

STUDY ON FACTORS INFLUENCING ON TIME OVERRUN OF CONSTRUCTION PROJECTS IN INDIA

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ABSTRACT: In India, construction is the second largest economic activity after agriculture. The construction industry accounts for nearly 65 per cent of the total investment in infrastructure, and is expected to be the biggest beneficiary of the surge in infrastructure investment over the next five years. The construction sector, largely a project-based sector, thrives on delivering unique projects that fulfil the various needs of the society. The delivery of the project is often measured in terms of three parameters, schedule, cost, and quality achievement. Of these three parameters, schedule and cost are the widely used performance measures, that receive most attention from the construction industry stakeholders (Iyer and Jha 2006). Earlier studies in the construction field show that, while the upper limit of time extension for contracts in the United Kingdom is approximately 25 percent, 70 percent of the construction contracts in India exceed that limit, often by large margins. Moreover, 40 percent of the contracts in India experience cost overruns of about 25 percent to 50 percent. This figure is very alarming and disheartening (Patil and Jugati 2011).

INTRODUCTION

The analysis of the central sector projects by the Ministry of Statistics and Programme Implementation (MOSPI) shows that, many of the projects suffer from inadequacies in project formulation and implementation, resulting in large time and cost overruns, affecting the very viability of the projects, and acting as a drag on the economy. The analysis has also identified several factors responsible for time and cost overruns, some within the control of the enterprises and some beyond their control.

Thus, the primary objectives of this research are to analyze the resource constraint factors influencing the time overrun of construction projects, to find the relationship between these factors by statistical methods and to predict the impact of these identified factors on time overrun of construction projects, using a time overrun model for the Indian construction sector.

TIME OVERRUN IN CONSTRUCTION PROJECTS

Delay could be defined as either beyond the completion date specified in a contract or beyond the date that the parties agreed upon for the delivery of a project (Assaf & Al-Hejji 2006). Construction delay has been considered as a major risk as well as a source of disputes (Ogunlana 1996; Aibinu & Jagboro 2002);

therefore, a knowledge and understanding of the sources of delay is important in order to identify and effectively manage the various risks of time overrun, dispute, arbitration, total abandonment, and litigation involved in achieving the project objectives (Aibinu & Jagboro 2002)

Bassioni & El-Razek (2008) stated that time overrun in construction project is considered one of the most common problems causing a multitude of negative effects on the project and its participating parties. Therefore, it is essential to identify the actual causes of time overrun in order to minimize and avoid the time overrun and their corresponding expenses.

Arditi & Pattanakitchamrorn (2006) stated that the time overrun in construction can cause a number of changes in a project such as late completion, lost productivity, acceleration, increased costs, and contract termination.

In general, situations causing delay are complex in nature. A time overrun in one activity may not result in the same amount of project delay as in another.

A time overrun caused by a party may or may not affect the project completion date and may or may not cause damage to another party. A time overrun may occur concurrently with other time overrun and all of them may cause an impact on the project completion date. Completing projects on time is an indicator of efficiency, but the construction process involves many

unpredictable factors, which result from many sources.

These sources include the performance of the project parties, resource availability, financial availability, environmental conditions and contractual relations. The time overrun definitely create negative impacts on the project performance. Therefore, time overrun is an important problem in the construction industry. The challenge is to measure the net impact of the construction time overrun accurately. Investigation into this problem area is needed, in order to manage time overrun situations in a better way, and to mitigate their consequences. Not many studies have been carried out to study the influence of resource constraint factors causing time overrun in the Indian construction industry. Assessing the frequency of time overrun, the extent to which time overrun may occur, and the factors influencing time overrun can provide insights for better planning of a construction project, to control these factors and improve the project performance.

INFLUENCES OF TIME OVERRUN

Time overrun can lead to many negative effects such as cost overrun, disputes, arbitration, litigation and total abandonment (Aibinu & Jagboro 2002, Sambasivan & Soon 2007). These effects will retard the entire development of a construction industry. So, it is necessary to take steps to overcome time overrun in a construction project. The effects time overrun is shown in Figure 1.1.

