. This resulting into a total of 18 structured interviews conducted in the three case studies. The background details of interviewees are presented in Table IV as follows:

As shown in Table IV, the 18 interviewees (representing six interviewees in each case study) were top management from both the public and private sectors with their professional years of experience ranging from 8 to 27 years (see Table IV). Also, the interviewees have been directly involved in the aforementioned PPP project case studies from conception to completion. This implies that the information supplied by these interviewees is adjudged reliable.

As earlier mentioned, the outcome of a comprehensive literature review provides a masterlist of 26 identified success factors (see Table III) which were used to design a case study protocol using FMEA method. Using similar success factors would allow like-for-like comparison between the results of the present study. Therefore, in each case study face-toface structured interviews coupled with personal observations and review of documentary reports was conducted. Each structured interview lasted between 45 minutes and 60 minutes and it was conducted during the second half of 2015. The structured interviews were staggered to one case study per month. The spacing of structured interviews enhanced the establishment of good contact with the top management of different key stakeholders in both public and private sectors in each case study. This facilitated the arrangement in terms of the date and venue for the interviews. During the interviews, the interviewees were interrogated on each 26 identified success factors using FMEA technique, with the interviewer completing the scoring to determine the criticality of identified success factors in each case study.

In addition, the case studies data, particularly the documentary reports pertaining to each case study were analysed using the thematic technique. Thus, the case studies were analysed both individually and collectively. The process of each case was analysed and compared. This was supported by Murphy (2008) and Cheung (2009) that thematic or content analysis is an appropriate means of assessing case studies. Moreover, FMEA technique was also employed for the analysis of quantitative data obtained in the three case studies. This approach was similar to earlier studies, particularly the study by Liyanage and Villalba-Romero (2015) that used quantitative measures to quantify the key performance indicators and performance measures in the four case studies from four different EU countries.

FMEA technique has been widely utilised in the manufacturing industry. However, the application of FMEA technique has not received much attention in the construction industry, especially in construction management and PPP studies. Few earlier researchers have applied

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the technique. For example, Murphy (2008) used FMEA technique when studying product innovations within the construction procurement process. Murphy *et al.* (2011) undertook FMEA technique when exploring a methodology for evaluating construction innovation constraints through project stakeholder competencies. Therefore, Murphy (2008) asserted that FMEA technique is an appropriate tool that allows for subjective assessment of case study which produces empirical values for statistical analysis. It is on this premise that FMEA technique was employed in assessing the criticality of identified 26 success factors in the three PPP case studies.

Furthermore, FMEA is calculated by ranking the data into three sets: (i) occurrence (O); (ii) severity (S); and (iii) detection (D). Within this context, FMEA ranking criteria are as follows:

- (i) Occurrence (O): the likelihood/frequency of occurrence of each success factor, on a 1-10 scale.
- (ii) Severity (S): assesses the impact/severity of each factor to the success of the project on a 1-10 scale.
- (iii) Detection (D): assesses the ability to detect each factor to the success of the project on a 1-10 scale.

FMEA is computed by the multiplication of occurrence (O), severity (S), and detection (D) of each identified 26 success factors in each case study. The resultants value termed 'risk priority number' (RPN) enables actions to be prioritised. In this study's context, the success factors that have higher RPN values are regarded as critical. For example, the decisional rule is that any success factor with an RPN value greater than 750 is said to be critical (see Figure II). This approach is supported by earlier studies (see Murphy, 2008; Murphy *et al.*, 2011). The RPN value was used to determine the CSFs that made the three PPP project case studies investigated in this study successful. Thus, RPN values range from 1 to 1,000 (i.e. occurrence (O) multiply by severity (S) multiply by detection (D), with the maximum score of 10 representing 10x10x10=1000). Hence, it is necessary to construct a scale using the rankings above. The scale appeared to be, '1' (not critical) to '1000' (critical), as illustrated in Figure II as follows:

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## 4. Case studies findings

The structure of the presentation of the three case studies results involve three main steps: (i) a brief write up on the description of the case studies, based on the review of documentary evidence (ii) a write-up of the findings, based on FMEA result from the individual case analysis, and (iii) results and discussions. These are briefly discussed as follows:

#### 4.1. Description of the case studies

A summary of the three case studies comprised specific project information to include the year of the award, concession period, construction period, estimated project cost, year of commissioning, stakeholders involved, PPP model adopted in each case study among others. This served as a baseline data from which the finding in each case study can be compared. The summary of the three PPP case studies are presented in Table V as follows:

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**Case study 1:** The concession of Lekki-Epe Expressway was the first toll road PPP in Nigeria signed in April 2006 with a view to eliminating the severe traffic gridlocks in Lagos Island. The concession consists of two phases: Phase I- involves upgrading and expansion of 49.5km and Phase II of the project involve the construction of approximately 20 km of the coastal road on the Lekki peninsular. The project was funded, using a mix of debt and equity with some supports from the Lagos state government as illustrated in Figure III.

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As indicated in Figure III, the funding of the project is as follows:

- Lagos state government The state invested US\$42 million in a 20-year mezzanine tranche;
- The African Development Bank Provided US\$85 million senior debt over 15 years;
- Local banks Provided a 12-year note facility of US\$80 million; and
- The remaining term funding was provided by Standard Bank London which became the sole arranger of the US\$93 million a 15-year international tranche.

