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Identifying Critical Success and Risk Factors for Public Private Partnership (PPP) Infrastructure in Road Sector: Perspective from India

Abhishek C. Bramhankar*, Rajanikant V. Devalkar**
**M.E. (CM) student, Department of Civil Engineering, NDMVP's KBTCOE, Nashik-422013, India.*
Email: abhishek.bramhankar@gmail.com
***Assistant Professor, Department of Civil Engineering, NDMVP's KBTCOE, Nashik-422013, India.*

ABSTRACT
Road and transportation infrastructure construction is highly capital intensive, wherein the government alone cannot meet its ends and initiated Public Private Partnership (PPP) for its execution right from planning and designing to its maintenance through various PPP models. Over the last few years many of the awarded road projects through PPP model has been in trouble because of various reasons. This paper mainly focuses on finding the critical success and failure factors which are involved in PPP projects in road sector. From comprehensive literature review and discussion with PPP experts, 11 critical success factors and 10 critical risk factors are identified. Using questionnaire survey and RII method of ranking, the most significant factor for successful implementation of PPP road project is sharing of risk between public & private sector and most risky factor is construction cost overrun.

Keyword: Public Private Partnership (PPP), Road sector, Critical Success Factor (CSF), Critical Risk Factor (CRF), Relative Importance Index (RII)

I. INTRODUCTION

A public private partnership (PPP) is defined by the National Council for Public-Private Partnerships, USA (2009) as "a contractual agreement between a public agency (federal, state, or local) and a private sector entity," through which the skills and assets of each sector are shared in delivering a service or facility for the use of the general public. It has been recognized as an effective way of delivering value for money for public infrastructure and services, which seeks to combine the advantages of competitive tendering and flexible negotiation, and to allocate risk on an agreed basis between the public sector and the private sector (Li et al. 2005).

The Government of India defines a PPP as "a partnership between a public sector entity (sponsoring authority) and a private sector entity (a legal entity in which 51% or more of equity is with the private partner/s) for the creation and/or management of infrastructure for public purpose for a specified period of time (concession period) on commercial terms and in which the private partner has been procured through a transparent and open procurement system"(Ministry of Finance, Government of India).

In PPPs, the private sector assumes the traditional role of the public entity of delivering services to the general public under conditions that are monitored, independently or by a Government agency, regulated or left to the market, depending on the type of the services/assets to be delivered. It

is important to note, though, that the ultimate accountability to users for provision of these services continues to remain with the public entity, even if the delivery is by the private partner. For example, the National Highways Authority of India (NHAI) may contract out the responsibility for construction and maintenance of a road to a private party under a Build- Operate and Transfer (BOT) concession. However, the ultimate responsibility to users for providing good quality road services continues to remain with NHAI which needs to ensure that appropriate quality/service standards are maintained.

However, it is worth highlighting that PPP is not a quick fix solution to deliver project financing and realization (European Commission 2003). It is essential for the public client and the private bidders to evaluate all of the potential risks throughout the whole project life. Risk is inherent and difficult to deal with, and requires a proper management framework both theoretically and practically. This is more so for PPP implementation, due to the large project scale, long concession period, complexity, and social sensitivity usually associated with PPP projects (Grimsey and Lewis 2002).

1. Need of study

Infrastructure is the back bone of economic development of any Nation. Road infrastructure plays key role for trade and commerce, connecting the production and consumption centers. In most developing countries public private partnership is relatively new trend in urban infrastructure. Government both at national level and state level are focusing to implement their projects through PPP model. Over the last few years many of the awarded road projects through PPP model has been in trouble because of various reasons. Therefore, we have to first focus on finding the critical success and failure factors which are involved in PPP projects in Road sector.

2. Objective of study

- To study the basics of Public Private Partnership (PPP)
- To find critical success and critical risk factors for PPP projects in road sector
- To do analysis of factors by Relative Importance Index (RII)
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II. METHODOLOGY

The main focus of the study is on finding critical success and failure factors for PPP while implementation of road infrastructure. For this comprehensive literature review through various journal papers and success and failure stories of PPP road projects are studied. From this around 11critical success and 10 critical failure factors are found out. Then relative importance index (RII) technique is use to rank the critical success and failure factors. Questionnaire of critical factors is formed using likert scale from 1 as not significant to 5 as extremely significant and distributed to 13 experts who have vast experienced of PPP road infrastructure projects.

