Conceptual Collaborative Engagement Framework for Road Infrastructure Management in Nigeria

Alaba Adetola PhD, MSc, BSc, AFHEA, MCPMIN, MPMI, AMASCE, ICIOB

Department of Building, School of Environmental Studies, Yaba College of Technology, P.M. B 2011, Yaba - Lagos, Nigeria; abadetola@gmail.com

ABSTRACT

Managing major public infrastructure projects presents considerable challenges for governments and associated stakeholders, especially where resources are limited. Consequently, many countries around the world are now exploring a wide variety of approaches in engaging the private sector in the delivery of essential infrastructure projects crucial to economic growth and development. Given these, a conceptual collaborative engagement framework is developed to overcome the challenges and contextual constraints associated with road infrastructure management in Nigeria. The study adopted a pragmatist philosophical positioning that involved a sequential mixed-methods research approach (qualitative research, quantitative research and case study research). The ‘Quality Function Deployment’ systematic integration tool was employed to determine the degree of correlation between the ‘pivotal drivers’ and the ‘voice of the customer’. Research findings identified 12 important priorities of collaboration which constitute the nucleus of the conceptual Collaborative Engagement Framework for Road Infrastructure Management (CEFRIM). These priorities reaffirm the need for ‘good/harmonious relationships’, ‘collective understanding’ (mutual trust, open/honest/transparent communication), ‘shared responsibility’, ‘innovative capacity’, ‘accountability’ and ‘value for money’ as essential rubrics for collaborative engagement. The CEFRIM presents new knowledge and understanding, particularly on ‘relationships’. Key implications include the need to help stakeholders appreciate the importance of people-centric forces in relationships.

Keywords: Collaborative engagement, framework, road infrastructure, management, Nigeria.

Introduction

There is no gainsaying that modern industry and commercial activities depend on appropriate, well developed and effective transport system. In this regard, transportation appears to play a crucial role in the destiny of nations.

Road transportation is the most dominant mode of movement in Nigeria, a country with an area of 923,768.64 square kilometres, population of over 150million comprising 11 cities with population above one million and 23 cities with population of over 200,000 (Federal Government of Nigeria 2010). It accounts for over 90% of all inter and intra city movements of persons, goods, farm produce, merchandise, animals and mobile services (banks, clinics
and libraries) across the country (Akpogomeh 2002). The total road network in Nigeria is presently estimated at about 200,000 kilometres. These roads were constructed through the traditional procurement methods and managed by government agencies and institutions. About 17% of the network are ‘Trunk A’ roads, 16% are ‘Trunk B’ roads while the remaining 67% are ‘Trunk C’ roads. Trunk A roads are owned, constructed, operated, managed and maintained by the Federal government. Trunk B roads are owned, developed, rehabilitated and managed by the State governments. Trunk C roads are owned, built and maintained by the local government authorities (Central Bank of Nigeria 2003; Oni and Okanlawon 2006).

However, most of these roads are plagued by a number of problems which include inadequate funding, inadequate maintenance, misuse and institutional issues. These challenges have significantly reduced the usefulness of Nigerian roads, negatively impacted on the cost of production of goods and services, caused avoidable traffic accidents, loss of lives, loss of productive man-hours, high vehicle operating cost and lengthier travel times (Odeleye 2000; Central Bank of Nigeria 2003; Campbell 2009; Adetola et al 2011a and Abiodun 2013).

The desire of the Federal Republic of Nigeria to become one of the leading 20 economies in the World by the year 2020 (Federal Government of Nigeria, 2010) demands accelerated national development and specifically adequate, safe, environmentally friendly and efficient road transport infrastructure services to enhance the full mobilisation of other economic sectors. Therefore, there is a need to rehabilitate and re-construct most of the federal, state and local government roads in Nigeria. Furthermore, Nigeria requires additional 100,000 kilometres networks of road before year 2020 (Punch 2013).

 Granted that no public agency has sufficient resources to finance, construct, rehabilitate, maintain and manage its road assets, the need arises for a positive and dynamic collaboration between the public and private sectors. Collaboration could be described as a cooperative arrangement in which two or more organisations share the same vision and work jointly towards a common goal. This research paper developed a conceptual collaborative engagement framework to overcome the challenges and contextual constraints associated with road infrastructure management in Nigeria.

**Research Methodology**

This research developed a conceptual Collaborative Engagement Framework for Road Infrastructure Management in Nigeria. The study adopted a pragmatist philosophical approach that involved literature review, questionnaire survey and case study.

A critical desktop analysis, synthesis and evaluation (qualitative research) of public private partnership studies spanning over two decades was carried out in order to identify the causal problems and key issues that impinge upon the effective delivery of collaborative infrastructure projects. The study identified ten core themes which were the most commonly cited issues by seminal literature on public private collaboration (Adetola et al 2011b).
These issues were captured and embedded in a questionnaire survey (quantitative research) that sought the views and opinions of stakeholders about the drivers of public private sectors’ collaboration and service element requirements of road infrastructure. The findings of the survey revealed the ‘pivotal drivers’ of collaboration and the ‘voice of the customer’ (Adetola 2014).