Other sources of funding include federal government loans/grants, and private sector finance. The major shareholders in the project include Macquarie Bank and Old Mutual of South Africa through the African Infrastructure Investment Fund. The project was able to raise the first ever 15-year tenured local-currency debt financing in Nigeria from Standard Bank. Also, the support from the Lagos state government has been received in the form of a mezzanine loan (see Figure III). The financial close of the first phase was achieved in November 2008. The Lekki Concession Company (LCC) as a Special Purpose Vehicle (SPV) invested about US\$450 million, this includes about US\$42 million mezzanine loans from Lagos state government. The concession project is a user-based toll road with the private party taking on full market risk. Financing will be recovered through charging tolls, advertising fees, duct leases and other defined revenue sources till November 2038 when the concession agreement expires. It is estimated that 85,000 vehicles would use the road each day at the rate of US\$1-US\$2 toll charges depending on the types of vehicle.

The lessons learnt to date include:

- The importance of stakeholder consultation in the early phase of the project as during the operation phase, communities living along the Lekki-Epe axis began to protest about having to pay tolls and, as a result, tolling was suspended, which was eventually resolved in the court of law.
- The need for a strong contract management function within the government team, as project preparation was not thorough on the side of Lagos state government team.
- The importance of managing public and investor perceptions during project implementation, as the project has been delayed resulting in commuter frustration with the perceived lack of progress.
- The need for agreed performance standards that are backed by an effective penalty regime.
- The need for Lagos state government to have its own financial model to ensure that the project was affordable and provided value-for-money.
- The need for Lagos state government to have a transaction advisory team.

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Case study 2: In 2003 the federal government chose to rebuild the old domestic airport terminal that was gutted by fire in 2000 through the PPP initiative. The contract was awarded to Bi-Courtney Limited an indigenous company on a build, operate and transfer (BOT) basis. The BOT contract agreement was originally signed in April 2003 between the federal government, represented by Federal Airports Authority of Nigeria (FAAN) and the concessionaire. The contract comprises an airport terminal building, a multi-storey car park, an apron and other ancillary facilities on a land area of 20,000m<sup>2</sup>. In June 2004, a supplementary agreement was signed, in which the construction period was increased from 18 to 33months. In February 2007, an addendum agreement was also signed. Thus, the concession period was extended from 12 to 36 years. The concessionaire invested about US\$250 million on the construction of MMA2 and most of the funding comes from six local banks in Nigeria. The construction of MMA2 completed and commissioned on 7 April 2007 and flight operations commenced on 7 May 2007. Presently, MMA2 is the first BOT project of its magnitude in the area of infrastructure development which was completed successfully by a Nigerian company. After the completion of MMA2, there has been a substantial improvement and increase in the number of passengers, and aircraft movement. For instance, the existing survey shows that after the commissioning of MMA2 in 2007, the total passengers started increasing by almost a million in every year and a significant increase in total aircraft movements as at today.

The project encountered few challenges. These include: (i) after being awarded the contract, the concessionaire faced significant challenges in securing financing and had to start construction without a long-term financing agreement in place. It was in March 2007 that the concessionaire secured a US\$150 million part-financing from a consortium of six banks for the completion of MMA2; (ii) on the operations side, some airlines were reluctant to move from the International Terminal; and (iii) there have been disputes between the parties and claims of breach of contractual rights. For example:

"Claims: As at June 2010, Federal Airports Authority of Nigeria (FAAN) claims that concessionaire owes the government US\$6.7 million (mainly 5% of annual turnover), and concessionaire also claims that FAAN owing them US\$73 million (mostly proceeds from the operations at the General Aviation Terminal (GAT) in Lagos)" (Ahmed, 2011).

The main lessons learnt are:

- The importance of having an agreed financial model and long-term financing in place at the outset of the project.
- The initial bidding process also points to the importance of managing politicians' expectations and setting realistic goals regarding timelines.
- The difficulty of enforcing contractual agreements (e.g. the contract has a clause assuring that all scheduled domestic flights in and out of FAAN's airports in Lagos shall operate from the new terminal during the concession period, FAAN continues to operate the old domestic terminal (GAT).
- Any conflict of interest faced by the government puts significant pressures on the ability of the private sponsor to recover its investments and thus placed the financial viability of the project at risk.

**Case study 3:** Since the inception of seaports in Nigeria by the colonial masters in 1921, no systematic process for their re-development had been put in place until the current concession programme of port reforms started in 2000. The concession brought into existence the current

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set of private port operators in Nigeria. The concession of Nigerian ports gained global credibility with the involvement of the World Bank, CPCS Transcom (of Canada) and Royal Haskoning (of Holland) as project monitors, concession bid managers, and consultants respectively (Fivestar Logistics, 2008). In 2001, the federal ministry of transport through the World Bank Public Private Infrastructure Advisory Fund raised funds and commissioned Dutch consultants Royal Haskoning to do a 'Ports Modernisation Project Study'. Following the submission of the Royal Haskoning reports' and extensive consultations with maritime stakeholders, and recommendation of the project monitors (i.e. CPCS and World Bank), a consensus was reached upon the strategy for reforming and modernising Nigeria's seaport system (Bert, 2008). It is against this backdrop that "landlord port model" was adopted for Nigeria seaports.

