A Study on Critical Factors Influencing The Infrastructure Development Projects Under Public Private Partnership

K. Rajkumar¹, Dr. S. AnandaKumar² M.E., Ph.D., V. Krishnamoorthy³ M.com., M.B.A., M.Phil.,
³Assistant Professor, School of management studies, Kongu Engineering College, Perundurai, Tamil Nadu.
¹Student of Final Year- M.E (CE&M), Department of Civil Engineering, Kongu Engineering College, Perundurai, Tamil Nadu.
²Professor, Department of Civil Engineering, Kongu Engineering College, Perundurai, Tamil Nadu.

Abstract -There is no standard method of Public Private Partnership (PPP) implementation as each country adapts the process as appropriate for its own culture, economy, political climate and legal system. It is therefore essential that all parties likely to be involved have a common understanding of the principles underlying PPP structures and an appreciation of the key issues from the standpoints of the private as well as the public sectors. A key motivation for governments considering PPP is the possibility of bringing in new sources of financing for funding public infrastructure and service needs. An introduction to PPP and a comprehensive review of literatures regarding Public Private Partnership projects are included. The observations from case studies and the literature studies were used to identify the critical factors influencing the infrastructure development projects under public private partnership. The data for this study will be gathered through a detailed questionnaire survey. The questionnaire consists of fifty critical factors that influencing the infrastructure development projects under Public Private Partnership. By knowing the risk factors gives better understanding in allocating them to parties/stakeholders involved.

Keywords — Public Private Partnership, Risk Management, Risk Allocation, project management, managing risk in construction project

I. INTRODUCTION

Development of public works assets can be seen as a barometer of a countries’ economic, political, and populace well-being. Infrastructure development is critical for sustainable growth for countries such as India, Indonesia, China, and the Philippines to name a few. Development of infrastructure projects with private capital through Public Private Partnership (PPP) route has become one of the commonly adopted procurement strategies in developed and developing countries. All over the world where PPP procurement has been used in one form or another, the way in which it is carried out has become an important issue. There is no standard method of PPP implementation as each country adapts the process as appropriate for its own culture, economy, political climate and legal system.

It is therefore essential that all parties likely to be involved have a common understanding of the principles underlying PPP structures and an appreciation of the key issues from the standpoints of the private as well as the public sectors.

Among all, Build- Operate-Transfer (BOT) model is the most commonly adopted approach for privatized infrastructure procurement. Private infrastructure projects under BOT arrangement have a complex risk profile due to several factors like lumpiness of huge investment, long payback period, high developmental efforts and upfront cost, length of term of the loan, susceptibility to political and economic risk, low market value of the security packages, non-recourse/off balance financing, complex contract mechanism involving many participants with diverging interests and limitations on enforcing security. To a considerable extent, the success of a BOT project is influenced by the degree to which various project risks are identified, assessed and allocated and services that it needs to achieve its objectives of buying, storage and movement of materials.

II. INFRASTRUCTURE

Infrastructure is the basic physical and organizational structure needed for the operation of a society or enterprise or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development.

The term typically refers to the technical structures that support a society, such as roads, water supply, sewers, electrical grids, telecommunications, and so forth, and can be defined as “the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions.”
Functionally, infrastructure facilitates the production of goods and services and also the distribution of finished products to markets, as well as basic social services such as schools and hospitals.

III. PUBLIC-PRIVATE PARTNERSHIP (PPP)

The term PPP refers to a long-term, contractually regulated co-operation between the public and private sector for the efficient fulfillment of public tasks in combining the necessary resources (e.g. know-how, operational funds, capital, personnel) of the partners and distributing existing project risks appropriately according to the risk management competence of the project partners.

There is a long tradition of the involvement of the Public-Private Partnerships (PPP) in infrastructure development which involves the private sector participation in any or all of the design, construction, financing and operation phases of a public utility infrastructure, service or both. Examples of infrastructure developed through PPP models abound worldwide. It has been used in industrialized countries, such as the UK and Germany, and in newly industrializing countries with tremendous infrastructure demands, such as China and India, as well as in some developing countries in particular in Latin America. The capital-intensive nature of basic infrastructure and competition for limited government budgetary resources have prompted governments to invite private investors to fulfill the widening demand-supply gap for infrastructure while the governments are endeavoring to meet the social commitments within the fiscal constraints.

Attention has been drawn that the level of adoption of PPPs across the world differs widely. Typically, in industrialized countries, PPPs are used in areas of public service provision including education, health services, waste management and public buildings.