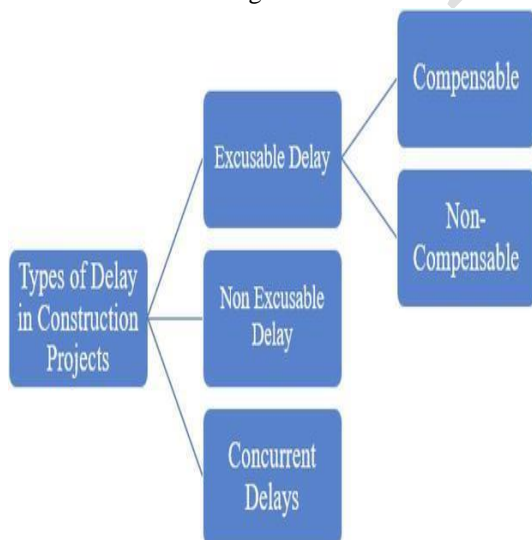


Figure 1.1 Effects time overrun

RESOURCE CONSTRAINTS CAUSING TIME OVERRUN

One of the major issues in the Indian construction industry is resource constraints. These resource constraint problems occur in most of the construction projects. The major resources in construction projects are man power, materials, equipment and finance. Shortage of labour, non-availability of equipment, non-availability of materials in the market, price fluctuation, and cash inflow and outflow, are the factors which cause the time overrun of a construction project during the construction stage. So, it is essential to conduct research to identify and evaluate the influence of the resource constraint factors, causing a time overrun and its importance. These findings can help the project managers, during the resource scheduling and resource allocation process in the construction projects. The construction industry is complex in its nature, because it contains a large number of parties, such as clients, contractors, consultants, stakeholders, shareholders, regulators and others. Construction projects involve a series of activities to accomplish their goals within a specific time. Each activity requires resources, such as manpower, materials, equipment and finance. Resource plays an important role in construction projects. Resource allocation in the schedule is necessary, to determine whether or not there is sufficient supply of resources on hand to perform the work as planned.

The Effects of time overrun, Cost overrun Disputes, Litigations, Arbitration, Total Abandonment resources are handled, in some projects effectively and efficiently, while some others are mismanaged. Hence, the projects sustain time and cost overruns. Construction delay is the main problem in the construction industry. It impairs the feasibility of owners, with respect to and retards the development of the construction industry. Contractors are prone to see most of the delays as the responsibility of the owner, while the owners usually want to put the blame on the contractor or third parties.

In order to improve this situation, the identification, quantification and analysis of time overrun become essential. Only a few studies so far have been carried out on the causes of time overrun, considering the Indian scenario. Consequently, it is necessary to analyse time overrun in construction projects, to avoid or

minimize their adverse impacts on a project, like cost overrun, disputes, litigation etc. This thesis is very important as it helps to identify and evaluate the factors influencing time overrun, which in turn, affect the performance of construction projects. Suitable recommendations are given to reduce the time overrun of the construction projects to improve their performance. The findings of this research will enhance the performance of the construction industry, to schedule the project activities properly, and to complete the projects in time by avoiding delays in the construction activities.

OBJECTIVES OF THIS STUDY

The aim of this research is to analyse the resource constraint factors influencing the time overrun of construction projects. The aim of this research is divided into the following objectives:

- To identify the factors causing time overrun of construction projects.
- To determine the owners, consultants and contractors perceptions of the relative importance of the factors causing time overrun of construction projects.
- To identify the most significant factors causing time overrun of construction projects.
- To evaluate the degree of agreement/disagreement between owners, contractors and consultants regarding the ranking of the factors causing time overrun of construction projects.
- To formulate the recommendations to reduce the time overrun of construction projects so as to improve the performance of the construction projects.

SCOPE OF THIS STUDY

- The scope of this study is limited to construction projects in India.
- The literature review and expert opinions contribute to identifying the causes of the time overrun.

LITERATURE SURVEY

One of the most important problems in the construction industry is Time overrun. Time

overrun occur in every construction project and the magnitude of these delays varies considerably from project to project. So it is essential to define the actual causes of Time overrun in order to minimize and avoid delays in any construction project. Chin and Hamid (2015) concluded that work sequencing, record keeping, scheduling of activities, price, contingency, time limits were used as constraints for time performance of construction works. Cost reports, work schedules, location of site, schedule for labour and equipments, meeting in construction site and sequence of works were important factors for cost overrun of construction projects.

Srdic and Selih (2015) mentioned that delays were the important feature of construction projects. Therefore, more attention must be given to the process of construction which was taking place before actual construction namely accurate and adequate design and proper documents. Time management and delay in construction of buildings was given due consideration as baseline for making guidelines for time management for all the parties in construction.

Subramani et al (2014) stated ineffective management of contract, slow in making important decision, inefficient management of schedule, increase in prices of both materials and equipment, error in design, wrong work, rework, alteration, time gap between design and tendering and faulty estimation of cost methods had created cost overrun in construction.