The 'landlord port model' entails that the public sector is responsible for port planning and regulatory tasks (related to safety, security and environmental), and maintains ownership of port-related land and basic infrastructure. On the other hand, the private sector is responsible for marine and terminal operations, construction, cargo handling operations, dock labour management, purchase and ownership of superstructure and equipment (Nigerian Ports Authority Brand Manual, 2005). In view of this, the bureau of public enterprise (BPE) engaged CPCS Transcom to evolve the legal and regulatory framework for the series of transactions, to prepare the restructure and concession plans and to assist in the bidding process. Before the concession in 2006, there are eight major ports in Nigeria. The concession of the ports was completed in 2006 after an international competitive bidding process (Bert, 2008). This led to the emergence of 26 port terminals carved out for competitive bidding in eight ports to include Apapa, Tin Can Island, Lilypond and Kirikiri all in Lagos, Port Harcourt, Calabar, Warri, and Koko. The concession took effect in 2006 and the port terminals were handed over to their successful bidders, except five (out of 26) port terminals that were handed over in 2007. Moreover, 11 (out of 26) port terminals concessions were located in Lagos. The concession periods for the 26 port terminals ranged between 10-25 years. After the concession in 2006, the Nigerian ports witnessed a rapid transformation. There is a remarkable increase inward and outward cargo movement during the postconcession era. For example, four years after the concession of Apapa-Lagos container terminal, delays for berthing space has dwindled, shipping lines congestion surcharge was reduced, and savings to government is estimated at US\$200 million a year among others.

The lessons learnt to include:

- There is a need to create an independent regulator that can monitor, resolve disputes, regulate pricing and competition, and allow the NPA to focus on its core obligations as a landlord.
- The importance of establishing legal and institutional frameworks for private participation. For instance, the concession contracts between government agencies and private investors must be underpinned by a strong legal framework to ensure transparency and sustainability.
- There is a need for host government agencies to work closely with international institutions and independent advisors to devise the concession model and to outline the concessions process. As international technical support is an effective way to ensure that best practices are implemented, most especially in developing countries.

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# 4.2. Assessment of criticality of identified success factors

The results of FMEA in each case study (i.e. case study 1-3) and the full details of assessment of the criticality of identified success factors in the three case studies are summarised and presented in Table VI as follows:

#### 

Based on the results of FMEA in the case study 1-3, as shown in Table VI revealed that: 10 (out of 26) identified success factors were indicated as CSFs that made the concession of Lekki-Epe Expressway (i.e. case study 1) attained the level of success it's achieved. These 10 CSFs are: thorough and realistic assessment of the cost and benefits; favourable legal framework; appropriate risk allocation and risk sharing; strong and good private consortium; government involvement by providing guarantees; political support; availability of suitable and adequate financial market; technical innovation and technology transfer; appropriate project identification; and project economic viability. On the other hand, good governance; project technical feasibility; commitment and responsibility of public and private sectors; effective management control; and favourable investment environment were identified as 'somehow critical' success factors (see Table VI).

Four (out of 26) identified success factors were revealed as CSFs in the concession of Muritala Mohammed Airport (MMA2) (i.e. case study 2). This includes government involvement by providing guarantees; political support; availability of suitable and adequate financial market; and project economic viability. While strong and good private consortium; and favourable investment environment were considered as 'somehow critical' success factors (see Table VI).

Eight (out of 26) identified success factors were indicated as CSFs in the concession of seaports (i.e. case study 3). These include transparency in the procurement process; competitive procurement process; appropriate risk allocation and risk sharing; commitment and responsibility of public and private sectors; strong and good private consortium; government involvement by providing guarantees; political support; and project economic viability. On the other hand, thorough and realistic assessment of the cost and benefits; favourable legal framework; project technical feasibility; technical innovation and technology transfer; effective management control; favourable investment environment; and good partners' relationship were revealed as 'somehow critical' success factors (see Table VI).

# 4.3. Cross-case analysis and discussion

It is important to consolidate experience from the three PPP case studies, to ascertain if there is any convergence or discrepancy regarding the CSFs that made the aforementioned case studies successful. Based on the assessment of the criticality of identified success factors in the three PPP project case studies as shown in Table VI. The factors identified as CSFs in the three PPP case studies comprised the concession of Lekki-Epe Expressway (road); concession of Muritala Mohammed Airport (MMA2); and concession of seaports (i.e. case study 1-3) are presented in Table VII as follows:

## 

As indicated in Table VII, in comparing the CSFs in the three PPP transport case studies, attention was paid to the four major contextual aspects of PPP project, namely: project characteristics, contractual arrangements, project participants, and interactive processes,

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which determined the success of PPP projects (Chua *et al.*, 1999; Roumboutsos, 2010; Vanelslander *et al.*, 2014). Table VII revealed that government involvement by providing guarantees, political support, and project economic viability are CSFs common to the three PPP transport case studies. These three CSFs associated with PPP project characteristics to include political leadership, economic environment, adequacy of funding, site limitation and location, and project size (Chua *et al.*, 1999). It can be deduced that the three aforementioned CSFs are combined to determine the success of any typical PPP transport project infrastructure development. This implies that PPP transport project success can be better assured if these three CSFs are present. For instance, the identification of government involvement by providing guarantees as one of the three common CSFs is connected to the large investments required in the execution of PPP transport infrastructure projects, which the host government (i.e. central, regional or local) needs to provide guarantees in form of loans or grants to reduce the heavy financial burden on the part of the concessionaires, particularly in developing countries.

Also, the political support being identified as a CSF from the three PPP transport case studies (see Table VII) indicates that a successful PPP transport project requires strong political leadership. For example, transport infrastructure PPP project contracts have frequently long life cycles of over 25 years and are exposed to various exogenous changes arising from the political sphere. However, lack of political support can doom a PPP transport project. Against this backdrop, strong political support is needed to increase developmental assistance, and capacity building for the successful implementation of PPP transport infrastructure projects. In the same vein, project economic viability as a CSF common to the three PPP transport case studies (see Table VII) shows that the three PPP transport case studies are bankable to attract both the local and international lenders/financiers. This proved that these three PPP transport case studies have the potential that the concessionaires would recoup their financing before the concessions agreement expire, thus providing good investment opportunities to the concessionaires.