IV. NEED FOR STUDY

Under existing approaches, infrastructure project financing is structured in a way which creates flaws: inefficiencies and added costs, greater political (policy) risk, and a lack of diverse ownership needed for transparent incentives. With India ready to further embark in public-private partnerships for infrastructure projects, getting the formulas right is imperative. This can make the difference between further regional divergences and politicization which deters reforms and development, and the opportunity for more balanced growth for those who will need it most.

A key motivation for governments considering Public Private Partnerships is the possibility of bringing in new sources of financing for funding public infrastructure and service needs. It is important to understand the main mechanisms for infrastructure projects, the principal investors in developing countries, sources of finance (debt, equity, etc.), the typical project finance structure, and key issues arising from developing project financed transactions.

A number of key risks need to be taken into consideration as well. These risks will need to be allocated and managed to ensure the successful financing of the project. The party that is best placed to manage these risks in a cost effective way may not necessarily always be the private sector. However, there are a number of mechanisms products available in the market for project sponsors, lenders and governments to mitigate some of the project risks, such as: Hedging and futures contracts; insurance; and risk mitigation products provided by international finance institutions.

The main revenue model of implementing an integrated platform, joining all the functions of government, exists in terms of saving immense costs, which are involved in maintaining existing channels of functioning of government, and in distribution of information. It would drastically cut down the costs incurred on manual transfer of information, administrative costs, etc.

V. AIM AND OBJECTIVES OF THE STUDY

- To identify the various critical factors in the infrastructure development projects under PPP
- To conduct a survey among construction industries and predicting probability and expect impact of occurrence of the most critical risks
- To analyze the impact of the critical risk

VI. SCOPE OF THE PROJECT

The project is concentrated on Public Private Partnership Infrastructure projects which come under the Indian scenario only. The scope of the study is restricted to analysing BOT and BOOT projects due to their high complexity.

VII. METHODOLOGY

- Objectives
- Review of literature & collection of case studies
- Identification of risk factors
International Journal of Emerging Technology and Advanced Engineering


- Questionnaire survey
- Data collection & Analysis
- Discussion & Conclusion

VIII. CASE STUDIES FROM INDIAN SCENARIO

Eight case studies are presented in this chapter which include projects from public sectors like,
- Water supply and sewerage,
- Urban infrastructure,
- Roads and Expressways,
- Ports.

Table 8.1 gives the details of case studies which includes:
- Public Private Partnership structure,
- Year of signing contract,
- Project cost and
- Concession period.

Table 8.2 shows the key risks addressed at the various project stages of the case studies. Project stages are broadly classified into the following:
- Project preparation stage
- Procurement stage
- Development stage
- Operations stage

### Table 8.1
Details of case studies.

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Sector</th>
<th>PPP project structure</th>
<th>Year of signing contract</th>
<th>Project cost in crores (INR)</th>
<th>Concession period (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alandur Sewerage Project, Tamil Nadu</td>
<td>Sewerage</td>
<td>BOT Annuity</td>
<td>2000</td>
<td>6.68</td>
<td>14</td>
</tr>
<tr>
<td>TuniAnaka palli Annuity Road Project, Andhra Pradesh</td>
<td>Roads</td>
<td>BOT Annuity</td>
<td>2001</td>
<td>315</td>
<td>25</td>
</tr>
<tr>
<td>Delhi Gurgaon Expressways, Delhi and Haryana</td>
<td>Roads-Expressways</td>
<td>BOT</td>
<td>2002</td>
<td>1.175</td>
<td>20</td>
</tr>
</tbody>
</table>

### Table 8.2
Key Risks addressed at various stages of PPP Projects

<table>
<thead>
<tr>
<th>N O.</th>
<th>LEARNING</th>
<th>KEY RISKS ADDRESSED</th>
<th>PPP CASE STUDY EXAMPLES TO BE EMULATED</th>
<th>PPP CASE STUDY EXAMPLES WHERE PROBLEMS WERE ENCOUNTERED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project Preparation Stage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Robust Traffic / Market Assessments</td>
<td>Operations Risk,</td>
<td>--</td>
<td>Delhi Gurgaon Expressway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time and Cost Overrun Risk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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### Procurement Stage

| 1. Robust and Simple Bid Criteria | Default Risk, Termination Risk | Gangavaram Port |
| 2. Dealing with Speculative Bids | Default Risk, Termination Risk | Gangavaram Port, Hyderabad Metro |
| 3. Importance of Lead Consortium Member/ Promoter of Concessionaire | Financing risk, Time and cost overruns risks | Hyderabad Metro |