Shanmugapriya and Subramanian (2013) revealed that cost overruns and time overruns are main problem in all most all construction projects. Modification in contract, unavailability of materials, market price, requirement of higher degree of quality were causes for time overrun, while, material specification changes, higher cost of transportation and increasing price of materials were causes for cost overrun in construction projects in India.

George kutty and Mathew (2012) stated that the actual problem in construction industry was non completion of projects within time and estimated cost and it led to failure of projects. If construction materials were not properly maintained, the total cost of project would be increased. The computer based cost control and

material management practices should be used to finish projects within period and cost.

Memon et al (2012) showed that more than 90 per cent of construction works were time overrun and nearly 10 per cent of construction work was completed within time period. The time overrun in the range of five to 10 per cent was accepted by owners and 11 per cent of respondents viewed that their building construction was completed within budget and 89 per cent of them viewed that their building constructions were facing the problem of cost overrun. Problems in documentation, error in design, inefficient financial management and administration problems caused cost overrun in construction of buildings.

Rahman et al (2013) mentioned that design changes, uncertainty and risk, poor fixation of time for project, poor performance of subcontractors, difficulties in works, conflicting interest among parties, documentation errors, various understanding of contractors, errors in project works, price increase, improper payment for works, lack of knowledge and experience of managers, availability of skilled workforce, climate conditions, unavailability of materials and soft wares, changes in exchange rates, inefficient control and regulation, poor monitoring, corruption, fraudulent practices and changes in policies of government were the factors causing cost overrun in large sized construction projects.

El-Razek et al (2008) mentioned that financing during works by contractors, delayed payments by owners, changes in design by owner, incomplete payments during works and inefficient use of construction professionals for management of materials and resources were determinants for delay in construction of buildings.

Sambasivan and Soon (2007) concluded that inappropriate planning by contractor, inefficient management of location, lack of experience, insufficient finance from clients, improper payment for finished work, issues of subcontractors, shortage in materials, supply of labour, availability of equipments and tools, failure of equipments, lack of effective communication and mistakes in the construction were main factors for delay in construction

works.

Tumi et al (2009) concluded that inefficient planning, ineffective communication, shortage of materials, errors in design and issues in financing were the main causes for delays in construction projects.

Ali and Kamaruzzaman (2010) found that quality, time, cost and scope of the construction project were very important parameters for management of construction project. They also found that inappropriate cost estimation, errors in design, improper financing, poor management of site and poor supervision were contributing factors for cost overrun of construction projects and cost overrun was the major issue that affected the effectiveness of construction projects.

Fugar and Agyakwah-Baah (2010) revealed that delay in honouring commitments, poor estimation of project costs, complexity, problems in getting assistance from banks, inadequate supervision, poor time estimation, shortage in materials, lack of professional management, price fluctuations, increase in cost of materials and wages and improper management of construction site were important factors that affected time schedule and completion of work in time in building construction.

Wong and Vimonsatit (2011) mentioned that skill shortages, financial problems, labour shortage, impractical time deadlines, unexpected situations, lack of coordination between workers, ineffective communication, underestimation of cost and time schedules, lack of quickness in making decision and mistakes in designs were significant causes for delays in construction works.

Time overrun in construction projects has been a research topic for decades. Research conducted in this area is broadly divided into two streams - one stream relating to factors that cause project time overrun and the other stream relating to time overrun analysis. Some location specific work related to time overrun analysis reported by El-Razek et al (2008); Sambasivan & Soon (2007); Iyer & Jha (2005) highlighted the complexity on this issue across many countries. The first stream of literature focusing upon time

overrun factors which is more relevant to this research is reviewed below.

Arditi et al (2006) reported the causes of delay on Turkish public sector construction projects. This study divided the identified factors into those that are influenced by national economic policies and those that can be controlled by the public agencies and contractors. They identified the factors that shortages of some resources; deficiencies and delays in design work, frequent change orders and considerable extra work are the most important sources of delay. While some of the causes are dependent on national economic policies, others may be overcome by measures to be taken by public agencies and contractors. Salunkhe and Patil (2014) concluded that delay in construction of building was one of the repeating phenomena in the construction sector and it had undesirable impact on the completion of projects in terms of quality, cost and time. The time and cost performance of construction projects were very important for both contractors and workers. Both internal and external factors affected cost overrun and time delay in construction of large buildings. Okoye et al (2015) found that management of time, quality, cost and safety were the main management problems in construction industry. Technical and management competencies were needed to tackle these problems. Thus it was recommended that adequate and correct management practices should be adopted to manage construction projects efficiently.

Time overrun in construction projects has been a significant challenge for project managers, contractors, and stakeholders worldwide. This literature review aims to provide a comprehensive overview of the causes, impacts, and mitigation strategies associated with time overrun in construction projects.

