PUBLIC PRIVATE PARTNERSHIPS (PPP) IN ROAD PROJECTS: CRITICAL SUCCESS FACTORS IN THE INDIAN CONTEXT

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ABSTRACT

The Public Private Partnerships (PPPs) have come a long way into the road infrastructure projects in India. A mix of Design-Build-Finance-Operate-Transfer (DBFOT) type toll or annuities where laws, regulations, institutions, modalities, funding, sub national development, expansion into non-traditional areas for PPP etc., are being developed for implementation. The current approaches for selection of PPP road projects are based upon assessment of combined effects of both financial and non-financial (risks and opportunities) without considering all relevant success factors to evaluate a given project. This paper tries to identify the Critical Success Factors (CSFs) for Indian PPP Highways projects and their relative importance to assess the projects viability. These CSFs thus can help in selecting/evaluating the projects put to developers for bidding under provisions of model concession agreement (MCA). A sensitivity analysis is carried out on subjective judgment of developers without appropriate formalism for non financial aspects.

1 INTRODUCTION

Since 1991, India has gradually opened up its markets through economic reforms by reducing government controls on exports and foreign investment in India. Privatization of public-owned industries and opening up of roads to private and foreign industries is slowly changing the face of infrastructure in India. At the central level, the national highways projects are presently being upgraded to 4/6/8 lanes under National Highway Development Projects (NHDP) using three models - Design-Build-Finance-Operate-Transfer (DBFOT) toll, DBFOT (annuity) and special purpose vehicle (SPV). Of the first two models, DBFOT (toll) has been preferred accounting for 82% of total proposed private investment. The selection of concessionaire for award is carried out through open competitive bidding using two stage bidding process. In spite of all initiatives the response had been lukewarm mainly due to below past performance of several DBFOT projects either failing in reaching financial closure after issue of Letter of Acceptance (LOA) or turning into a loss making project due to heavy reliance on Bid Document data and projection without considering uncertainties. As per Request for Proposal (RFP) developers are not even allowed enough time to investigate more information useful for taking right decision. Thus the present decision process adopted by developers in evaluating DBFOT (toll) projects is to base their major decisions on data given in standard bidding document with limited traffic count to arrive at a margin without considering all factors that has effect on project viability. Thus it becomes important to evaluate a project for taking decision under the limited time, uncertainties and multiple objectives rather than declining a project/or selection of wrong

project without analyzing the opportunities and alternatives. Ock (1998) suggested five sequential decisions involved in the BOT proposal design process: 1. Go/No-go decision, 2. Project scope decision, 3. Financial needs decision, 4. Revenue forecasting decision, and 5. Credit enhancement decision. The multiple objectives from various project participants' point of view are, i)1) Generating efficient revenue as well as developers' profits, ii) The project revenue can meet the debt servicing with margin as required by lenders, and iii) Revenue is sufficient to borrow money at comfortable Debt: Equity ratio.

Tilotia and Pawar (2004) analysed the traffic Risk Management-Derivatives in the Transport Sector. They feel that some significant issues that need to be tackled before the derivatives market can be fully developed are: tolling of all roads; transparency in measurement of traffic flow and; and allowing banks and institutions to take part.

Raghuram (2004) concluded that tolling of small stretch is not appropriate as corridor management is being preferred in Indian context. Washington State Transportation Commission (2006) in which ten compiled background papers includes analysis of certain illustrative examples of Toll roads and recommendations are highlighted with suggestions for modifications in successful toll projects. Vandoros and Pantouvakis (2006) in the paper concluded that real options, despite the difficulty in their proper application, may provide better decision-making for evaluating PPP/Private Finance Initiative (PFI) projects at the appraisal stage.

It is thus evident there are limited studies available that help in identifying critical success/failure factors (CSF) for PPP projects in India. This paper attempts to evolve a simple yet a significant tool to guide developers to systematically analyze the CSFs for making quick decisions. The main objective of this paper is to evaluate projects considering all the CSFs.

2 STANDARD BIDDING DOCUMENT (SBD)

The Standard bidding document for DBFOT (toll) projects is based on model concession agreement (MCA). Like most of other countries the concession processes in India as well is regulated by legislation under concession contract, a private sector firm designs, builds or rehabilitates, finances, maintains and operates a road for a specified period called concession period. Since initiation of concession regulation in India, many modifications have been made based on past experience, deliberation of concession documents inviting Consultants to attract concessionaires.

The concession agreement describes a comprehensive framework addressing the issues which are typically important for limited recourse financing of infrastructure projects, such as mitigation and unbundling of risks; allocation of risks and rewards; symmetry of obligations between the principal parties; precision and predictability of costs and obligations; reduction of transaction costs; force majeure and termination. It also addresses other important concerns such as user protection, independent monitoring, dispute resolution and financial support from the Government.