Furthermore, an exploratory case study interview (qualitative research) was conducted with the top management stakeholders of an on-going concession road infrastructure project in Nigeria in order to explore and identify the challenges of the case study road project and the priorities of the project stakeholders’. In this regard, an iterative semi-structured interview process was adopted with 15 top/senior management level professionals from the public, private and end-user stakeholders of the case study road in order to obtain wholistic view of the issues and challenges associated with the project. These key stakeholders were purposively selected because they have in-depth knowledge, understanding and were directly involved in the case study road project (see Table 1). This method enabled the researcher to obtain balanced views/opinions from all sectors about issues, challenges and priorities. Primary data were analysed with ‘Relative Importance Index’ descriptive statistical tool while the framework was developed using the ‘Quality Function Deployment’ (QFD) systematic integration tool. The CEFRIM was validated internally and externally using the views of the public, private and end-user experts in road infrastructure management.

Table 1: Designation of framework development team members

<table>
<thead>
<tr>
<th>Designation</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>10</td>
<td>67</td>
</tr>
<tr>
<td>Accountant</td>
<td>1</td>
<td>6.6</td>
</tr>
<tr>
<td>Legal Practitioner</td>
<td>1</td>
<td>6.6</td>
</tr>
<tr>
<td>Community Leader</td>
<td>1</td>
<td>6.6</td>
</tr>
<tr>
<td>Transport Operator</td>
<td>1</td>
<td>6.6</td>
</tr>
<tr>
<td>Town Planner</td>
<td>1</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

Results from Table 1 show that the members of the framework development team are experts in different fields of endeavour relevant to policy formulation, planning/design, construction/rehabilitation, operation and management of road facility. The team comprised the case study participants. There was equal representation of the public, private and end-user stakeholders in the development team. The public sector partner has been in operation for 47 years, the private sector concessionaire was established 17 years ago, while the user/community participants are settlers/residents in the towns and estates served by the case highway.
Development of collaborative engagement framework for road infrastructure management

Miles and Huberman (1994) defined a conceptual framework as a written or visual presentation that explains either graphically, or in narrative form the key factors, concepts or variables, and the presumed relationship among them.

Initially, the existing collaborative tools and models were identified through extant literature and were presented to the case study participants for consideration. Most of the participants expressed their interest and preference for the Quality Function Deployment (QFD) model because of its ability to capture data in a meaningful way, provide multi-levels fit for purpose and adequately represent the needs of the CEFRIM. Given this, the QFD systematic integration approach was chosen as an appropriate tool for developing the CEFRIM. The ‘pivotal drivers’ of collaboration and the ‘voice of the customer’ emerged from a questionnaire survey (quantitative research) (Adetola 2014).

The QFD matrix was used to correlate the ‘pivotal drivers’ with the ‘voice of the customer’ in order to determine their strength of relationships and identify the ‘important priorities’ of collaborative road infrastructure management. These ‘important priorities’ were used to develop the CEFRIM (see Figure 1). A Collaborative Training and Education Model for the Construction Industry was developed using the same tool (Nadim 2012).

The CEFRIM was developed through an interactive iterative discussion with the 15 case study participants (public, private and end-user) using mapped priorities from the QFD ‘voice of the customer’. The case study stakeholders were selected because of their position, role, in-depth knowledge and understanding of the case study project. The interactive, iterative, and face to face structured interview process with these participants helped to infuse internal consistency and internal validation to the CEFRIM. This method is supported by Lincoln and Guba (2000). Furthermore, the CEFRIM was exposed to critique beyond the research data set in order to secure external consistency and external validation. In this context, three new participants (a participant each from the public, private and end-user sector) outside the case study project were presented with the developed framework. These participants were chosen on the basis of their knowledge, professional expertise, experience and positions.
Figure 1: Collaborative Engagement Framework for Road Infrastructure Management
Discussion

The conceptual Collaborative Engagement Framework for Road Infrastructure Management (CEFRIM) developed by this study (see Figure 1) is an instrument detailing in graphical and logical form the important priorities of collaborative road infrastructure management. The strength of this framework depends on data. The CEFRIM showed that ‘relationships (good)’ is considered to be of high importance by the government, private and end-user stakeholders in order to deliver and manage sustainable road infrastructure in Nigeria. Good relationships involve a deliberate, concerted and realistic determination to move away or cross over from adversarial lose-lose relationships to collaborative win-win relationships. A good relationship between the sector participants involved in a collaborative project will foster cooperation and shared understanding of project objectives, risks, concerns and strategies. It will enable the public and private sector participants to develop a cordial, harmonious, and seamless interpersonal and inter-organisational interaction, work together, share project responsibilities, and optimise resources, assets and rewards. In particular, a good relationship between the public and private sector stakeholders will help to overcome broad public sector constraints in relation to lack of public capital, public sector capacity, resources and specialised expertise to design, construct, operate and maintain road assets.