In addition, Table VII revealed that appropriate risk allocation and risk sharing, and strong and good private consortium are CSFs in both case study 1 (i.e. concession of Lekki-Epe Expressway) and case study 3 (i.e. concession of seaports). These two CSFs are connected with the contextual aspects of PPP project to include: (i) the contractual arrangement comprised PPP model adopted, contract award method, and equitable risk allocation; (ii) attributes of project participants encompassed the competency of the private sector to undertake PPP projects in a competitive environment, and capabilities of public sector authorities involved in PPP projects; and (iii) interactive processes, which refer to the communication, planning, monitoring and control, and project organisation to facilitate effective coordination throughout the PPP project life cycle. In this regard, in case study 1, the PPP model adopted is Build-Operate and Transfer (BOT) method, and in case study 2 the "Landlord port model" is used. Thus, in achieving equitable risk allocation, the attributes of PPP project participants and interactive processes among the PPP stakeholders play a vital role. For instance, the project participants, particularly the private sector comprised the concessionaires, consultants, contractors and financials in case study 1 and case study 2 are foreign investors, international construction firms, and foreign banks/lenders. It is on this premise that it is not surprising that the two aforementioned CSFs were achieved in case study 1 and case study 2. Therefore, it is evident that the success of any PPP transport infrastructure project is largely dependent on the maturity and competency of the stakeholders in both public and private sectors involved in transport PPP contractual arrangement.

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Consequently, Table VII revealed 10 CSFs in the case study 1 (i.e. concession of Lekki-Epe Expressway), four CSFs in case study 2 (Muritala Mohammed Airport, MMA2), and eight CSFs in case study 3 (concession of Seaport Terminals). This study, therefore, found that CSFs vary according to specific PPP transport infrastructure project. It can be deduced that the difference in the number of identified CSFs in the case study 1-3 resulting in different levels of success rate achieved in these three PPP case studies. This difference is not surprising considering the variations in the conditions of respective PPP transport projects to include the type of transport project, PPP models, contract award criteria, ways of funding the project, and stakeholder involvement (see Table V for details). These factors are inherent to specific transport sub-sectors that may contribute to the success of the project. In this study, the three PPP case studies comprised road, airport, and seaport act as modes in transport networks, their functions are broadly similar, but their economic and institutional structures are significantly different. Thus, it is evident that the variability of PPP structures within each mode of transport, suggests that PPP project stakeholders, PPP project characteristics, PPP arrangements, and PPP policy of the host country have the greatest influence on CSFs for specific PPP transport infrastructure projects. It is believed that these study findings will improve understanding of the particularities of the various PPP transport sub-sectors, particularly the roads, airports, and seaports.

## 5. Conclusion

It is evident that many public transport infrastructure projects are delivered through PPPs in the last two decades. The identification of the specific critical success factors (CSFs) for these PPP transport projects implementation is crucial. Considering the vast majority of previous related studies focused on the CSFs for general implementation of successful PPP projects. It is against this backdrop that this study assessed, identified and compared specific CSFs in the three PPP transport infrastructure project case studies comprised road, airport, and seaport in Nigeria. In achieving this, a set of 26 success factors were identified from the significant literature, which was used to design a case study protocol using FMEA method. Based on the foregoing, FMEA technique was used to assess the criticality of identified 26 success factors in the three PPP case studies. Thus, using similar CSFs provided a uniform basis and allowed like-for-like comparison between the three PPP case studies. In addition, personal observations and review of documentary reports were conducted in each case study to unfold the characteristics of events, and to describe the process of project conception and delivery, which led to drawn the lessons learnt in the three PPP project case studies.

The study revealed a total of 13 CSFs which are peculiar to the successful realisation and delivering of PPP transport infrastructure projects in Nigeria. The identified CSFs slightly varied within the three PPP case studies. For instance, 10 CSFs were identified in the concession of the road; four CSFs in the concession of the airport; and eight CSFs in the concession of the seaport. This implied that the success of any PPP transport infrastructure project is largely dependent on the ability of stakeholders involved in PPP contracts to successfully managed the entire 13 CSFs identified in the three PPP transport project case studies. Further, the difference in the number of CSFs identified in each PPP case study could be attributed to the variations in the conditions of respective PPP transport project; thus resulting in different degrees of success attained in each case study. In addition, the study found that government involvement by providing guarantees, political support, and project economic viability as CSFs common to all the three PPP transport case studies. This implied

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that PPP transport project success can be better assured if these three CSFs are present. It further implied that these three CSFs are the bedrock for successful implementation of PPP transport infrastructure projects in Nigeria and developing countries at large.

This study is not without limitations. First, although the study findings are robust yet it cannot be generalised to the entire population of PPP transport projects. Hence, further study using the findings of this study as the basis utilising quantitative technique are required to create a set of CSFs specific to PPP transport infrastructure projects. Second, the use of three PPP transport case studies and structured interviews of stakeholders from both public and private sectors could be enhanced in future work, as having more case studies and interviewees may enrich the findings. Despite its limitations, this present study provides more insights and useful information for the government and private sector concerning the important factors that need to be emphasised in ensuring the successful implementation of PPP transport projects in developing countries as a whole.

