

PILOT STUDY

5.1. INTRODUCTION

Pilot Study refers to so-called “feasibility studies which are small scale version(s), or trial run(s), done in preparation for the major study” (Polit et al., 2001). “Another objective of a pilot study is the pre-testing or 'trying out' of a particular research instrument”(Baker, 1994). A pilot study can give alert a researcher on where the main research project can fail and problems in following research protocols, or if a method or instrument chosen could be inappropriate or impractical. In the words of De Vaus (1993) "Do not take the risk. Pilot test first."

This chapter gives objectives/perspectives set for pilot study and the methodology followed for the pilot study. A pilot study was conducted as a mini versions of the full-scale study and also for pre-testing of the research instrument i.e. questionnaire designed for opinion survey. Initially six experts considered as judges were briefed on the objective of the study and were consulted on the approach used for data collection and research instrument. Primary data was collected through a structured questionnaire to a select sample of respondents considered experts in the field of public private partnerships in railways/metros. Performance indicators that define the success of a PPP metro or dependent variables distilled through literature survey were validated in the pilot study which was first of the four research objectives. Analysis of pilot study data also helped in testing the reliability and validity of the research instrument giving confidence for using it on a larger group of respondents for opinion survey. The data was also used to evaluate which CSFs are impacting which performance indicators.

5.2. PILOT STUDY OBJECTIVES:

The following objectives were set for pilot study.

- Reliability and Validity of Research Instrument
- Significant Performance indicators for PPP metro : Research Objective -1
- Verification of impact of CSFs (independent research variable) on Performance indicators (dependent research variable)

5.3. KEY RESEARCH PROPOSITIONS IN THE PILOT STUDY

The key research propositions examined in the pilot study are as follows:

- The research instrument or the questionnaire designed for the research will be able to provide answers to the research questions.
- Questions in the designed questionnaire will measure the same construct which it is supposed to measure.
- The research instrument has acceptable degree of consistency.
- All the twelve performance indicators identified through literature survey are significant indicators that define the success of a metro project in Indian context.
- Critical success factors are drivers for the success of a PPP metro project i.e. some of the CSFs are predictors of one or more of the performance indicators.

5.4. PILOT STUDY METHODOLOGY

Before starting the pilot study, it was decided to consult a few experts as judges on the overall approach, design and the methodology for the research. The following attributes were decided for choice of judges:

- Well conversant with PPP framework and having first hand experience of various forms of PPP contracts.
- Adequate knowledge of rail/metro systems and the nuances of rail/metro project development
- Senior level working professionals with minimum 15 years of experience
- Well acknowledged by Colleagues for their domain knowledge and clarity of thoughts

Two experts each were chosen from the following disciplines to form the panel of six judges:

- Consultants/academicians
- Private sector senior executives working in metro projects
- Government sector senior executives working in rail/metro projects

All the six experts were interviewed through semi-structured questionnaire in person. They were first given a brief on the proposed study outlining the purpose, objectives, design and the methodology of the study. They were asked to give opinion on the approach used for data collection and design of the research instrument. Questionnaire was re-visited based on the suggestions gathered.

It was decided to pre-test this questionnaire with 25-30 stakeholders of PPP metro system in the country. For collection of primary data a structured questionnaire was given to select sample of respondents who were considered experts in the field of public private partnerships in railways/metros. A Structured Survey (Direct Approach) was conducted by using formal lists of questions asked to all respondents in the pilot study group. Questionnaire was given in person in majority of cases and in a few cases they were sent over mail.

Face Validity and Content Validity approaches were used to establish validity of factors. The responses received from 25-30 respondents selected for pilot study were used to understand whether the factors derived from literature survey are valid. Therefore, validity of the factors was ascertained from secondary as well as primary data. Before starting the analysis the reliability of the scale was checked with the help of appropriate tool.

Pilot study data was analyzed using statistical methods to establish significance of performance indicators (Objective-1) and to study the impact of critical success factors on the performance indicators.

5.5. TOOLS FOR DATA COLLECTION (RESEARCH INSTRUMENT)

A structured questionnaire was used as research instrument. The design of research instrument and method of administration is described in this section.

