

# Analyzing Cost and Schedule Over Runs in Construction Project: A Review

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**ABSTRACT** – Cost and schedule overruns in construction projects have been persistent challenges faced by stakeholders in the industry, leading to financial losses, delays, and disputes. This paper provides a comprehensive analysis of the factors contributing to cost and schedule overruns, their impacts on project performance, and effective strategies for mitigation. Drawing upon a synthesis of literature and case studies, the paper examines the root causes of overruns, including inadequate project planning, scope changes, unforeseen risks, and poor management practices. Furthermore, the paper explores the interplay between cost and schedule overruns and highlights the cascading effects on project stakeholders, project delivery, and overall project success. Finally, the paper presents a range of proactive measures and best practices for mitigating cost and schedule overruns, emphasizing the importance of robust risk management, stakeholder collaboration, and effective project controls.

**Keywords:** cost and schedule overruns, time delay management, cost estimation.

## 1. INTRODUCTION

Cost and schedule overruns represent significant challenges faced by construction projects worldwide, exerting detrimental effects on project stakeholders, budgets, and timelines. While cost and schedule estimates are meticulously crafted during the project planning phase, deviations from these estimates often occur due to a myriad of factors, ranging from unforeseen site conditions to misaligned stakeholder expectations. These overruns not only strain project budgets but also lead to delays in project completion, impacting the overall project success.

The construction industry's susceptibility to cost and schedule overruns can be attributed to various intrinsic and extrinsic factors, including the complexity of projects, dynamic regulatory environments, and the inherently uncertain nature of construction processes. Inadequate risk assessment, scope creep, ineffective project management practices, and disputes among project participants further exacerbate the likelihood of overruns. Recognizing the profound impacts of cost and schedule overruns on project outcomes, stakeholders are increasingly seeking proactive measures to mitigate these risks and enhance project predictability. This paper aims

to delve into the root causes of cost and schedule overruns, examine their impacts on project performance, and elucidate effective strategies for mitigation. By synthesizing existing literature, empirical evidence, and industry best practices, this paper seeks to provide insights and guidance for stakeholders grappling with the complexities of managing construction projects amidst uncertainties and risks.

Construction projects are intricate endeavors that require meticulous planning, coordination, and execution to achieve success. However, despite the best efforts of project stakeholders, cost and schedule overruns remain pervasive challenges plaguing the construction industry. This review seeks to delve into the multifaceted nature of cost and schedule overrun, examining their causes, impacts, and potential mitigation strategies.

## 1.1 CAUSES OF COST AND SCHEDULE OVERRUN:

### 1.1.1 Unravelling the Complexity

Cost and schedule overruns in construction projects can stem from a myriad of interrelated factors, spanning from inadequate planning and unrealistic budgeting to unforeseen site conditions and scope changes. Poor project management practices, including ineffective communication, inadequate risk management, and scope creep, often exacerbate the likelihood of cost and schedule deviations.

Moreover, external factors such as regulatory changes, fluctuating market conditions, and adverse weather events can further compound the challenges faced by construction projects, leading to delays and cost escalations. Inadequate resource allocation, procurement delays, and labor shortages also contribute to project inefficiencies, ultimately impacting project timelines and budgets.

### 1.1.2 Impacts of Cost and Schedule Overrun:

The ramifications of cost and schedule overrun extend far beyond the immediate confines of a construction project, permeating through various stakeholders and sectors. From financial implications such as budget overages, increased borrowing costs, and potential legal disputes to reputational damage and strained relationships between project participants, the impacts of overrun can be profound and long-lasting.

Furthermore, schedule delays can disrupt downstream activities, leading to cascading effects on other projects, stakeholders, and the broader economy. In the context of

public infrastructure projects, delays in project completion can impede socio-economic development, hinder service delivery, and erode public trust in governmental institutions.

### 1.1.3 Mitigation Strategies:

*Charting a Path towards Project Success*

Addressing cost and schedule overrun requires a proactive and holistic approach, encompassing robust project planning, effective risk management, and transparent communication among project stakeholders. Early identification and mitigation of potential risks, coupled with contingency planning, can help buffer against unforeseen events and minimize the impact of deviations from the baseline schedule and budget.

Furthermore, the adoption of advanced project management techniques, such as Building Information Modeling (BIM), Lean construction principles, and agile methodologies, can streamline processes, enhance collaboration, and drive efficiencies throughout the project lifecycle. Embracing technology-driven solutions, including project management software, real-time monitoring tools, and predictive analytics, can also empower project teams to make informed decisions and proactively address issues before they escalate.

According to a report by the Ministry of Statistics and Programme Implementation, the average cost overrun in construction projects in India was 37.5% between 2008 and 2012. Another study by the Indian Institute of Technology (IIT) Delhi found that the average cost overrun in infrastructure projects in India was around 20% to 25%. However, according to a report by the Ministry of Statistics and Programme Implementation, the average time overrun in projects monitored by them during the period of April 2020 to December 2020 was 34.33%.

Therefore, it is very important to understand cost overrun and time overrun and factors affecting them. Cost overrun occurs when the final cost or expenditure of the project exceeds the original estimation cost. And time overrun occur when project gets delayed beyond its estimated completion time. Some of the major factors for cost overrun are Poor Estimate, Design changes, Scope creep, Delays, Inflation, Poor project management, Unforeseen site conditions, Material and labour cost fluctuations and Contractual disputes. And for time overrun are Project Planning, Design Changes, Weather Conditions, Workforce Productivity, Unforeseen Conditions, Regulatory and Permitting Issues, Coordination and Communication. It is important to have control on the factors that impact cost over runs and time over run which ultimately reduces the performance of the overall project.