Based on the findings of this study, the following policy recommendations are proposed:

- To improve the successfulness of using PPPs for the transport infrastructure projects, it is recommended that PPP stakeholders in transport infrastructure projects development should focus their attention, priorities, and leadership in managing the specific CSFs identified in this study in achieving value for money.
- Due to the difficulty in PPP project preparation within the government team, the public procuring agencies should engage a transaction advisory team/ independent advisors to devise the concession model and to outline the concessions process, particularly in developing countries. This will ensure that best practices are implemented and it will induce confidence in both local and foreign investors for investing in developing countries' PPPs market.
- With respect to the protest to pay tolls in PPP road project (i.e. case study 1), it is vital to inform, involve, and include the diverse stakeholders at very early stage of PPP project development. Through and detailed consultations with relevant stakeholders, such as relevant communities or users, media, labour unions, and special interest groups among others become imperative, so that desired outcomes are better captured.
- In light of the likely issues on PPP transport project affordability, a detailed feasibility study and value for money assessments need to be undertaken before proceeding with a PPP. The important role of an affordability analysis is highlighted for PPP transport projects owing to the large investment required for the provision of transport infrastructure projects.

It is believed that, this study is not only fills the knowledge gap by identifying specific CSFs for PPP transport infrastructure projects in Nigeria and developing countries at large, but is also provided a list of CSFs that could be used to develop metrics and standard for measuring maturity levels of public and private sector organisations involved in PPP transport infrastructure projects implementation. This would provide a roadmap for improvement process in PPP transport infrastructure projects; thus enhancing the success rate of PPP transport projects in developing countries. Therefore, further study should be conducted to widening the understanding of specific CSFs to PPP transport projects implementation in different countries, using a comparative approach. The findings emanating from this study prove to be more reliable as they come about not merely from a secondary data investigation but rather from field work approach which involved getting stakeholders share their true practical experiences.

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# **List of Figures**

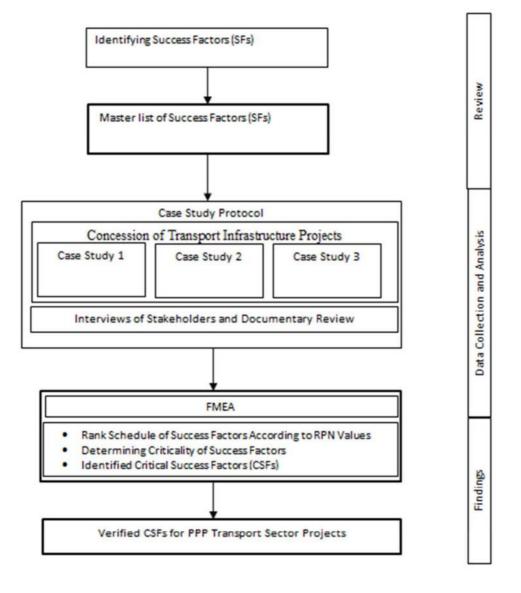


Figure I. Research methodology chart

Key: FMEA-Failure Mode and Effect Analysis

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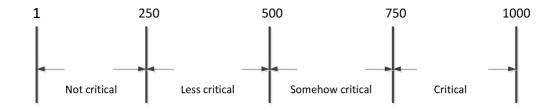
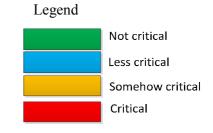
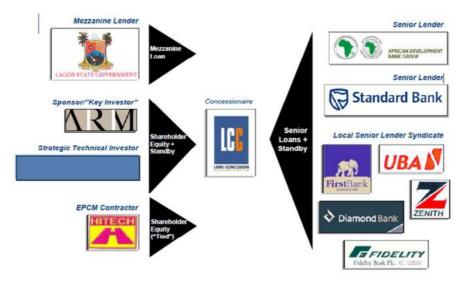


Figure II. Criticality scale



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**Figure III.** Financial structure of the concession of Lekki-Epe Expressway at financial close (Source: Lekki Concession Company (LCC), 2008, p. 21).

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# List of Tables

| Nation         | Population   | Area (Km <sup>2</sup> ) | Stock        | infrastructure |           |
|----------------|--------------|-------------------------|--------------|----------------|-----------|
|                | (millions)   |                         | Rails (km)   | Roads (km)     | *Airports |
| Netherlands    | 16.72        | 41,543                  | 2811         | 135,470        | 22        |
| Brazil         | 179.10       | 8 ,514 , 877            | 28, 875      | 1,751,868      | 718       |
| Turkey         | 96.81        | 783,562                 | 8,697        | 426,951        | 90        |
| India          | 1166.08      | 3287,263                | 63,327       | 3,316,425      | 251       |
| Nigeria        | 140.00       | 923,768                 | 4,500        | 194,200        | 22        |
| Note: *Paved c | vivil commer | cial airports (         | Adapted from | n AfDB, 201    | 0)        |

Table I. Infrastructure availability in few selected countries

| Table II. Methodology | for comparing | PPP transpor | t infrastructure | projects |
|-----------------------|---------------|--------------|------------------|----------|
|                       | <u>-</u>      | ,            |                  | J        |

|      | "the eight "Ws"     |   |
|------|---------------------|---|
| No.  | characteristic      | Description   |
| 1    | What                | This describes the nature of the transport project to be undertaken by the PPP, in terms of its physical characteristics (including PPP arrangement and the level of temporary monopoly that it is able to exercise), functions, and size within the transport network. |
| 2    | When                | This refers to the maturity of the investment.  |
| 3    | Where               | This is principally describes the geographical locations of the PPP transport project.  |
| 4    | Why                 | This search is initiated for the underlying motivation for proceeding with a PPP; a way of funding the investment or delivering a service; and PPP award criteria.  |
| 5    | Whole               | This expresses the vulnerability of the investment/PPP transport project to macro-economic and social influence.  |
| 6    | Who                 | This describes the initiating public sector authority including level of government (i.e. central, regional, or local) in terms of decision and regulating ability.   |
| 7    | Whom                | This reflects the private sector that is able to undertake the business development in a competitive environment.   |
| 8    | Which way           | This refers to the key characteristics of the PPP contractual agreement including risk transfer and (re-)payment schemes etc.   |
| (Aft | er, Roumboutsos 201 | 10; Vanelslander et al., 2014)  |

