



Identification of Major Factors Causing Cost Overrun In Indian Commercial Projects

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ABSTRACT

Ineffective Project management strategies are leading to time and cost related crisis in construction projects. The aim of this study is to examine and identify factors that cause cost overrun in commercial construction projects. In this study Relative Importance Index (RII) is used to determine importance of factors causing cost overrun. A questionnaire with 14 factors, identified from the review of published research papers on cost overruns, was floated to respondents involved in commercial projects dealing with cost overruns. The major factors causing cost overrun in commercial construction projects were identified and ranked by application of Relative Importance Index (RII) method and conclusions were drawn from the findings of the study. It is observed that the factors namely poor site management, ineffective scheduling, inexperience of contractor, lack of communication between parties and inappropriate contract duration are most significant factors for construction cost overrun in Indian commercial projects.

Keywords: *Crisis in construction; cost overrun; relative importance index; non-infrastructure projects; commercial projects.*

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INTRODUCTION

Cost overruns and project delays have long been prevalent issues in the construction and engineering industries. Construction projects have a tendency to go over budget because of the risk and unknowns they contain. A nation's economy depends heavily on the construction industry, which is also regarded as the largest source of job possibilities. Construction is seen as an asset for a country's financial development because it also affects the GDP growth rate and employment in the nation. Hence the prediction of cost overrun, cause, its pattern, its frequency, impact on the progress is needed to be explored to have a successful project completion.

Cost is noted as one of the most important parameters and key driving force of project success among other considerations [1]. Previous research on cost performance for government-funded construction projects, such as rail and road projects, is accessible. Non-infrastructure and profit-oriented projects, such as residential and commercial constructions, have not been evaluated on cost performance because the market is competitive and costing information is kept confidential. The challenge in the non-infrastructure construction project is sourcing of funds, cash-flow management, and completion of project on time.

Many complications in construction projects permit more likely cost overrun factors to develop, increasing risks and uncertainties. A deeper comprehension of the pervasiveness of accuracy and risk in decision-making is necessary to determine the project's true costs and maintain control over cost overruns. Enhanced pre-planning potentially is a viable solution to the issue of determining the influence of essential success elements on building projects [2].

Despite numerous researches on cost overruns it is not always easy to quantify cost escalation. The cost performances of the project highly rely on cost overrun, which is referred as an increase in the budget, cost or any growth in the cost. Cost escalation was defined as the difference between the actual cost and the estimated cost [3]. In other words, the difference between expected cost and the actual cost is how much was budgeted or forecasted for the project at the time it was decided to commence. The percentage of cost overrun is significantly higher for larger construction projects, which highlights the relationship between project size and cost overruns.

The purpose of this research is to identify important overrun variables that are prevalent in the commercial construction sector and to manage them so that they have the least possible detrimental impact on the project's cost and timeline. The variation between the overall cost incurred to complete a project and the cost estimate at the time of an agreement or contract is referred to as cost overrun[4]. Identification and evaluation of the cost overrun factors are crucial

to determining critical elements that have the greatest influence on overruns. Monitoring and control are important for successful outcomes since new overrun factors can appear at any point throughout the construction process.

RESEARCH METHODOLOGY

Data collection was divided into two stages: 1. Identifying the delay factors and 2. Calculating the likelihood of each delay factor occurring. To identify the factors that affect construction cost, a literature review was conducted. The review uncovered 7 researches with studies in the scope of identifying factors affecting cost overrun in construction sector (Table 1). As mentioned in table 1 factor with frequency equal to or greater than 5 were identified and surveyed. In this research, 14 delay factors in construction projects were identified and categorised into seven main categories: 1) client related, 2) contractor defects, 3) project manager related and 4) consultant related, 5) labour related, 6) contract relationship related, and 7) external factors.

A questionnaire was developed in order to determine the likelihood of each identified delay factor occurring during phase two of the data collection procedure. Quantitative surveys are designed to obtain information from individuals about themselves or about a social unit to which they belong or with which they are involved [5]. Factors tested and used in earlier studies were used here to ensure clear and comprehensible factor definitions. To measure the impact of each factor on cost, an ordinal five point Likert scale was applied. Data collection was based on stakeholders employed in the various commercial projects. Respondents included architects, engineers, project managers, clients and contractors.

Equation 1 depicts one of the most extensively used methods for demonstrating the relative importance [6]. The relative importance index (RII) was used to rank factors with an index range of 0.0–1.0. Eq. (1) was used to calculate RII.

$$RII = \frac{\sum W}{A * N} \quad (1)$$

W=total sum of each factor (1 = strongly disagree, 2= disagree, 3= neutral, 4= agree and 5 = strongly agree); A= highest weight in this study (5 = strongly agree); and N = total number of respondents at each variable.