5.5.1. PILOT STUDY INSTRUMENT DESIGN

A structured Questionnaire was adopted as a research instrument to conduct the pilot study. Structured- undisguised questionnaire was used in the survey as this tool is easy to administer, it is standardized and easy to tabulate and analyze.

The questionnaire consisted of three sections.

- a) In the first section respondents were asked to rate indicators of performance for success of a PPP in MRTS project using a five point Likert scale (1=least important and 5=Highly important).
- b) In the second section respondents were given eighteen parameters that constitute CSFs and were asked to rate these parameters on a five point Likert scale (5: Highly Important, 4: Moderately Important, 3: To some extent Important, 2: Low importance, 1: Least Important)
- c) The third section included questions meant to profile the respondents and nature of their experience.

Both sections a) and b) had a provision for respondents to add factors/parameters other than included in the questionnaire. Questionnaire and covering letter are given in Appendix (Exhibit-1)

5.5.2. DATA COLLECTION AND SAMPLING METHODOLOGY

For collection of primary data a structured questionnaire was given to select sample of respondents who were considered experts in the field of public private partnerships in railways/metros. A Structured Survey (Direct Approach) was conducted by using formal lists of questions asked to all respondents in the pilot study group. 31 responses were received. Questionnaire was given in person in majority of cases and in a few cases they were sent over mail.

5.5.3. Sampling Element and Sampling Unit

The sampling element for pilot study was defined as a person having attributes as defined in 4.4 above. Samples (respondents) were selected based on judgmental sampling where decision was taken after studying the profile of experts and consulting colleagues and other experts. Profile of 31 experts contacted for pilot study is shown in Table-5.1 and Table-5.2 gives the case processing summary for responses obtained from them. Pilot study data are given in Appendix (Exhibit-4 and Exhibit-5).

Table 5.1: Profile of Experts/Respondents for Pilot Study

Profile	Private Sector	Government Sector	Total
Metro Operators	6	7	13
Metro Operator cum Infrastructure Manager		4	4
Consultants	2	5	7
Metro rolling stock supplier	1		1
International Transport Experts	1	1	2
Policy Makers	4		4
Sub Total	14	17	31

Table 5.2: Case Processing Summary for Pilot Study

Reponses Obtained	31
Used	26
Excluded by software on account of missing values	5

5.6. VALIDITY AND RELIABILITY OF QUESTIONNAIRE

Pilot data analysis of the questionnaire began with the testing of validity and reliability of the measures.

“Validity of an assessment is the degree to which it measures what it is supposed to measure. Reliability is the extent to which a measurement gives results that are very consistent.” (Malhotra,2004)

Reliability is defined as the extent to which measurements of the particular test are repeatable. “The reliability analysis of a measuring instrument determines its ability to yield consistent measurement” (Flynn et al. 1994). In other words, “reliability relates to the extent to which an experiment, test or any measuring procedure yields the same results on repeated trials” (Carmines and Zeller, 1979). “Among the methods, internal consistency method works quite well in field studies because it requires only one administration. Internal consistency is an indicator of how well the different items measure the same concept” (Saraph et al., 1989). “Internal consistency can be estimated using a reliability coefficient known as Cronbach’s alpha” (Cronbach and Meehl 1955; Nunally and Bernstein, 1994).

“Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability” (Kothari, 2004)

Nunally and Bernstein (Nunnally & Bernstein, 1994) state “allowable alpha value can be somewhat lower for new scales, suggesting the use of minimum alpha value of 0.60; whereas an alpha value of 0.70 is often considered the criterion for internally consistent established scale”. The study has taken 0.6 as cut off value of Cronbach’s alpha.

Table 5.3 Reliability Statistics for 18 CSFs

Cronbach’s Alpha	No of Items
0.8450	26

Cronach's alpha is 0.8450 (Table-5.3) implying that the reliability of the scale is good.

Omitted item statistics

Omitted Item Statistics tell us how removing any one item from the analysis improves or worsens Cronbach's alpha. The purpose is to keep the good questions. The output shows that Cronbach's alpha is quite high >0.8 to <0.85 in all the cases. We infer that the questionnaire has high degree of internal consistency.

It was, therefore, decided to keep the questionnaire with 18 CSFs without any change.