Ref Success factors References code Jefferies et al., 2002; Li et al., 2005a; Chan et al., SF01 Transparency in the procurement process 2010; Cheung et al., 2012; Gupta et al., 2013. **SF02** Competitive procurement process Jefferies et al., 2002; Li et al., 2005a; Chan et al., 2010; Cheung et al., 2012; Gupta et al., 2013. **SF03** Frilet, 1997 ; Qiao et al., 2001 ; Li et al., 2005a; Ismail Good governance and Ajija, 2011. **SF04** Well organized and committed public Boyfield, 1992; Stein, 1995; Jones et al., 1996; Li et al., 2005a. agency **SF05** Social support Frilet, 1997 ; Li et al., 2005a. Stonehouse et al., 1996 ; Kanter, 1999 ; Li et al., **SF06** Shared authority between public and 2005a; Chan et al., 2010. private sectors SF07 Thorough and realistic assessment of the Brodie, 1995; Qiao et al., 2001; Li et al., 2005a. cost and benefits **SF08** Favourable legal framework Jones et al., 1996; Li et al., 2005a; Ismail and Ajija, 2011; Cheung et al., 2012. SF09 Project technical feasibility Tiong, 1996 ; Qiao et al., 2001 ; Li et al. 2005a. SF10 Grant, 1996 ; Qiao et al., 2001 ; Li et al., 2005a; Appropriate risk allocation and risk Zhang, 2005; Cheung et al., 2012. sharing SF11 Commitment and responsibility of public Stonehouse et al., 1996 ; Kanter, 1999 ; Li et al., and private sectors 2005a; Ismail and Ajija, 2011; Cheung et al., 2012. SF12 Tiong, 1996 ; Birnie, 1999 ; Jefferies et al., 2002 ; Li Strong and good private consortium et al., 2005a; Dulaimi et al., 2010; Cheung et al., 2012. **SF13** Stonehouse et al., 1996; Zhang et al., 1998; Kanter, Government involvement by providing guarantees 1999 ; Qiao et al., 2001 ; Li et al., 2005a; Zhang, 2005; Chan et al., 2010; Cheung et al., 2012. Grant, 1996 ; Li et al., 2005a. SF14 Multi - benefits objectives SF15 Political support Zhang et al., 1998; Qiao et al., 2001; Li et al., 2005a; Zhang, 2005; Dulaimi et al., 2010; Chan et al., 2010. SF16 Stable macroeconomic conditions Qiao et al., 2001; Li et al., 2005a; Chan et al., 2010; Cheung et al., 2012. SF17 Sound economic policy EIB, 2000 ; Li et al. 2005a; Ismail and Ajija, 2011. SF18 Availability of suitable and adequate Akintoye et al., 2001 ; Qiao et al., 2001 ; Jefferies et financial market al., 2002; Li et al., 2005a; Chan et al., 2010; Ismail and Ajija, 2011. SF19 Technical innovation and technology Qiao et al., 2001; Chan et al., 2010; Cheung et al., transfer 2012.

Table III. Summary of selected literature on success factors for PPP projects

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| Ref.<br>code | Success factors                             | References  |
|--------------|---|---|
| SF20         | Effective management control                | Chan et al., 2010; Cheung et al., 2012.   |
| SF21         | Consultation with end-users                 | Chan et al., 2010; Cheung et al. 2012.  |
| SF22         | Appropriate project identification          | Chan et al., 2010; Cheung et al., 2012.   |
| SF23         | Clear project brief and client requirements | Chan et al., 2010; Cheung et al., 2012.   |
| SF24         | Project economic viability                  | Zhang, 2005; Chan et al., 2010.   |
| SF25         | Favourable investment environment           | Zhang, 2005.  |
| SF26         | Good partners' relationship                 | Zhang, 2005; Chan <i>et al.</i> , 2010; Cheung <i>et al.</i> , 2012 ;<br>Zou <i>et al.</i> , 2014 |

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**Table IV.** Background information of interviewees from both public and private sectors in the three case studies

| No.  | Organization of Interviewees                                 | Position of       | Years of      |
|------|--|-------------------|---------------|
|      | -  | Interviewee       | Professional  |
|      |  |                   | Experience of |
|      |  |                   | Interviewee   |
| Case | e Study 1: Concession of Lekki-Epe Expressway                |                   |               |
| 1    | Public sector: Contract Administration Unit                  | Team Leader       | 10 Years      |
| 2    | Public sector: Legal and Risk Management Unit                | Team Leader       | 12 Years      |
| 3    | Public sector: Engineering and Construction Unit             | Team Leader       | 9 Years       |
| 4    | Private sector: Financial-Specialised/Project Financing Unit | Manager           | 16 Years      |
| 5    | Private sector: Concessionnaire- Procurement Unit            | Team Leader       | 8 Years       |
| 6    | Private sector: Consultant-Legal Advisor                     | CEO               | 15 Years      |
| Case | e Study 2: Concession of Muritala Mohammed Airport Term      | uinal 2 (MMA 2)   |               |
| 7    | Private sector: Financial-Project Financing Unit             | Assistant Manager | 11 Years      |
| 8    | Private sector: Consultant-Project Manager                   | CEO               | 22 Years      |
| 9    | Private sector: Consultant- Quantity Surveyor                | CEO               | 27 Years      |
| 10   | Public sector: Procurement Unit                              | Manager           | 24 Years      |
| 11   | Public sector: Corporate Affairs                             | Assistant Manager | 22 Years      |
| 12   | Public sector: Legal and Risk Unit                           | Assistant Manager | 20 Years      |
| Case | e Study 3: Concession of Seaport Terminals                   |                   |               |
| 13   | Private sector: Project Consultant                           | Team Leader       | 12 Years      |
| 14   | Public sector: Procurement Unit                              | Manager           | 24 Years      |
| 15   | Public sector: Engineering Unit                              | Assistant Manager | 21 Years      |
| 16   | Public sector: Contract Administration Unit                  | Manager           | 25 Years      |
| 17   | Private sector: Concessionaire -Engineering Unit             | CEO               | 20 Years      |
| 18   | Private sector: Concessionaire - Procurement Unit            | Manager           | 18 Years      |