The current concession agreement has been reviewed to identify issues surrounding road concessions, including the legal framework for private sector involvement in road sectors, the features of concessionaires, criteria for selecting proposals, main risks of toll roads, public guarantees contributions in concession contracts and financial issues of concessionaire companies. Table 1 summarises important provisions pertaining to influencing factors of concession agreement.

Table 1: Salient features of the model concession agreement (MCA)

Project Phase	Risks Categories	Provision in MCA
	Concession period	A fixed concession period is specified based on feasibility.
	Viability Gap Funding	Maximum 40% of the project cost
	Basis of award	Grant or Premium from yearly revenue collection.
	User Fee	Fixed toll for different categories of vehicles across India. MCA provides for indexation of user fee as per Wholesale price Index.
Granting Authority responsibility: Compensation @0.1% of performance security for each day delay to a maximum of 20%		
Development Phase	Delay in LA	Compensation event
	Pre investment Risks	Risks are borne by granting authority.
	Delay in Resettlement and rehabilitation (R&R)	Compensation event
	Delay in financial closure	Compensation event penalty 0.2% of Performance Security (PS) /Bond for each day delay capped at 20% of PS
	Clearances – Environmental, Railways	Compensation for delay clause.
	State Support Agreement	Compensation for delay clause.
Construction Phase	Cost over run risks	Concessionaire risks.
	Completion time risks	Concessionaire risks. Compensation event
	Design and latent defect risks	Concessionaire risks.
	Technology risks	Concessionaire risks.
	Resources risks	Concessionaire risks.
	Cost overrun due to change of scope	Upto 0.5% of Total Project cost is concessionaire risk.
Operation Phase	Traffic revenue risks	Partial sharing of traffic risk. In case the traffic fluctuation fluctuates 2.5% (positive or negative) from target traffic – Concession period is adjusted +1.5 times for each 1% fall capped at 20% and reducing period by 0.75% for each 1% rise capped at 10%.
	Operation risks	Concessionaire risks.
	Demand risks	Non competing agreement but Market driven demand remains Concessionaire risks.
	Debt servicing risks	Concessionaire risks.
	Performance standard risks	Concessionaire risks.
Life cycle risks	Political risks	During construction and after operation both by granting authority.
	Non Political event risk	Insurance coverage.
	Partnering risks	Concessionaire risks.

The four critical elements that determine the financial viability of a highway project are traffic volumes, user fee, concession period and capital costs. In the Indian context the user fees are uniform across India. Concession period can be extended marginally due to traffic growth mismatch (limited risk sharing). Traffic volume risks to certain extent are manageable by non competing agreement but demand risks remain the concern which depends on macro and microeconomic environment. But the risks in capital cost and realization of revenue are inflation, delays, and construction risks, force majeur risks, financial market risks categorized in two categories: Granting authority default or concessionaire default.

Development Phase: During this phase major risk with concessionaire is delay in financial closure. The other uncertainties are granting authority responsibility defined in MCA. Non achievement of these is considered the granting authority default. Hence for Go/No go decision the project feasibility and project stand alone bank ability is vital.

Construction Phase: Construction uncertainties refers to unexpected developments during the construction period that may lead to time and cost overruns, change of scope or shortfalls in performance parameters of the completed project. High capital intensity and a relatively long construction period make project costs especially vulnerable to delays and cost overruns. Granting authority default is partially compensated in concession agreement. Construction risk can be reduced through a variety of instruments. While construction risk can be shifted to some extent, it cannot be eliminated entirely, since penalties for non-performance are typically capped and the residual risk has to be borne by investors. However, lenders would be satisfied with risk sharing that reduces project risk to a level that can be absorbed by equity investors without jeopardizing loan repayments.

Operating Phase: The technical performance of the project during its operational phase can fall below the levels projected by investors for a number of reasons. Operating risk is usually low for infrastructure projects that rely on a tested technology, as is the case with most roads. Many risks during the operational phase, including certain force majeure risks, are commercially insurable, and concessionaire will typically insure against such risks. In roads projects developers deals directly with individual users and users typically face competing options, market risk is borne by the concessionaire.

Interest rate risk: This risk lies with investor, who in turn can hedge the risk through devices such as interest caps.

Regulatory risk: Regulatory risk arises because infrastructure projects have to interface with various regulatory authorities throughout the life of the project, making them especially vulnerable to regulatory action.

3 METHODOLOGY

For deciding a go or no-go for a DBFOT (toll) project, the developers first evaluate their qualification for project followed by project conditions satisfying the interests of other project participants especially the concession granting authority and financial institutions, still meeting their profit-wise goals of the project.

The Critical success factor (CSF) method has been used successfully in financial services, information system and manufacturing industry. The CSFs have been identified in relation to BOT projects in China and UK successfully. The methodology is explained in following sequential steps.