According to Smith et al. (2018), inadequate planning and scheduling are among the primary causes of time overrun in construction projects. Unclear Project Scope Jones and Smith (2016) highlighted that unclear project scope leads to frequent changes and modifications during construction, resulting in delays. Inadequate Resource Allocation Sharma and Jain (2019) identified that insufficient allocation of resources, including labour, materials, and equipment, often leads to delays in project completion.

Ogunsemi et al. (2017) indicated that time overrun is closely associated with cost overruns, leading to financial losses for project stakeholders. According to Chan and Kumaraswamy (2018), delays in project completion negatively impact the reputation of contractors and may deter future clients. Legal Disputes Smith and Johnson (2020) highlighted that time overrun often results in legal disputes between project parties, leading to additional costs and project disruptions.

Gupta and Bhatt (2019) emphasized the importance of proactive risk management strategies to identify and mitigate potential delays before they occur.

Lee et al. (2021) suggested that effective collaboration among project stakeholders, including owners, contractors, and subcontractors, can help prevent time overrun by facilitating timely decision-making. Use of Advanced Technologies.

Wang and Zhang (2018) proposed the adoption of advanced technologies such as Building Information Modelling (BIM) and construction management software to improve project planning, coordination, and monitoring.

SUMMARY FROM LITERATURE STUDY

From the elaborative review of literature, the research gaps are identified. With these backdrop, the present research is made to study effectiveness of time management practices in construction of buildings in Tamil Nadu. Through the in depth literature review, the research gaps are identified and included in the present study. The framework for research, development of questionnaire, research and sampling designs, and analysis of data from the different prior research studies are understood precisely and pertinent research methodology is selected for the present study. Time overrun remains a significant challenge in construction projects, with far-reaching impacts on cost, schedule, and stakeholder relationships. Addressing the root causes of time overrun and implementing effective mitigation strategies are essential for improving project performance and ensuring successful project delivery.

RESEARCH METHODOLOGY

This chapter addresses the methodology adopted for capturing the data, needed to achieve the aim

and objectives of the research. It is organised in sections covering: the formulation of the objectives of the study, identification of the resource constraint factors and questionnaire design, data collection using the questionnaire survey, data analysis by the statistical analysis. A questionnaire was developed considering the factors influencing the time overrun of construction projects in India. Before distributing the questionnaire, a pilot study was conducted. The basic purpose of the pilot study was to verify the completeness of the questionnaire in capturing the factors relevant for India. The questionnaire was distributed among construction professionals, and the data was collected. The data collected was analysed, using SPSS tool.

Research Methodology for Studying Time Overrun in Construction Projects

Research Design:

- The research design should be chosen to effectively investigate the phenomenon of time overrun in construction projects. Common designs include quantitative, qualitative, or mixed-method approaches.
- A mixed-method approach could be beneficial to capture both quantitative data on the extent of time overrun and qualitative insights into the underlying causes and impacts.

Data Collection:

Quantitative Data:

- Surveys: Conduct surveys among project managers, contractors, and stakeholders to collect data on the frequency and extent of time overrun in construction projects.
- Project Documentation: Analyze project schedules, progress reports, and change orders to quantify the actual versus planned project duration.
- Interviews: Conduct semi-structured interviews with key stakeholders, including project managers, contractors, and clients, to gather in-depth insights into the factors contributing to time overrun.

- Focus Groups: Organize focus group discussions to explore common challenges and potential solutions related to time overrun in construction projects.

Sampling:

- Purposeful Sampling: Select participants who have direct experience with construction projects and are knowledgeable about project management processes.
- Sampling Criteria: Consider factors such as project size, complexity, geographic location, and type of construction (e.g., residential, commercial, infrastructure) to ensure diversity in the sample.

Data Analysis: a. Quantitative Analysis:

- Descriptive Statistics: Calculate mean, median, and standard deviation of project durations to assess the prevalence and severity of time overrun.
- Inferential Statistics: Use statistical tests (e.g., t-tests, ANOVA) to identify significant differences in time overrun across different project characteristics or factors.

CONCLUSIONS AND WORK TO BE DONE IN PHASE-2

Following a review of relevant literature and an on-site inspection, we have arrived at the following conclusions.

- The factors impacting each aspect of time overrun have informed the formulation of the questions.
- The 5 separate groups are identified by reviewing prior studies and doing physical inspections at the designated locations.
- A number of private building companies in the Coimbatore area have been selected to collect data. In order to determine the most important parameters, the collected data will be examined with SPSS program.

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