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Table V. Summary of the case studies (Derived from documentary/archival data)

| Project data              | Case study 1  | Case study 2   | Case study 3   |
|---------------------------|---|--|--|
| Project name              | Lekki-Epe Expressway  | Murtala Mohammed<br>Airport (MMA2)   | Seaport terminals  |
| Total length in           | Phase I- 49.5km &   | -  | -  |
| kilometre (Km)            | Phase II-20 km  |  |  |
| PPP model                 | BOT   | BOT  | Landlord port model & ROT  |
| Year of award             | 24 April 2006   | April 2003   | 2004   |
| Concession period         | 30 years  | 36 Years   | 10-25 years  |
| Estimated project cost    | US\$450 million   | US\$250 million  | US\$ 1.70 billion  |
| Year of commissioning     | July 2010 (Phase I)   | 7 April 2007   | 2006   |
| Status of project         | Operational   | Operational  | Operational  |
| Operational start         | December 2010   | 7 May 2007   | 2006   |
| Method of payment         | Toll-user-based   | User based   | User based   |
| Stakeholder involved      |   |  |  |
| Public sector authorities | i. Lagos State Public<br>Private Partnership<br>Office<br>ii. Ministry of<br>Transportation                                     | i. Federal Airports<br>Authority of Nigeria<br>(FAAN)<br>ii. Ministry of Aviation<br>iii. Infrastructure<br>Concession Regulatory<br>Commission (ICRC) | i. Bureau of Public<br>Enterprise (BPE)<br>ii. Federal Ministry of<br>Transport<br>iii. Nigerian Ports<br>Authority    |
| Concessionaires           | i. Asset Resources<br>Management (ARM<br>Group)<br>ii. Lekki Concession<br>Company (LCC) as<br>Special Purpose Vehicle<br>(SPV) | Bi-Courtney Nigeria<br>Limited   | 26 concessionaires-<br>These include:<br>i. AP Moller<br>ii. ENL Consortium<br>iii. Ecomarine Nig. Ltd<br>among others |
| Financials/Banks          | 5 local banks & 2<br>foreign banks  | 6 local banks  | World Bank Public<br>Private Infrastructure<br>Advisory Fund &<br>Foreign Direct<br>Investment (FDI)                   |
| Consultants               | i. Aurecon<br>ii. High-Point Rendell<br>iii. Trinity International<br>LLP & few local<br>advisors                               | i. Spring Engineering<br>Limited (project<br>manager)<br>ii. AOC Architect<br>iii. BEE QUE (quantity<br>surveyor)                                      | i. CPCS Transcom (of<br>Canada)<br>ii.Royal Haskoning (of<br>Holland)<br>iii. World Bank (projec<br>monitors)          |
| Contractors               | Hitech Construction<br>Company Ltd (main<br>contractor)   | Stabilini Visinioni<br>(main contractor)   | -  |

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|   |            | Ca         | Case study 1 |                           |           | Ca         | Case study 2 |                               |            | Ca         | Case study 3 | ~                                    |
|---|------------|------------|--------------|---------------------------|-----------|------------|--------------|-------------------------------|------------|------------|--------------|--------------------------------------|
| Success factors   | Public     | Private    | Total        | Remark                    | Public    | Private    | Total        | Remark                        | Public     | Private    | Total        | Remark                               |
|   | RPN        | RPN        | Av.<br>Rdn   |                           | RPN       | RPN        | Av.<br>Rpn   |                               | RPN        | RPN        | Av.<br>Rpn   | 1                                    |
|   |            |            |              |                           |           |            |              |                               |            |            |              |                                      |
| Transparency in the procurement process   | 240        | 448        | 344          | Less Critical             | 08        | 54         | 31           | Not Critical                  | 800        | 720        | 760          | Critical                             |
| Competitive procurement process   | 336        | 504        | 420          | Less Critical             | 32        | 140        | 86           | Not Critical                  | 810        | 720        | 765          | Critical                             |
| Good governance   | 560        | 480        | 520          | Somehow<br>Critical       | 120       | 252        | 186          | Not Critical                  | 336        | 432        | 384          | Less Critical                        |
| Well organized and committed public   | 240        | 224        | 232          | Less Critical             | 294       | 210        | 252          | Less Critical                 | 384        | 336        | 360          | Less Critical                        |
| Social support  | 180        | 320        | 250          | Less Critical             | 150       | 216        | 183          | Not Critical                  | 336        | 252        | 294          | Less Critical                        |
| onared authority between public and<br>private sectors<br>Thorough and realistic assessment of the<br>cost and henefits | 336<br>800 | 294<br>810 | 315<br>805   | Less Critical<br>Critical | 36<br>294 | 150<br>576 | 93<br>435    | Not Critical<br>Less Critical | 432<br>567 | 294<br>648 | 363<br>608   | Less Critical<br>Somehow<br>Critical |
| Favourable legal framework  | 648        | 006        | 774          | Critical                  | 09        | 168        | 114          | Not Critical                  | 630        | 640        | 635          | Somehow<br>Critical                  |
| Project technical feasibility   | 720        | 648        | 684          | Somehow<br>Critical       | 392       | 378        | 385          | Less Critical                 | 576        | 648        | 612          | Somehow<br>Critical                  |
| Appropriate risk allocation and risk<br>sharing   | 800        | 810        | 805          | Critical                  | 144       | 245        | 195          | Not Critical                  | 810        | 800        | 805          | Critical                             |
| communent and responsionity of puone<br>and private sectors   | 392        | 648        | 520          | Critical                  | 252       | 441        | 231          | Not Critical                  | 720        | 810        | 765          | Critical                             |
| Strong and good private consortium  | 720        | 800        | 760          | Critical                  | 448       | 648        | 548          | Somehow<br>Critical           | 810        | 800        | 805          | Critical                             |
| Government involvement by providing   | 010        | 000        | 905          |                           |           | 010        | 376          |                               |            | 000        |              |                                      |
| guatances<br>Multi – benefits objectives  | 010<br>180 | 392        | 286<br>286   | Less Critical             | 144       | 010<br>336 | 240<br>240   | Not Critical                  | 252        | ouo<br>210 | /00<br>231   | Not Critical                         |
| Political support   | 648        | 006        | 774          | Critical                  | 720       | 006        | 810          | Critical                      | 006        | 720        | 810          | Critical                             |