TABLE 1.0 : LIST OF FACTORS CAUSING COST OVERRUN FROM REVIEW OF LITERATURE

	Aibinu and Odeyinka	Al Kharashi and Skitmore	Faridi and El Sayegh	Fugar and Adwoa	Hemanta Doloi	Odeh and Battaineh	Y Lo and Fung
Client related factors							
Slow decision making by clients	✓	✓	✓	✓	✓	✓	✓
Delay in payments by clients	✓	✓	✓	✓	✓	✓	
Contractor related factors							
Inexperience of contractor	✓		✓		✓	✓	✓
Project manager related factors							
Ineffective scheduling	✓	✓	✓	✓	✓	✓	
Poor site management	✓	✓	✓	✓	✓	✓	✓
Consultant related factors							
Delay in approving changes	✓	✓	✓		✓	✓	✓
Delay in inspection	✓	✓		✓	✓	✓	
Labour related factors							
Shortage of material requirement	✓	✓	✓	✓		✓	
Shortage of skilled labour	✓	✓	✓	✓	✓	✓	✓
Shortage of tools	✓	✓	✓	✓	✓	✓	
Contract relationship							

Lack of communication between parties	✓	✓	✓	✓	✓	✓	✓
Inappropriate contract duration	✓		✓	✓	✓	✓	✓
External							
Unforeseen geological conditions							
Unforeseen weather conditions							

Questionnaire Categories

The overrun variables that were identified were turned into a questionnaire. There are four sections to it; the first one concerns the profile of the respondents, and the following three portions use a Likert scale to evaluate the enumerated cost overrun factors. The influence of these variables was assessed using a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = highly agree).

Client related complications include delay in decision making process and delay in payments. Inexperience of contractor leads to contractor related complications. Complications in project management are human-related factors that can inhibit a stable organization and process. Problems identified include ineffective scheduling and poor site management. Consultant related complications are caused by delays in inspection and approving change. Labour related factors incline to shortage of material, skilled labour and tools. Complications in contractual relationship are circumstances or inconsistencies in documentation shared by partners. It includes lack of communication or miscommunication between partners and in appropriate contractual duration. External complications are conditions or circumstances that are beyond the control of the project organization, such as unpredictable soil conditions and unpredictable weather conditions.

RESULTS AND ANALYSIS

Client related complications include delay in decision making process and delay in payments. Inexperience of contractor leads to contractor related complications. Complications in project management are human-related factors that can inhibit a stable organization and process. Problems identified include ineffective scheduling and poor site management. Consultant related complications are caused by delays in inspection and approving change. Labour related factors incline to shortage of material, skilled labour and tools. Complications in contractual relationship are circumstances or inconsistencies in documentation shared by partners. It includes lack of communication or miscommunication between partners and in appropriate contractual duration. External complications are conditions or circumstances that are beyond the control of the project organization, such as unpredictable soil conditions and unpredictable weather conditions.

TABLE 2.0: Respondant Profile

Category	Range	No of participants
Education	Architect/Designer	31
	Civil Engineer	6
	Project Manager	17
	Others	3
Profession	Student	25
	Client	1
	Contractor	5
	Project Manager	13
	Others	13
Level of experience	0-1 years	21
	1-5 years	26
	5+ years	10

Ranking of overrun factors

The RII for various categories was calculated using Eq. (1) and taking only the factors present in that category into account. The results showed that the RII for the client-related category was 0.804, the RII for the consultant-related category was 0.781, the RII for the contractor-related category was 0.853, the RII for the project manager-related category was 0.875, the RII for the contractor relationship category was 0.846, the RII for the labor-related category was 0.807, and the RII for external factors category was 0.805.

TABLE 3.0: Relative Importance Index of The Factors Causing Cost Overrun

COST FACTORS	OVERRUN	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)	Total (W)	RII
Client related factors								0.804
Slow decision making by clients		95	108	21	6	1	231	0.811
Delay in payments by clients		90	96	33	8	0	227	0.796
Contractor related factors								0.853
Inexperience of contractor		125	96	18	4	0	243	0.853
Project manager related factors								0.875
Ineffective scheduling		115	120	9	2	0	246	0.863
Poor site management		150	88	15	0	0	253	0.888
Consultant related factors								0.781
Delay in approving changes		125	64	45	2	0	236	0.828
Delay in inspection		55	104	39	8	3	209	0.733
Labour related factors								0.807
Shortage of material requirement		105	108	27	0	0	240	0.842
Shortage of skilled labour		120	92	21	4	1	238	0.835
Shortage of tools		50	100	54	8	0	212	0.744

Contract relationship								0.846
Lack of communication between parties		115	100	24	2	0	241	0.846
Inappropriate contract duration		120	100	18	2	1	241	0.846
External								0.805
Unforeseen conditions	geological	75	112	39	0	1	227	0.796
Unforeseen conditions	weather	105	80	45	2	0	232	0.814

Relative Importance Index (RII) of each identified overrun factor was calculated and tabulated (as shown in Table 3.0). The overrun factors were sorted in descending order (as shown in Table 4.0), starting with the factor that had the highest RII value and ending with the factor that had the lowest RII value. For the fourteen overrun factors, the value of RII varied between 0.888 and 0.733. Top five overrun factors identified in Indian commercial projects are poor site management, ineffective scheduling, contractor inexperience, a lack of communication between parties, and incorrect contract durations.