### Development Stage

| 1. Handling of Land acquisition | Land acquisition risk, Time and Cost Overruns Risks, Social Risk | Hyderabad Metro, Delhi Gurgaon Expressway, Mumbai Metro, Gangavaram Port |
| 2. Streamlining of Approvals and Clearances | Approvals risk, Time and Cost Overruns risks | Delhi Gurgaon Expressway |
| 3. Well Defined Project Scope | Scope Change risk, Time and cost Overruns risks | Delhi Gurgaon Expressway |
| 4. Environmental and Socially responsive development framework | Social Risk, Environment Risk, Land acquisition risk, Social Risk, Time and Cost Overruns risks | Timarpur Solid waste management project |
| 5. Financing Innovations | Financing Risk, Default Risk, Performance Risk | TuniAnakapali Road project, Alandur Sewerage Project, Hyderabad Metro |

### Operations Stage

| 1. Favourable Operating Environment | Policy Risk, Revenue Risk | – |

### Project Life Cycle

| 1. Technology transfer disputes | Partnering risk | – |
| 2. Need for Public support | Time and Cost Overrun Risks, Social Risk, Revenue Risk, Political Risk | Alandur Sewerage Project |
| 3. Strong political will | Political Risk, Time and Cost Overruns Risk, Revenue Risk, Social Risk | Alandur Sewerage Project, Salt Lake Water Supply project |
| 4. Resolution of Issues through Mutual Discussions | Termination risk | – |

### IX. CRITICAL FACTORS IDENTIFICATION

Risk factor have to be determined before the risk being allocated, they have to anticipate the risk so it will be more organize and prepared. In order to achieved this stage, a study based on same research objective being used to develop idea for this study. The risk factor were generated based on extensive literature review especially the work of Yongjian [27], Abednego [2], Li [11], Shen [17], Ibrahim [7], Yuan [28], Yelin [26], Xiao [25], Zhang [30], Singh [18], Wibowo [24], Ng and Loosemore [13] and VDTF [21]. Risk factors identified by the case studies and literature reviews.

**Table 9.1 Critical Factors Influencing the PPP Projects**

| 1. Change in law |
| 2. Delay in Project Approval and Permits |
| 3. Nationalization of Assets |
| 4. Inconsistencies in Government Policies |
| 5. Strong Political Opposition |
| 6. Land Acquisition |
| 7. Availability of Appropriate Labour |
| 8. Availability of Appropriate Material |
| 9. Availability of Finance |
| 10. Design Deficiency |
| 11. Construction Time Delay |
The significant risk factors for each of the groups that were determined earlier are elaborated further as below:

- **Political risk**, due to legal changes and unsupportive government policies [6]. The significant risk factors obtained from this group are change in law, delay of project approval & permit. Change in law occur when the local governments inconsistent for application of new regulations and laws. Delay of project approval & permits is the scenario when there is a delay or refusal of project approval by local government [27].

- **Construction risk**, due to faulty construction techniques, cost escalation and delays in construction [6] besides that land acquisition is also one of the factors. In this group, land acquisition is identified significant from the mapping. It normally occurs when the project land is unavailable or unable to be occupied at the required time [27].

- **Legal risk**, mainly due to government regulations. The significant risk factors are change in tax regulation, corruption and lack of respect for law and legislation change/inconsistencies. Change in tax regulation indicates the scenario when local government inconsistent when apply the tax regulation [27]. Corruption and lack of respect of law is the behavior of the corruption of government officials that will increase the relationship between government and the project company [27]. Lastly legislation change/inconsistency is occurred when there is a change of law and regulation that will cause the increase of project costs and decrease the revenue [27].

- **Economic risk**, due poor financial market and inflation [9]. The significant risk factor is interest rate volatility. It is occurring when local interest rate unanticipated due to immature local economic and banking system [27].

- **Operation risk**, due to higher operating and maintenance cost [6]. The significant factor is cost overruns. It is resulting from improper measurement, ill planned schedule or low operation efficiency of when operating or maintenance [9].

- **Market risk**, due to the demand or price for a service which vary from forecast levels, generating less revenue than user expectation [21]. The significant factor is tariff change. It occurs when improper tariff design or inflexible adjustment framework leading to the insufficient income [27].
XI. CONCLUSION

The identification of risk factor one of the most important stages in order to allocate the risk. The findings from this reviewed study is that the risk factors are clustered into 50. Meanwhile the most frequent factors are Change in law, Delay in Project Approval and Permits, Land Acquisition & Operation Cost Overrun.

REFERENCES