5.7. DATA ANALYSIS AND RESULTS FOR OBJECTIVE-1

Objective-1: To identify key performance indicators which define the success of a public private partnership for rail based urban mass transit systems (PPP metro system) in India.

Table 5.4: Reliability Statistics for 12 Performance Indicators

Cronbach's Alpha	No of Items
0.6716	26

Cronach's alpha is 0.6716 (Table-5.4) implying that the reliability of the scale is acceptable.

Omitted item statistics

Omitted Item Statistics show that Cronbach's alpha value is close to 0.6 or higher indicative of acceptable degree of internal consistency.

Chi-square goodness of Fit Test

Theoretical Concept

“Chi-square is an important non-parametric test and as such no rigid assumptions are necessary in respect of the type of population. As a test of goodness of fit, test enables us to see how well does the assumed theoretical

distribution fit to the observed data? The chi-square test can give answer to this. “ (Kothari,2004)

Chi-Square Goodness-of-Fit Test for Observed Counts in Variable was carried out to test the hypothesis as defined below:

For performance indicator A_i (where $i=1, 2, \dots, 12$)

H_0 : There is no significant difference between ratings for performance indicator A_i given by respondents.

H_a : The rankings given by respondents for A_a are significantly different.

Chi Square test was done for all A_1, \dots, A_{12} individually for each parameter to test all twelve hypotheses.

Table 5.5: Chi Square for Performance Indicators

Performance Indicator	Total Count for rating 1 to 3	Total Count for rating 4 & 5	p value
A1	0	29	0.000
A2	0	31	0.000
A3	2	29	0.000
A4	6	25	0.000
A5	3	28	0.000
A6	6	25	0.000
A7	2	29	0.000
A8	4	27	0.000
A9	4	26	0.000
A10	4	26	0.000
A11	2	29	0.000
A12	1	30	0.000

Inferences

At 95% confidence p values are less than 0.05 for all parameters (Table 5.5). Therefore at 95% confidence level we reject null hypothesis that there is no significant difference in ratings by respondents. Hence we conclude that the ratings have significant difference and the performance indicator parameters are significant parameters

5.8. IMPACT OF CSFs ON PERFORMANCE INDICATORS

We have used pilot study data to evaluate which CSFs are impacting which performance indicators.

We have a number of independent variables (predictors) that might be correlated with other independent variables what is known as ‘multicollinearity’ (Kothari, 2004). To confirm multicollinearity, Pearson correlation table was developed with R and associated p values. All the variables are correlated with one or more predictors confirming the collinearity.

We also conducted test for equal variances to ascertain whether our data satisfy the assumption of homoscedasticity? “Levene's test is used to test if k samples have equal variances. Equal variances across samples are called homogeneity of variance or absence of heteroscedasticity.” (Levene 1960)

The Levene test is defined as:

$$H_0: \sigma_1^2 = \sigma_2^2 = \dots = \sigma_k^2$$

$$H_a: \sigma_i^2 \neq \sigma_j^2 \text{ for at least one pair (i,j).}$$

Leven’s test p values (Figure 10.1) show p values > 0.5. Hence we accept null hypothesis that variances are equal and conclude that data are homoscedastic (absence of heteroscedasticity).