The identified factors must be handled before they may have a negative impact on the construction project. From this study it is identified that out of the seven enlisted categories project management related complications were deemed to be the most critical, with an RII score of 0.875. The top two ranked factors under this category are Poor site management ranked at 1, with an RII value of 0.888, and ineffective scheduling ranked at 2, with an RII score of 0.863. It is required for the project manager to be effective at scheduling and managing of work at site. Poor site management causes delays in resolving challenges on the job site and has an adverse impact on work progress. To effectively manage project expenses, a site must be managed effectively. Inadequate planning at the beginning of a project results in delays at various phases. Only a well-planned project can be implemented successfully. Project managers need to deal with all project issues objectively and ensure that all communication is project issue based.

It is followed by inexperience under contractor related complications, with an RII score of 0.856. Many authors have identified a lack of expertise as one of the critical factors affecting the construction sector's performance. Inadequate contractor expertise, according to Odeh and Battaineh, was a significant factor, and this could be attributed to the contract awarding process, which typically favors the lowest bidder for projects. An inexperienced contractor will be unable to manage the projects, which could have severe consequences. The total project cost performance may be impacted by the contractor's inefficiency in terms of relevant project experience and the cost estimation procedure. The likelihood of attaining positive project cost performance may be increased by the contractors having an in-depth understanding of the project design and on-site constructability challenges upfront.

Lack of communication between parties, and incorrect contract durations under contract relationship related complications are ranked at 4 and 5 with an RII value of 0.846, and 0.846 respectively. Since there are numerous parties engaged in a project (the customer, the consultant, the contractor, and the subcontractors), communication between them is critical for its success. Communication and personal rapport between all project participants can lead to a decrease in unnecessary paperwork, which will significantly cut down on project time and expenses. This could be mitigated to some extent by employing more contemporary management methods to assess the array of intangible complexities associated.

Table 4.0: Categorising Of Top 5 Critical Cost Overrun Factors

COST OVERRUN FACTORS	RII	OVER ALL RANK
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Project manager related factors

Poor site management	0.888	1
Ineffective scheduling	0.863	2

Contractor related factors

Inexperience of contractor	0.853	3
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Contract relationship

Lack of communication between parties	0.846	4
Inappropriate contract duration	0.846	5

CONCLUSION

The stated purpose of this research is to identify the causes of cost overrun that produce the greatest effects and the extent to which these effects can be ameliorated in the Indian commercial construction industry. The problems were categorized into seven groups in order to find their root causes. It was discovered that problems pertaining to consultants, contractors, and coordination were highly ranked in terms of frequency of occurrence. Knowledge of the cost overrun factors that impact project cost and an awareness of their potential significance is the first step to mitigation of prospective consequences. Internal cost escalation factors can be addressed with actions, while external cost escalation factors can be managed and predicted with communication, education, and engagement of external sources. To mitigate factors that occur during the planning and design phases of project development, proactive measures to limit cost impacts may be taken. Risk analysis methodologies, for example, can be used to identify uncertainties associated with external factors such as potentially detrimental site conditions. These areas of uncertainty can be translated into risk-related costs and contingencies.

This study makes the following recommendations to ensure that project objectives are met successfully.

1. For the creation, submission, and approval of drawings, contractors and consultants must reach an agreement on a schedule that must be strictly adhered to.
2. Identified overrun factors should be controlled as soon as feasible to mitigate their negative consequences and improve project outcomes.
3. As a project can experience overrun at any phase from beginning to end, to improve comprehension and control, these overrun variables should be further separated into stages. These stages are feasibility, procurement, construction, operation, and transfer.
4. In a building project, new overrun factors are always arising. Overrun monitoring is an adaptive process that involves adding newly discovered factors to the management plan on a regular basis. Increased controls over cost and time overruns is ensured by doing this.

The overrun factors for various commercial projects may vary slightly. The study's further breadth allows for project-specific identification and prioritisation of important overrun variables. Project region should also be taken into account because variables can periodically vary depending on project location. Therefore, as engineers, project managers, construction professionals, risk managers, etc. dealing with cost overruns in construction projects, this research is necessary.

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