A good (collaborative) relationship between the sector partners will incorporate the strengths of the public, private and end-user sectors and help to overcome government and market failures in road infrastructure management (Tam 1999; Siemiatycki 2010; and Adetola et al 2011a). Government failure is characterised by such issues/problems as slow and ineffective decision-making, inefficient organisational and institutional arrangements, and lack of competition and inefficiency in managing publicly procured infrastructure. On the other hand, market failure includes inequalities in the distribution of infrastructure services which are attributes of purely privately procured facilities. The CEFRIM can draw upon the best available skills, knowledge and resources, whether they are in the public or private sector.

Collective understanding of project issues, goals, risks, challenges, strategies and priorities is of high importance to both the government and private sectors because of their strategic roles in the provision and management of collaborative road infrastructure (see Figure 1). In this regard, public authorities are expected to communicate clearly and disclose the objectives of infrastructure policies, project information, and the mechanisms for consultation between the public, private and end-user stakeholders. The concession agreement between the collaborating public and private partners will clearly define and stipulate verifiable service standards, output requirements or performance specifications for a given project along with penalties for non-compliance. The contract may also provide for allocation of risks and responsibilities.

The user sector considers ‘shared responsibility’ between the public (government) and the private (concessionaire) partners to be of high importance because these two sectors often bear the project risks. Shared authority and responsibility, joint investment, shared resources
and rewards, and mutual benefits are the thrust of collaboration (Tang et al 2010). A fundamental requirement for a successful PPC is the optimal sharing of risks and responsibilities between project partners. The primary risks often associated with road infrastructure projects include development, construction, operation and maintenance risks. Development risks relate to land acquisition, road design, sourcing for project fund, environmental clearance, credit-worthiness issues, change of government /political instability, inflation, foreign exchange rate, interest rate, and market demand for road asset. Construction risks include project site conditions, engineering and technical issues, performance of suppliers and contractors. Operation and maintenance risks include estimated traffic volume, toll levels, and toll collection technology. Given this, scholars have emphasised the need for project risks to be properly distributed to the partner with the best financial and technical capabilities to manage them (Li et al 2005; Akintoye and Beck 2009; Tang et al 2010). The public sector (government) may need to put in place a legal, financial and institutional framework that will promote and facilitate the implementation of collaborative road infrastructure projects. This would enhance transparency, fairness and long-term sustainability of road infrastructure projects. Other priorities in order of importance are new methods, innovative capacity, sustainable road asset, accountability, regular road maintenance, safe and functional road elements, value for money, intelligent road management and knowledge transfer.

**Conclusion**

Collaboration is a relationship built upon mutual trust, commitment to common goals, mutual respect, and an understanding of each partners’ expectations and values in order to maximise the effectiveness of each participant’s resources. It is an effective method of transferring ‘know-how’ among individuals, parties and stakeholders, hence it is critical to creating and transmitting a competitive advantage. Collaborative working is the key ingredient for success in today’s construction and built environment sectors. It provides an opportunity for the public and private sectors to partner/ work together and share risks, responsibilities, resources, skills, assets and rewards in order to deliver sustainable infrastructure for the use of the general public.

The conceptual Collaborative Engagement Framework for Road Infrastructure Management (CEFRIM) developed by this study is an instrument detailing in graphical and logical form the important priorities of collaborative road infrastructure management. The strength of this framework depends on data. The CEFRIM is a mechanism that would lower divergences in stakeholders’ interests and promote teamwork. The framework is expected to help bridge the financial, technological and managerial gaps inherent in infrastructure management in Nigeria. In this regard, the CEFRIM might harness the resources of the public, private sectors and end-user to secure the best infrastructure outcomes. Furthermore, the CEFRIM may help to preserve the asset value of infrastructure, reduce the burdens of operators and end-users, and improve the general health, safety and quality of life. It may accelerate investment in virgin alignments and ensure that existing road assets are rehabilitated/expanded and maintained to a satisfactory standard that meets the needs and aspirations of the end-user/general public.
Throughout the world, collaborative approaches have been used mostly in managing urban highways/motorways infrastructure. Therefore, the CEFRIM is targeted at ‘Trunk A and B’ roads (Federal and State highways/expressways) assets in Nigeria that are critical economic routes, attract high volumes of vehicular traffic, and which if appropriately managed can generate revenues and be self-funding.

References


Punch (2013) New agency to manage road infrastructure nationwide, Punch Newspaper, February 27th, Lagos, Nigeria