Review of BOT sample case studies: During this stage data pertaining to ongoing DBFOT (toll) projects, collated and reviewed. Initially critical review results in long list and filtration and condensation is carried out using case histories and unstructured interviews with Project Sponsors, Developers, Lenders, Contractors, Project sponsors and Consultants.

Unstructured Depth interview of Top Management of Developers, sponsors, Lenders, Contractors, Consultants and Operation and Maintenance operator followed the review stage. The methodology involves unstructured, subjective depth interview using open ended questions and minimum of prodding. Questions were open ended and were for opinions, anecdotes, feeling about PPP projects, and occasion of use and so on. The respondents were the key manager responsible for decision making in their respective organizations. The theme was proposed before interview. Following open ended questions were put to 14 (fourteen) respondents to get the factors they consider important in success of DBFOT projects and their experiences with earlier projects.

The responses were recorded and the factors mentioned are tabulated in developing a questionnaire which contained 22 nominated success factors that affect application of BOT delivery system for National Highways in India.

The next step being questionnaire design and responses: The questionnaire was designed and included twenty two key success factors form unstructured response survey which included issues involved in current BOT. The aim was to assess the criticality of identified CSFs. projects. This survey was carried out among developers who are currently or have been involved in BOT project implementation. All respondents were either Directors or Head BOT Contracts in their respective organization and share an average of 12 years of experience in BOT Projects. The stratified sampling has been used (small, medium and large category) and questionnaire has been designed based on factors associated with identified six categories. The respondent responses were re tabulated to indicate on a five point scale (5=most critical), their perception of criticality of factors with 22 factors. In all, out of 26 questionnaires distributed, 12 came from Indian Developers covering (Large, medium and small) and 2 international developers. The effective response rate is 54%.

Data screening and descriptive analysis were carried out before moving to factor analysis. Factor analysis was carried out using SPSS (statistical software package) for reducing the number of factors obtained from unstructured depth interview. Statistical analysis was also carried out for reliability of collected data. Nevertheless all top management were interviewed, yet Cronbach alpha reliability was carried out which gave a value of 0.595 suggesting that data collected for critical factor are reliable. Thereafter the factor analysis was carried out to group the CSFs.

4 DATA ANALYSIS AND INTERPRETATION

The review of case studies mainly aimed at identifying success factors for DBFOT National Highways Projects in India. The review included followings;

- Model concession agreement provisions for financing, contract, risks, critical success factors and case studies of successful and unsuccessful projects.
- Current practice of evaluating PPP projects
- Key success factors for PPP projects in other countries.

The review resulted in identifying success factors on which successes of DBFOT projects depend. To be more precise for Indian Highways Projects, unstructured depth interview of concessionaires were carried out that resulted in 22 critical success factors and its mean

and std. deviation were calculated using SPSS analytical package. **Table 2** gives the relative criticality based on survey respondent's ratings in terms of mean and standards deviation (SD).

Table 2: Critical success factors in current BOT projects-descriptive statistics

S. No.	Success factors	N	Minimum	Maximum	Mean	Std. Deviation
1	Private Sector capability	14	1.00	4.00	2.64	.84
2	Termination Payment	14	2.00	4.00	2.79	.80
3	Project Size	14	2.00	5.00	2.93	.83
4	Penalties	14	1.00	5.00	3.14	1.17
5	Competitive Procurement	14	1.00	5.00	3.36	1.08
6	State Support	14	2.00	5.00	3.43	.75
7	Political support	14	2.00	5.00	3.50	.94
8	Encumbrance Free	14	2.00	5.00	3.50	.94
9	Exit Clause	14	2.00	5.00	3.57	1.02
10	Change in Scope	14	3.00	5.00	3.79	.80
11	Macro economy	14	3.00	5.00	4.07	.73
12	Transparency	14	3.00	5.00	4.14	.77
13	Technical Feasibility	14	2.00	5.00	4.14	.95
14	Government Guarantees	14	2.00	5.00	4.14	.95
15	Project structuring	14	3.00	5.00	4.14	.86
16	Good Governance	14	2.00	5.00	4.21	.97
17	Public Support	14	3.00	5.00	4.21	.70
18	Dispute Mechanism	14	3.00	5.00	4.29	.73
19	Legal Framework	14	3.00	5.00	4.29	.83
20	Financial market	14	3.00	5.00	4.36	.74
21	Appropriate Risk allocation	14	3.00	5.00	4.43	.65
22	Financial viability	14	4.00	5.00	4.86	.36

The analysis shows that the order of ranking based on responses and financial Viability being most critical (High Mean and low SD), where as Private sector capability being least important critical factor in order.

Further factor analysis was carried out to identify a relatively small number of factor groupings that can be used to represent relationships among set of many inter-related variables. This technique was applied to the survey data to explore the groupings that might exist among CSFs. Factor analysis helps the decision-makers to understand the problem by structuring the hierarchy, and it transfers their subjective judgments into meaningful weights and ratios that represent their priorities. In the present context factor analysis was carried out in two stages.