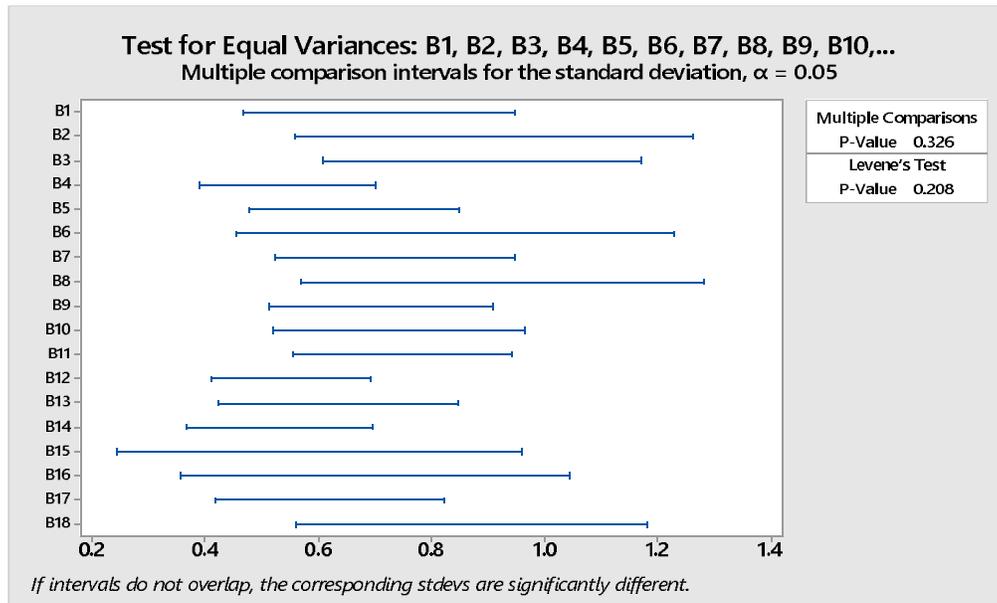


Figure 5.1 Test for Ascertain Homoscedasticity of data (Test for equality of variances)

Having established that data are homoscedastic and that there exists multicollinearity between variables and predictors, we have used stepwise regression method. Stepwise regression is useful in cases where we have many variables and the objective is to identify a useful subset of the independent variables or predictors. “Stepwise regression fits the regression model by adding/dropping co-variables one at a time based on a specified criterion. Types of stepwise regression methods generally used are listed below:

- Forward selection starts with most significant predictor in the model and adds variable for each step.
- Backward elimination starts with all predictors in the model and removes the least significant variable for each step.” (minitab)

We have selected forward selection method of stepwise regression with aim to include maximum number of factors to achieve highest R square. According to minitab, “Minitab identifies a useful subset of predictors based on how much variation the model explains (the maximum R-squared criterion). Minitab starts with no predictors in the model and adds the most significant variable for each step. Minitab stops when all variables not in the model have p-values that are greater than the specified Alpha-to-Enter value.”

Step wise regression was carried out to test the hypothesis as defined below:

For performance indicator A_i (where $i=1, 2, \dots, 12$)

H₀: None of the CSFs (B_1, B_2, \dots, B_{18}) are predictors of A_i

H_a: At least one CSF is a predictor of A_i .

There are twelve hypotheses to be tested. Since we are interested in a good number of independent variables (success criteria or predictors), we have selected $\alpha= 0.15$ for this analysis (default selection under Minitab)

Based on the above analysis the results are reported in Table-5.6 and interpretive matrix is given in Table-5.7

Table 5.6 : Impact of CSFs (Independent Variables) on Performance Indicators (Dependent Variables) : Step Wise Regression

$\alpha = 0.15$ to enter

$\alpha = 0.15$ to exit

P.I.	Impacting CSF	Null Hypothesis H_0	Alt. Hypothesis H_a	F Values	P Values	Inference
A1	B5	B1...B18 are not predictor of A1	B1...B18 are predictor of A1	2.330	0.142	Null Hypothesis is not accepted rejected for B5,B13 & B15
	B13			4.010	0.058	
	B15			9.330	0.006	
A2	B10	B1...B18 are not predictor of A2	B1...B18 are predictor of A2	2.560	0.123	Null Hypothesis is not accepted for B10 & B14
	B14			9.160	0.006	
A3	B4	B1...B18 are not predictor of A3	B1...B18 are predictor of A3	4.530	0.045	Null Hypothesis is not accepted for B4,B6 & B7
	B6			13.06	0.002	
	B7			2.630	0.119	
A4	B7	B1...B18 are not predictor of A4	B1...B18 are predictor of A4	2.420	0.133	Null Hypothesis is not accepted for B2 & B7
	B2			6.210	0.020	
A5	B1	B1...B18 are not predictor of A5	B1...B18 are predictor of A5	6.350	0.020	Null Hypothesis is not accepted for B1,B12, B14 & B17
	B12			5.230	0.033	
	B14			3.820	0.064	
	B17			8.790	0.011	
A6	B3	B1...B18 are not predictor of A6	B1...B18 are predictor of A6	6.380	0.020	Null Hypothesis is is not accepted for B3,B5 & B7
	B5			2.340	0.141	
	B7			10.480	0.004	
	B10			15.960	0.001	
A7	B2	B1...B18 are not predictor of A7	B1...B18 are predictor of A7	7.080	0.016	Null Hypothesis is not accepted for B2,B3,B10,B14,B15,B16 & B17
	B3			3.690	0.071	
	B10			6.420	0.021	
	B14			2.520	0.130	
	B15			10.190	0.005	
	B16			18.540	0.000	
	B17			4.660	0.045	
A8	B10	B1...B18 are not predictor of A8	B1...B18 are predictor of A8	3.360	0.080	Null Hypothesis is is not accepted for B10,B11 & B13
	B11			4.380	0.048	
	B13			6.550	0.018	