Table VI. Summary of the assessment of criticality of success factors using FMEA technique in the three PPP cases studies

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|  |        | Car     | Case study 1 |                     |        | Ĵ       | Case study 2 |                     |        | Ĵ       | Case study 3 |                     |
|--|--------|---------|--------------|---------------------|--------|---------|--------------|---------------------|--------|---------|--------------|---------------------|
| Success factors                              | Public | Private | Total        | Remark              | Public | Private | Total        | Remark              | Public | Private | Total        | Remark              |
|  | RPN    | RPN     | Av.          |                     | RPN    | RPN     | Av.          |                     | RPN    | RPN     | Av.          |                     |
|  |        |         | RPN          |                     |        |         | RPN          |                     |        |         | RPN          |                     |
| Stable macroeconomic conditions              | 180    | 280     | 230          | Not Critical        | 120    | 392     | 256          | Less Critical       | 384    | 576     | 480          | Less Critical       |
| Sound economic policy                        | 252    | 336     | 294          | Less Critical       | 96     | 210     | 153          | Not Critical        | 280    | 336     | 308          | Less Critical       |
| Availability of suitable and adequate        |        |         |              |                     |        |         |              |                     |        |         |              |                     |
| financial market                             | 720    | 810     | 765          | Critical            | 810    | 006     | 855          | Critical            | 441    | 432     | 218          | Not Critical        |
| Technical innovation and technology transfer | 720    | 810     | 765          | Critical            | 120    | 280     | 200          | Not Critical        | 504    | 648     | 576          | Somehow<br>Critical |
| Effective management control                 | 504    | 720     | 612          | Somehow<br>Critical | 96     | 315     | 206          | Not Critical        | 504    | 648     | 576          | Somehow<br>Critical |
| Consultation with end-users                  | 100    | 126     | 113          | Not Critical        | 07     | 64      | 36           | Not Critical        | 180    | 140     | 160          | Not Critical        |
| Appropriate project identification           | 800    | 720     | 760          | Critical            | 810    | 720     | 765          | Not Critical        | 441    | 504     | 473          | Less Critical       |
| Clear project brief and client requirements  | 504    | 336     | 420          | Less Critical       | 63     | 120     | 92           | Not Critical        | 336    | 432     | 384          | Less Critical       |
| Project economic viability                   | 720    | 006     | 810          | Critical            | 810    | 720     | 765          | Critical            | 810    | 720     | 765          | Critical            |
| Favourable investment environment            | 648    | 720     | 684          | Somehow<br>Critical | 729    | 648     | 689          | Somehow<br>Critical | 640    | 567     | 604          | Somehow<br>Critical |
| Good partners' relationship                  | 252    | 504     | 378          | Less Critical       | 75     | 210     | 143          | Not Critical        | 280    | 294     | 574          | Somehow<br>Critical |

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| Identified CSFs   | Case study 1<br>(Road) | Case study 2<br>(Airport) | Case study 3<br>(Seaport) |
|---|------------------------|---------------------------|---------------------------|
| Transparency in the procurement process                     | (itoud)                | (/ inport)                | √ (Seuport)               |
| Competitive procurement process                             |                        |                           | $\checkmark$              |
| Thorough and realistic assessment of the cost and benefits  | $\checkmark$           |                           |                           |
| Favourable legal framework                                  | $\checkmark$           |                           |                           |
| Appropriate risk allocation and risk sharing                | $\checkmark$           |                           | $\checkmark$              |
| Commitment and responsibility of public and private sectors |                        |                           | $\checkmark$              |
| Strong and good private consortium                          | $\checkmark$           |                           | $\checkmark$              |
| Government involvement by providing guarantees              | $\checkmark$           | $\checkmark$              | $\checkmark$              |
| Political support   | $\checkmark$           | $\checkmark$              | $\checkmark$              |
| Availability of suitable and adequate financial market      | $\checkmark$           | $\checkmark$              |                           |
| Technical innovation and technology transfer                | $\checkmark$           |                           |                           |
| Appropriate project identification                          | $\checkmark$           |                           |                           |
| Project economic viability                                  | $\checkmark$           | $\checkmark$              | $\checkmark$              |

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