Stage 1 was Factor Extraction process to identify the number of factors that will be extracted from data based on Principal Components Analysis. The objectives of this factor analysis were to extract least number of factors possible that will maximize the explained variance.

Table 3: Factor extraction of identified CSFs

	Initial Eigen values			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Transparency in Procurement	5.437	24.711	24.711	5.437	24.711	24.711
Competitive Procurement process	3.449	15.677	40.388	3.449	15.677	40.388
Project Structuring	2.688	12.216	52.605	2.688	12.216	52.605
Appropriate Risk sharing	2.400	10.911	63.516	2.400	10.911	63.516
Technical feasibility	1.900	8.635	72.152	1.900	8.635	72.152
Financial viability	1.646	7.481	79.633	1.646	7.481	79.633
Private sector capability	1.218	5.537	85.170	1.218	5.537	85.170
Good Governance	1.000	4.547	89.717	1.000	4.547	89.717
Political support	.825	3.749	93.466			
Public support	.592	2.689	96.155			
Exit clause	.404	1.835	97.990			
Legal framework	.265	1.203	99.193			
Encumbrance free	.177	.807	100.000			
State support	.000	.000	100.000			
Financial market	.000	.000	100.000			
Project size	.000	.000	100.000			
Govt. Guarantees	.000	.000	100.000			
Macro economy	.000	.000	100.000			
Penalties	.000	.000	100.000			
Termination payments	.000	.000	100.000			
Dispute mechanism	.000	.000	100.000			
Change in scope	.000	.000	100.000			

Stage 2 was rotation of Principal Components that gave interpretation capability to name the factors. Values close to 1 give high loading and those close to 0 low loading.

Table 4: Rotation of principal component analysis

Factor Component	Components							
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Dispute mechanism	0.784							
Legal framework	0.665							
Termination payments	0.532			Project Implementability				
Project Structuring	0.374							
Govt. Guarantees		0.892						
Competitive Procurement process		0.754			Govt. supports and Risks			
Appropriate Risk sharing		0.591						
Financial		0.584						
Project size			0.304					
Good Governance			0.057		Project Location and size			
Private sector capability				0.501				
Exit Clause				0.125	Developers Capability			
Change in scope				0.901				
Financial viability					0.880			
Political support					0.019			
Public support					0.718	Favourable conditions		
Macro economy					0.037			
Technical feasibility						0.364	Technical feasibility	
Penalties						0.764		
Transparency							0.381	Transparency & encumbrances
Procurement								
Encumbrance free							0.903	
State support								0.907

From the factor analysis relatively a small number of factor groupings was attempted that can be used to represent relationships among sets of many interrelated variables. The factor analysis shows that 17 CSFs can be grouped into eight principal factors and be interpreted as follows;

Factor Grouping 1 represents ease of *Project implementability* comprising of dispute mechanism, legal framework, termination payment and project structuring that accounts for 19.56%.

Factor Grouping 2 represents *Govt. support & risk sharing* consisting of Govt. guarantees, competitive procurement process, appropriate risk sharing and financial market that accounts for 23.44%.

Factor Grouping 3 represents *Project Location and size* accounting for 3%.

Factor Grouping 4 represents *Developers Capability* consisting of ability to absorb change of scope, capability and exit clause that accounts for 12.69%.

Factor Grouping 5 represents *Favourable conditions* that are financial viability, public support, macro economy and political support accounting for 13.74%

Factor Grouping 6 represents *Technical feasibility* including penalties that account for 9.37%

Factor Grouping 7 represents *Encumbrance free and Transparency* in procurement jointly account for 10.67%.

Factor Grouping 8 represents Indian States whose support is important in Indian political system and account for 7.54%

5 CONCLUSIONS

The field of BOT toll road projects is growing as Govt. of India is committed to offer all Highways projects through BOT in first stage, Annuity when BOT initiative fails and finally cash contract when no takers on Annuity. Since there are many criteria and variables that affect DBFOT toll road projects the critical success factor (based on Indian developer experiences) may be very useful. Decision-makers within the public sector need a practical and simple tool that can be implemented easily. This paper developed initially identified the success factors by reviewing case studies of both success and loss making projects. Thereafter the developers' top management's unstructured interview confirmed the factors they find important based on their experience in the Indian toll road projects. These identified critical success factors were grouped and presented as per percentage they represent in group and also amongst total factors analysed. Thus it gives a systematic approach based on experiences of concessionaires engaged in Indian Highway projects and includes all the criteria and can accommodate subjective judgments.

The methodology adopted in this paper involves interrelated success factors for comparative importance of each factor. However, it is limited in terms of quantitative measurement of these critical success factors.

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