III. DATA COLLECTION

For data collection of various success and risk factors following sources are used,

- Journal papers related to PPP road projects
- Discussion with PPP experts
- Success Stories of PPP road projects
- Failure Stories of PPP road projects

The critical success and risk factors identified are given in table 1 and table 2 respectively,

Table 1: Critical Success Factors

Code	Factors	Description
SF1	Appropriate project identification[8]	The PPP project should be properly identified by knowing its needs, market demand, future scope and feasibility.
SF2	Capacity and experience of the concessionaire[3] [13]	The concessionaire should be well capable and have much experience in doing PPP projects.
SF3	Proper arrangement of cash[7]	Pre analysis should be done for arrangement of funds with its sources to reduce financial crisis risk
SF4	Local public support to project[3]	There should be a support from local public in various manner for smoothly completion of work
SF5	Transparent procurement policy[13] [16]	Transparency in tender processes, or negotiation, lies with the public client, private contractor and their advisers, which further suggests that three features are important for transparency: good communication between the public and private contractor and their advisers; the private sector openly consulting with the public sector and its adviser, while keeping responsibility for all decisions; and the private sector establishing a clear basis for making decisions.
SF6	Availability of standard concession agreement[9] [15]	There should be a ready Standard Model Concession Agreement which spells out the policy and regulatory framework for implementation of a PPP project.
SF7	Sharing of risk between public and private sector[5]	The commitment and responsibility of both public and private participants are important for successful PPP projects. All parties should commit their best resources (financial, human, etc.) to the partnership project. Commitment should be established throughout all management levels.
SF8	In time land acquisition[3][14]	Land acquisition refers to the process by which the government acquires private land for the purpose of development of infrastructural facilities of the private land, and provides compensation to the affected land owners and their rehabilitation and resettlement. For in time completion of work acquisition of land should be done prior to starting on any work.
SF9	Less environmental impact[3]	PPP project and construction activities for those projects should be less harmful to environment and preserved its biodiversity.

SF10	Transparency in toll collection system[12][14]	There should be a transparency in toll collection and its operation like by implementing electronic tolling system, cameras at toll locations, day to day audit system, etc.
SF11	Appropriate safety considerations	Appropriate safety considerations should be done while operation of road like warning sign boards, speed breakers, safety sign boards and emergency numbers, etc.

Table 2: Critical Risk Factors

Code	Factors	Description
RF1	Public opposition to project[8][14][15][1]	Opposition by local public for giving land or doing further work because of their local issues or may be personal.
RF2	Unstable/ change of government[9][15]	Frequent changes in government; agitation for change of government or disputes between political parties or different organs of the state
RF3	Corruption and bribery in system[6][13]	Corrupt local government officials demand bribes or unjust rewards, it can be from private side also.
RF4	Inadequate distribution of responsibilities and risk between both sector[9]	One sided distribution of responsibilities and risk like financial risk, traffic revenue risk, safety considerations can create disputes between sectors and delay the process.
RF5	Delay in land acquisition[1][4][10][9]	Land acquisition refers to the process by which the government acquires private land for the purpose of development of infrastructural facilities of the private land, and provides compensation to the affected land owners and their rehabilitation and resettlement.
RF6	Construction cost overrun[1][9][10]	Proper planning will prevent many problems that can haunt a project all the way to completion. Of course, this is the plan for almost all projects, but circumstances occur that causes some projects to go astray which make cost overruns inevitable.
RF7	Environmental impact risk[1]	Many construction activities will have a negative impact on environment and degrades biodiversity.
RF8	Traffic revenue risk[1][10][12]	There is frequent change in traffic pattern which leads to traffic revenue risk.
RF9	Maintenance cost risk[7][14]	Because of misinterpretation in forecasting, inflation, fluctuating traffic, low quality materials, etc. maintenance cost can be increases considerably.
RF10	Lack of government support[7]	Lack of government support at operation phase like collection of toll, its maintenance leads to many conflicts & disputes and affects the revenue stream, relationship of both sectors.

1. Successful PPP project story

Development of NH-7 portion from Farooqnagar to Jadcherla NHAI and GMR for Design, Construction, Development, Finance, Operation and Maintenance on BOT basis'

National Highway No. 7 is located in Andhra Pradesh between Farooqnagar (km 34.8) to Jadcherla section i.e. 34.14 km to 135.739 km. The NHAI appointed M/s Secon Surveys Pvt Limited as the Consultant for providing necessary technical service to prepare Detailed Project Report (DPR).The Project Road length runs in North-South direction and passes through Farooqnagar to Jadcherla (Km 34.140 to Km 80) as Package 1 covering a length of 46.167 km and Rajapur to Janampet (Km 80 to Km 135.74) as package II covering a length of 55.740 km including Kottakota bypass. The total length of the project is 101.907 km. The Concession Agreement for this Project Highway was signed on 20th Feb 2006 between the National Highway Authority of India (NHAI) and the Concessionaire i.e. M/s. GMR Jadcherla Expressways Limited, a company incorporated under the provisions of the Companies Act 1956. The Consortium also submitted the performance security of Rs. Seventeen Crores and Thirty Seven Lakhs for the Project.