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P.I.	Impacting CSF	Null Hypothesis H ₀	Alt. Hypothesis H _a	F Values	P Values	Inference
A9	B1	B1...B18 are not predictor of A9	B1...B18 are predictor of A9	3.810	0.066	Null Hypothesis is not accepted for B1,B, B6,B7,B8 & B18
	B5			13.960	0.001	
	B6			4.870	0.040	
	B7			4.070	0.058	
	B8			2.780	0.112	
	B18			7.270	0.014	
A10	B1	B1...B18 are not predictor of A10	B1...B18 are predictor of A10	0.740	0.406	Null Hypothesis is not accepted for B5,B6,B7,B8, B15,B16 & B18
	B4			2.070	0.174	
	B5			7.360	0.018	
	B6			20.390	0.001	
	B7			8.600	0.012	
	B8			2.710	0.124	
	B9			2.270	0.156	
	B14			1.820	0.200	
	B15			3.800	0.073	
	B16			5.600	0.034	
	B18			5.930	0.030	
A11	B12	B1...B18 are not predictor of A11	B1...B18 are predictor of A11	6.740	0.016	Null Hypothesis is not accepted for B12
A12	B10	B1...B18 are not predictor of A12	B1...B18 are predictor of A12	8.930	0.007	Null Hypothesis is not accepted for B10 & B12
	B12			2.430	0.133	

Table 5.7 : Impact of CSFs on Performance Indicators : Outcome of Step Wise Regression Analysis

Performance Indicators		Impact Factors					
A1	Completeness and clarity of the contract	Capable & well organised public agency (B5)	Government support and Government Guarantee (B13)	Contract Agreement- Quality, Defined roles & risk framework (B15)			
A2	Appropriate risk sharing and risk allocation	Techno-economic feasibility of project (B10)	Risk analysis and proper risk allocation in a PPP project (B14)				
A3	Selection of concessionaire and finalisation of contract agreement	Financial market availability (B4)	Good governance (B6)	Consultation with stake holders (B7)			
A4	Financial closure within stipulated time	Consultation with stake holders (B7)	Stable macro-economic environment (B2)				
A5	Timely project delivery	Political/social environment/ support (B1)	Strong consortium (B12)	Risk analysis and proper risk allocation (B14)	Commitment, responsibility and defined role of partners (B17)		
A6	Project completion within budget	Institutional & Legal Framework (B3)	Capable & well organised public agency (B5)	Consultation with stake holders (B7)	Techno-economic feasibility of project (B10)		

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Performance Indicators		Impact Factors							
A7	Scope of the project as per contract	Stable macro-economic environment (B2)	Institutional & Legal Framework (B3)	Techno-economic feasibility of project (B10)	Risk analysis and proper risk allocation (B14)	Contract Agreement- Quality, Defined roles & risk framework (B15)	Monitoring by public agency (B16)	Commitment, responsibility and defined role of partners (B17)	
A8	Quality of construction	Techno-economic feasibility of project (B10)	Competitive and transparent procurement process (B11)	Government support and Government Guarantee (B13)					
A9	Ridership recovery in short and long term	Political/social environment/ support (B1)	Capable & well organised public agency (B5)	Good governance (B6)	Consultation with stake holders (B7)	Multi benefit objectives for all stake holders (B8)	Shared authority between public and private agency (B18)		
A10	Last mile connectivity	Capable & well organised public agency (B5)	Good governance (B6)	Consultation with stake holders (B7)	Multi benefit objectives for all stake holders (B8)	Contract Agreement- Quality, Defined roles & risk framework (B15)	Monitoring by public agency (B16)	Shared authority between public and private agency (B18)	
A11	Service quality in O&M	Strong consortium (B12)							
A12	Overall user satisfaction with the metro system	Techno-economic feasibility of project (B10)	Strong consortium (B12)						

