

ABSTRACT

New (inexperienced) PPP markets require private sector participation to change the current situation in which governments are the only entity responsible for funding and supporting infrastructure projects. However, it is vital to examine drivers, barriers, and associated failure and success factors before implementing a public-private partnership (PPP) form of project delivery mechanism in new markets. To address public delivery-related problems, this study aims to develop a framework that identifies potential PPP solutions to public delivery problems. To develop a framework, documents that provide first-hand PPP experiences were collected from five toll roads and bridge projects in Senegal, Ghana, Nigeria, Mozambique, and Cote d'Ivoire. Furthermore, the author conducted interviews with the key stakeholders of toll road projects in Ethiopia—a newly emerging, inexperienced PPP market. The cross-case-study analysis exposed 11 PPP implementation drivers. Furthermore, the interviews and document analysis identified 12 problems associated with the public delivery of road projects in Ethiopia. These findings were subsequently analyzed through a concept-mapping technique to develop a framework that provides potential PPP solutions to public delivery problems. Consequently, the study developed a framework that consisted of nine PPP-associated factors acting as a solution to 12 public delivery-associated problems. The results demonstrate that fostering economic development with the help of the private sector to raise project financing and constructing roads that can ease traffic congestion are the main potential drivers of PPP implementation in new PPP markets. This reveals that PPP implementation motives in the inexperienced PPP markets of developing countries are different from the motives in the experienced PPP markets of developing countries.

Despite the drivers for PPP implementation and the successful delivery of toll roads through PPP, inexperienced markets are more susceptible to failures due to the complexities involved in this approach, which have created distrust in inexperienced road sector markets in implementing PPP. In this regard, the study aims to identify possible failure reasons and enablers of PPP implementation in new road sector markets. To achieve this aim, the study

employed a comparative cross-case study aggregation technique on documents collected from PPP projects, namely the Dakar-Diamniadio toll highway (DDTH) from Senegal and the Lekki-Epe expressway (LEE) from Nigeria. The analysis identified reasons that had played important roles in the projects' success and failure. The DDTH was successfully implemented through PPP due to the early formation of a legal and institutional structure, the hiring of advisory services, stakeholders' consultation, government commercial viability gap financing, and the implementation of improved risk allocation mechanism to prevent transfer of macro-economic risk to the end-users. These factors enabled the successful implementation of DDTH, whereas the same acted as the failure reasons in the LEE project, leading to its early termination. The findings may help inexperienced markets avoid project failures by taking mitigation measures at an early stage.

The challenges of PPP adoption differ depending on the country and project-related factors. These factors play a crucial role in increasing the likelihood of project success. Therefore, the study intended to explore the barriers of PPP adoption in SSA countries and their implication in the Ethiopian road sector. To realize this, the study collected the PPP barriers data of the earliest PPP implementation experiences with toll-road projects from Senegal, Ghana, Nigeria, and Mozambique. The cross-case-study aggregation technique was used to explore barriers of PPP from these documents. This analysis exposed 32 barrier themes. These themes were used to explore PPP adoption challenges in a new PPP market, namely the Ethiopian roads sectors, through concept mapping. In this regard, the concept mapping technique explores barrier-related findings in the Ethiopian roads sector using the SSA countries' findings as input in the preparation of semi-structured interviews. The findings revealed the similarity of barriers in 17 out of 32 themes. Often overlooked barriers identified in the current study include traffic mismatch with the forecast due to economic instability, political change leading to successive re-negotiation, public opposition owing to a false promise from some politicians to exempt local users from toll fees, lack of relevant experience and expertise causing delays in the decision-making process due to the absence of a PPP unit, and loss of public benefit caused by the lack of an independent system for monitoring traffic

flow. The study also offers a mechanism to control or reduce the barriers, which enables the identification of parameters negatively affecting the adoption of PPP and ways to overcome them. Some of the enablers include using appropriate PPP modalities, facilitation of compensation mechanisms in complex projects, and minimizing the level of complexity using standardized contracts and open procedures. The findings help new PPP markets adopt a PPP approach by establishing the necessary conditions for its implementation.