- Conclusion from successful PPP story:

The project was completed and is in the operation phase with the concessionaire collecting toll and sharing it with NHAI. The project will be handed over to NHAI after the concession period of 20 years. The officials for this project have rated the highest for land acquisition risk, demand risk, and CSF to be proper project identification, clearances, appropriate risk allocation, safety considerations, good governance and availability of project finance with experience of the concessionaire in road projects.

2. Failure PPP project story

Development of four laning of Vijaywada--- Machlipatnam section of NH-9 between NHAI and Madhucon projects Ltd on BOT basis'

Project for four laning of Vijaywada – Machlipatnam section of NH-9 between NHAI and Madhucon projects Ltd on BOT basis for a length of 64 km costing 606 crores was entered in November 2011 to be completed in 2 years. The contract was terminated on 23.09.2013.

- Conclusion from failure PPP story:

The project was terminated because of aggressive bidding by the concessionaire (quoted excessive premium to NHAI), aggressive bidding is a process were the concessionaire bids and wins the project by quoting unreasonably and later wants to change the agreement accordingly(competitive tendering system will stop aggressive bidding), Improper assessment of the traffic and field conditions (Demand risk and land acquisition risk), Dispute between NHAI and Madhucon Projects ltd. (Improper dispute mechanism), Delay lead to increase in the cost of the project (Cost overrun risk). The officials for this project have rated the highest for demand risk, cost overrun risk and land acquisition risk.

3. Respondents summary

The respondents used for questionnaire survey are expert in the field of PPP road projects. The respondents are classify sector wise i.e. government sector and private sector to know the view point from both the sector. Total approach respondents were 13.

Table 3: Respondents Information

Sector	No. of Respondents
Government	5
Private	8

IV. DATA ANALYSIS

The data received in the questionnaire was analyzed by Relative Importance Index (RII) method to determine the relative importance of i) the success factors affecting implementations of PPP road projects; and ii) the risk factors affecting implementations of PPP road projects. The following tables show the rating and corresponding frequency given to each factor and then ranking given to the factors as per their score. The formula to calculate RII is given below:

$$RII = \frac{\sum W}{A \times N}$$

Here,

W = Weighting given to each factor by the respondents (ranging from 1 to 5),
A = Highest weightage given for that factor,
N = Total Number of respondents which is 13

Table 4: Analysis of Critical Success Factors

Factor Code	Rating					RII	Rank
	5	4	3	2	1		
SF1	3	7	3	0	0	0.800	7
SF2	8	4	1	0	0	0.908	2
SF3	3	9	1	0	0	0.831	5
SF4	2	5	6	0	0	0.738	8
SF5	3	3	7	0	0	0.738	8
SF6	1	5	7	0	0	0.708	9
SF7	10	2	1	0	0	0.938	1
SF8	7	4	2	0	0	0.877	3
SF9	2	5	6	0	0	0.738	8
SF10	0	7	6	0	0	0.885	4
SF11	0	4	9	0	0	0.827	6

Table 5: Analysis of Critical Risk Factors

Factor Code	Rating					RII	Rank
	5	4	3	2	1		
RF1	5	4	4	0	0	0.815	6
RF2	3	1	4	5	0	0.631	8
RF3	1	6	2	4	0	0.662	9
RF4	9	3	1	0	0	0.923	2
RF5	7	6	0	0	0	0.908	3
RF6	9	4	0	0	0	0.938	1
RF7	0	7	6	0	0	0.885	4
RF8	9	3	1	0	0	0.923	2
RF9	0	6	6	1	0	0.827	5
RF10	1	8	0	4	0	0.692	7

V. CONCLUSION

After RII analysis, sharing of risk between public and private sector is most critical factor amongst all successful factors for PPP road projects and capacity and experience of the concessionaire is second most critical factor. Amongst all risk factors, construction cost overrun is the most crucial factors for failure of PPP road projects and traffic revenue risk, inadequate distribution of responsibilities and risk between both sectors are second most crucial factors. So, for successful implementation of PPP road projects we have to mainly focus on private sector commitments, previous work experience and shared authority and their responsibility between public and private sectors. For, reduce the risk of failure for PPP road

projects we have to concentrate and find the solution on inadequate revenue generation from traffic issues and also reasons for cost overrun.

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