5.8.1. INTERPRETATION OF STEP WISE REGRESSION ANALYSIS RESULTS

In Chapter-2 on literature survey we had learnt that to evaluate success of a PPP program we need to consider the viewpoint of the promoter of the scheme usually a public authority/agency. (e.g. DMRC in case of DAMEPL). We evaluate success against its objectives; to what extent the metro project has been able to achieve its stated objectives. It was also discussed that both evidence based assessment and stakeholder perceptions form part of such an evaluation. We had defined success for each stage in a PPP metro contract; ‘contract success’ which focuses on evaluating the preparation phase of the project, ‘implementation success’ which analyses the project through the implementation phase and ‘post implementation success’ which evaluates the project through post implementation phase.

We have twelve dependent variables, the success or performance indicators and eighteen independent variables, the critical success factors that contribute to the success of a PPP metro. Our objective here is to identify a useful subset of the independent variables or predictors for each response variable. With the help of Minitab we have started with no predictors in the model and continued to add the most significant variable (CSF) for each step. The analysis has resulted in highlighting as to which CSFs are impacting which performance indicators that define success of a PPP metro project at three different stages of project life cycle. Outcome of the step wise regression is interpreted for each of the performance indicator in ensuing paragraphs to ascertain as to what extent the outcome is in harmony with the knowledge and insight gained from literature survey.

CONTRACT SUCCESS.

Contract success focuses on evaluating the preparation phase of the project. It includes all pre-bid activities, structuring the PPP package, selection of consortium, signing of contract agreement and the private consortium achieving financial closure. Interpretation of how the four performance indicators defining contract success are influenced by the CSFs is given below:

Performance Indicator A1 : Completeness and clarity of the contract.

Complete clarity on the contract and unambiguous contract terms with respect to Scope, Time, Deliverable, Cost etc.

Impacting CSFs as per regression analysis

- Capable & well organized public agency (B5)
- Government support and Government Guarantee (B13)
- Contract Agreement- Quality, Defined roles & risk framework (B15)

A good quality and robust contract needs to be structured by the public agency. There should be complete clarity in the contract. Contract agreement should contain terms and Clauses which are explicit and unambiguous, define the scope of the contract and deliverables as well as the roles of both the partners. The contract agreement should also reflect a proper risk allocation framework.

Performance Indicator A2: Appropriate risk sharing and risk allocation

Acceptable and manageable risk allocation in the contract to private party

Impacting CSFs as per regression analysis

- Techno-economic feasibility of project (B10)
- Risk analysis and proper risk allocation in a PPP project (B14)

Outcome of a techno-economic feasibility will dictate whether the project should be undertaken at all. It will indicate the likely returns of investment and sensitivity analysis under different scenarios. It will also highlight the technical and managerial challenges in executing the project as also the potential risks in the project. There may be tendency on the part of public agency to transfer all the project related risks to the private sector. The contract should properly allocate risks into risks to be retained by the public agency, risks to be transferred to private operator and risks that will be shared by both. Private bidder will factor the risks to be assumed under the concession agreement into the price bid. In order to ensure wider participation in the tender and unduly high priced bids, risk allocation under the concession agreement needs to be acceptable and manageable to the private party.

Performance Indicator A3. Selection of concessionaire and finalization of contract agreement

Impacting CSFs as per regression analysis

- Financial market availability (B4)
- Good governance (B6)
- Consultation with stake holders (B7)

This is the most important criteria of contract success. A technically and financially competent consortium partner is selected and the contract agreement is signed without any delay-dallying on the part of the either party. Macro-economic-environment prevailing in the country and the states where the project is to be undertaken and the availability of public finance will definitely influence the participation of bidders. While the regression analysis has selected the latter, it has not highlighted the former CSF. Good governance is a crucial factor that contributes to the success of a PPP program at each stage and perception of good governance practices of the authority and the state government definitely promotes private participation in a PPP metro program. Selection of ‘consultation with stakeholders’ as a predictor of ‘selection of concessionaire and finalization of contract agreement’ does not appear logical except in the sense that potential bidders will definitely evaluate the likely resistance from the stakeholders to the project. A perception of potential derailment of the project from resistance and opposition from stakeholders specially the affected parties could keep the bidders away.