Employing a suitable PPP modality reduces the possibility of project failure. However, selecting a proper PPP modality requires a decision framework that provides balanced insight between public preferences and impressions of stakeholders in the prevailing conditions to attract the maximum investments with better value development. To establish a conceptual framework that assists the selection of proper PPP modality, content analysis of PPP modality selection factors was conducted under the evolution of PPP models. Accordingly, 12 decision factors were identified from 22 case study projects, Indian PPP practitioner guidelines, and World Bank toolkit findings. Consequently, a conceptual framework has been developed using PPP modality selection criteria to accommodate project characteristics with the experience of clients, the private sector, and lenders in preferring a specific PPP model. The implementation of the proposed framework in newly emerging PPP markets has been validated with a case study project. This framework would facilitate the provision of a long-term solution for selecting the most appropriate PPP model in changing circumstances.

Categorizing a project as a PPP without comparing alternative procurement methods leads to project performance-related problems because PPP may not apply to every project. In contrast, the application of a suitable toll road delivery method (TRDM) can improve project performance to a great extent. To facilitate the selection of a proper TRDM, the study aims to develop an illustration that indicates project characteristics generally associated with better performance in different TRDMs. To develop an illustration that indicates the suitability and performance of TRDMs, the study explored the suitability and performance indicators of TRDMs by using a literature review as well as experts' related findings. Finally, 15 suitability and 21 performance indicators of TRDMs were identified under seven suitability and six

performance packages, respectively. These indicators were used to explore perceptions of NHA I experts regarding the suitability and performance levels of TRDMs. Consequently, the outputs of one sample t-test and one-way ANOVA test were used to develop an illustration that indicates the suitability and performance of TRDMs. This illustration presented the suitability and performance indicators of TRDMs in a comparative way. This illustration displays highly suitable project characteristics with the TRDMs and high-performance indicators.

The study also presented a comprehensive framework, which supports the decision of selecting a proper TRDM. To develop the framework, the study explored factors that indicate the suitability and performance of TRDMs and enablers for the successful implementation of TRDMs by using a literature review and experts' related findings. These indicators were used as inputs to develop a framework that guides the selection of TRDMs. This framework guides the selection of toll road delivery method with the decision process that involves two major stages: Stage 1— Identifying the category of case study project characteristics out of mutually exclusive features and selecting optimal model by ranking TRDMs based on the suitability and performance parameters; and Stage 2— conducting a pass-fail analysis to assess the presence of enabling conditions to implement the optimal TRDM. To facilitate the decision-making process in stage 1—the study presented a hybrid mechanism that helps to use the combined benefit of the analytic hierarchy process (AHP), Delphi, and mean utility method. To facilitate the decision-making process in stage 2—the study presented a flowchart that assists “pass” and “fail” assessment of project delivery model enabling conditions. The Panipat-Jalandhar Section of the NH-1 road project was used as an example to validate the application of the proposed toll road delivery modalities (PPPs, public, composite methods) selection supporting framework in a realistic situation.

In inexperienced PPP markets, success and failure drivers are project dependent. If PPP failure drivers are not mitigated at the early stage, it moves from one phase to another, leading to new failure reasons. PPP modalities selection framework avoids projects' failure since the choice of a model does not account for project characteristics and associated stakeholders' capacity and risk preference. Every model has a unique and outstanding performance area

relative to the other. However, PPP modalities have outstanding performance in more performance areas than public and composite models. Selecting a modality that considers the suitability with the characteristics of a specific project and its performance requirements helps to realize intended targets—enabling mandatory decision factors to prevent underperformance of the selected modality.

This study's findings provide information on PPP drivers, barriers, failure, and success reasons concerning new PPP markets. The study also provides information on the suitability and performance level of TRDMs. Furthermore, the findings guide to select an appropriate modality (i) within the PPP modalities by taking into account the characteristics of the project and stakeholders involved; (ii) within the PPP modalities, public and composite models by taking into account the suitability of contractual models with the project characteristics; performance of contractual models to the performance targets of the client; and availability of enabling condition to facilitate the successful implementation of the optimal contractual model.