Performance Indicator A4. Financial closure within stipulated time *Concessionaire achieves financial closure within stipulated time.*

Impacting CSFs as per regression analysis

- Consultation with stake holders (B7)
- Stable macro-economic environment (B2)

Stable Macro-economic-environment and financial market availability will dictate whether the consortium is able to tie up the debt portion of the project investment within the stipulated time and achieves financial closure. While the regression analysis has selected the former, it has not highlighted the latter CSF. ‘Consultation with stakeholders’ as a predictor appear an odd choice

here except in the sense that potential lenders will also evaluate the likely resistance from the stakeholders to the metro and its potential impact on the completion of the project before lending money.

Implementation Success

Implementation success analyses the project through the implementation phase, how well the project is implemented and delivered as per contract specifications in terms of scope, time-lines, quality etc. Interpretation of how the four performance indicators defining implementation success are impacted by the CSFs is given below:

Performance Indicator A5.Timely project delivery *Concessionaire delivers the project within stipulated time i.e. there is no time over run*

Impacting CSFs as per regression analysis

- Political/social environment/ support (B1)
- Strong consortium (B12)
- Risk analysis and proper risk allocation (B14)
- Commitment, responsibility and defined role of partners (B17)

Delay in project delivery is a common problem in Indian metro projects and could prove to be a costly proposition for both private and public partners in PPP metro project. Because of the importance of timely delivery for all the stakeholders in a metro project, this is also a source of potential dispute and litigation. While, a competent consortium will have the requisite project skills to anticipate delays and plan/manage compensate for delays to keep overall project delivery as per contract schedule, political support and commitment and fulfilment of obligations by both the partners will help resolve issues that crop up during implementation. A metro project is a political and social challenge in implementation much more than any other project. Problem in land acquisition is a potential risk that can derail a metro project. While this risk is normally retained by the public authority, if the metro project entails acquisition of private land it could result in inordinate delay in project delivery as was recently observed in the case of DMRC Phase-III and Mumbai metro one.

Performance Indicator A6. Project completion within budget *The project is completed within budget i.e. there is no cost overrun.*

Impacting CSFs as per regression analysis

- Institutional & Legal Framework (B3)
- Capable & well organized public agency (B5)
- Techno-economic feasibility of project (B10)

While private bidder is expected to do its own due-diligence, Techno-economic feasibility of the project is the basic document on which are based projects costs and IIR estimates and price bids. How accurate are the estimates will determine whether project is completed within budget. Sometimes in India demand in change in scope and realignment of track from affected parties and other stakeholders is more of a rule rather than exception. Such issues get politicised easily and here is the role played by capable and well organised public agency in ensuring that there is no time and cost overruns due to late specification changes. Sometimes ground conditions, archaeological or environmental considerations, permission issues may result in higher costs.

Performance Indicator A7. Scope of the project as per contract *The delivered project is as per the scope defined in the contract*

Impacting CSFs as per regression analysis

- Stable macro-economic environment (B2)
- Institutional & Legal Framework (B3)
- Techno-economic feasibility of project (B10)
- Risk analysis and proper risk allocation (B14)
- Contract Agreement- Quality, Defined roles & risk framework (B15)
- Monitoring by public agency (B16)
- Commitment, responsibility and defined role of partners (B17)

Delivery of the project as per scope of the contract is an important performance indicator. Among the CSFs highlighted by the regression analysis, monitoring by public agency and commitment, responsibility and defined roles of partner are the most important CSFs impacting the indicator.

Performance Indicator A8. Quality of construction *Quality of construction of metro system and associated infrastructure*

Impacting CSFs

- Techno-economic feasibility of project (B10)
- Competitive and transparent procurement process (B11)
- Government support and Government Guarantee (B13)

The technical and managerial competence of the consortium and monitoring of contractual compliance by the public agency during implementation of the metro project are the most important CSFs which impact this performance indicator. However, step-wise regression has highlighted different CSFs which logically do not appear to impact the quality of construction except to some extent techno-economic feasibility which plays a role in fair estimation of project's technical requirements and costs so that the private operator does not cut corners to control costs within budget.

Post Implementation Success

After commissioning of the metro project, its operation, maintenance and service quality determine satisfaction of users and impacts ridership. For a sustainable performance over the concession agreement it is imperative that metro achieves ridership to make operations viable and the project earns fair return on capital. Discussion on which CSFs impact the four stages of this phase of a metro project is given below:

Performance Indicator A9. Ridership recovery in short and long term

Impacting CSFs

- Political/social environment/ support (B1)
- Capable & well organized public agency (B5)
- Good governance (B6)
- Consultation with stake holders (B7)
- Multi benefit objectives for all stake holders (B8)
- Shared authority between public and private agency (B18)

A metro project that has been structured with Stakeholder engagement and political and social support will be able to achieve ridership recovery soon after commissioning. Stabilisation of metro operations will require coordination from the public agency and political/social support. A metro project that provides multi-benefit objectives for all stakeholders will be able

to leverage all-round support and will achieve projected ridership in due course.

Performance Indicator A10. Last mile connectivity *Last mile connectivity available to passengers for travelling by metro.*

Impacting CSFs

- Capable & well organized public agency (B5)
- Good governance (B6)
- Consultation with stake holders (B7)
- Multi benefit objectives for all stake holders (B8)
- Contract Agreement- Quality, Defined roles & risk framework (B15)
- Monitoring by public agency (B16)
- Shared authority between public and private agency (B18)

Last mile connectivity is an important determinant of success of a metro line. A commuter's decision to choose metro for travel to desired destination is greatly influenced by the availability of feeder bus service and rickshaw-auto rickshaw from residence to the nearest metro station as also by the availability of parking own two wheeler/car and ease of access to metro station. Public agency contributes to this both during design of the project and post implementation by coordinating with civic and transport agencies. Stakeholder engagement and multi-benefit objectives will also influence performance on this indicator.

Performance Indicator A11. Service quality in O&M Service quality in Operation and maintenance of Metro and associated infrastructure

Impacting CSFs

- Strong consortium (B12)

Step-wise regression has rightly highlighted the most important contributor to this performance indicator. A reputed, technically competent and committed private consortium will ensure service quality in Operation and maintenance of metro as also of the associated infrastructure to ensure sustainable performance and profits.

Performance Indicator A12. Overall user satisfaction with the metro system

Impacting CSFs

- Techno-economic feasibility of project (B10)
- Strong consortium (B12)

A reputed, technically competent and committed private consortium will deliver excellent quality of infrastructure and ensure service quality in enhancing users experience not only with the journey but the total experience of using metro infrastructure. Project's feasibility has also been highlighted during analysis as a predictor for this indicator. Its role can be explained in initial design of the metro infrastructure and service which meets users' needs and expectations.

INFERENCE

Critical success factors impacting performance indicators highlighted by step-wise regression analysis by and large appear to be logical and in harmony with the knowledge and insight gained from literature survey. There are exceptions where additional and not so significant CSFs have been selected against a performance indicator and a few cases where CSF/CSs shown to impact performance indicator do not appear logical. These minor aberrations can be explained on account of multi-collinearity and/or indirect influence through other predictors.

5.9. INFERENCES FROM PILOT STUDY

- Analysis of pilot study data establishes the validity and reliability of the research instrument.
- Pilot analysis validates that all twelve performance indicators for defining success of a PPP metro identified through literature survey are indeed significant in Indian context.
- It highlights as to which CSFs are impacting which performance indicators that define success of a PPP metro project at three different stages of project life cycle.

- Factors impacting performance indicators appear to be logical (except one or two which can be explained on account of multi-collinearity and/or indirect influence through other predictors) and in harmony with the knowledge and insight gained from literature survey.

5.10. CONCLUDING REMARKS

Before conducting full scale research study the approach and methodology was tried out on a pilot scale by pre-testing the research instrument on carefully selected sample of respondents. Pilot study right from its objectives/perspectives to detailed methodology, data collection and analysis, results and findings have been documented in this chapter. Not only pilot study helped in understanding the variables and their relationships, it validated all the twelve performance indicators that were identified through extensive literature survey which was research objective-1. Having established reliability and validity of the research instrument, researcher had greater confidence in starting full scale study which is presented in next chapter.