### 1.2 COST MANAGEMENT

**Budgeting:** Cost management begins with establishing a budget for the project. This involves estimating the costs of resources, labour, materials, and any other expenses

associated with completing the project.

**Cost Control:** Once the project is underway, it's essential to monitor and control costs to ensure they stay within the budget. This involves tracking expenses, comparing them to the budget, and identifying any variances.

**Cost Estimation:** Accurate cost estimation is vital for effective cost management. Project managers use various techniques such as bottom-up estimating, analogous estimating, and parametric estimating to forecast costs.

**Resource Allocation:** Efficient allocation of resources helps in optimizing costs. Project managers need to ensure that resources are utilized effectively and efficiently throughout the project lifecycle.

**Cost Tracking:** Regularly tracking costs allows project managers to identify any deviations from the budget early on. This enables them to take corrective action promptly, such as renegotiating contracts, adjusting resource allocation, or revising project plans.

**Risk Management:** Identifying and mitigating risks that could impact project costs is an integral part of cost management. By proactively addressing risks, project managers can minimize their financial impact on the project.

### 1.3 TIME DELAY MANAGEMENT

**Scheduling:** Time delay management starts with creating a detailed project schedule that outlines the sequence of activities, their durations, and their dependencies. This schedule serves as a roadmap for the project and helps in identifying potential delays.

**Critical Path Analysis:** Identifying the critical path—the longest sequence of dependent activities—helps project managers pinpoint activities that could cause delays to the overall project timeline.

**Monitoring Progress:** Regularly monitoring progress against the project schedule allows project managers to identify any delays as soon as they occur. This involves tracking the completion of tasks, comparing actual progress to the planned schedule, and identifying any deviations.

**Identifying Causes of Delays:** Once a delay is detected, it's essential to identify its root causes. Delays can be caused by various factors such as resource constraints, scope changes, unexpected issues, or external dependencies.

**Extenuation Strategies:** Developing mitigation strategies to address delays is crucial for minimizing their impact on the project timeline. This could involve reallocating resources, resequencing activities, renegotiating deadlines, or implementing contingency plans.

The construction sector is most severely affected by cost and schedule overruns. Schedule and cost overruns are inevitable in construction projects, and their severity can vary significantly from one project to another. To effectively mitigate and eradicate these excessive expenses and delays

in any given project, it is crucial to accurately pinpoint the precise factors that contribute to the overrun of both time and cost.

## 2. REVIEW OF LITERATURE

Hatkar K B and Hedao N A (2016) conducted a comprehensive analysis of the literature and administered a questionnaire survey. They successfully identified the causes and effects of delays in building projects. Issues include local political intervention, client's delay in progress payments, improper project planning and scheduling, inadequate cash allocation, and escalation of material prices. The Relative Importance Index (RII) was utilized to evaluate and prioritize the criteria. In addition, he employed the Spearman's Rank Correlation Coefficient test to ascertain the existence of a substantial correlation between the viewpoints of contractors and consultants.

U. Sindhu et al. (2016) examined multiple factors using various methodologies, including the Frequency index method, Severity index method, Importance Index method, and Relative Index method. They collected questionnaires based on prior studies to gather data for their analysis. He determined that inadequate climate planning and scheduling, insufficient site management, fluctuations in material costs, inadequate monitoring and control, improper resource management in construction projects, and poor financial control on site can result in cost overruns.

Serdar Durdyev, Syuhaida Ismail, and Nooh Abu Bakar (2012) conducted a descriptive survey in Turkey, a representative developing nation, to identify and analyze the factors contributing to project overruns. They utilized the Relative Importance Index approach to analyze the collected data. The examination of variables reveals that the primary factors influencing cost overruns in the construction of residential projects in Turkey are inaccurate project cost estimation, inadequate planning, exorbitant cost of necessary resources, shortage of skilled workforce, elevated prices of construction materials, and high land prices.

In a study conducted by Aishwarya Prashant Patil in 2017, the factors contributing to time overrun were identified based on the perspectives of the three main parties involved in the contract: the contractor, consultant, and client. These factors include delays in payment, adverse weather conditions, inaccurate planning and scheduling by contractors, inexperienced technical staff, excessive workload for contractors, labor shortages, delays in approving additional work, and poor site management and supervision by contractors. Ineffective time management was also found to be a contributing factor.

In their study, Abdul Rahman, et al. (2013) conducted a questionnaire survey to identify the key factors contributing to cost overruns in Malaysia. They analyzed the statistical

data using the Relative Importance Index (RII) method, which allowed for a hierarchical assessment of these factors. The results revealed that the three most significant factors leading to cost overruns were cash flow and financial difficulties faced by contractors, fluctuations in material prices, and inadequate site management and supervision.

Ghaleb et al. (2013) conducted a study to determine the factors that influence cost overruns in the public construction industry in Jordan. Upon conducting a thorough examination of the literature, he categorized many elements that contribute to cost overruns in construction projects as follows: escalation in material costs due to inflation, Rise in fuel expenses, Alterations in design, Insufficient quantity estimation, Limited expertise in project location, Limited expertise in project kind, Limited expertise in local rules, Unforeseeable weather circumstances, and Equipment scarcity. After conducting a PCFA analysis, it was determined that the main factors contributing to cost overruns in the Jordanian public construction sector, according to the perceptions of 30 engineers, were design changes, lack of experience with the project type, and location.

Nabil et al., 2015 After conducting a thorough analysis of several documents and reports from various projects, it has been determined that the most crucial aspects contributing to project success are weather circumstances, terrain conditions, variation of order, and availability of manpower.

In their 2013 study, Shanmugapriya and Subramanian investigated the significant factors that contribute to delays and increased expenses in Indian projects. They conducted a questionnaire survey, which was developed based on a thorough review of existing literature, and distributed it to Contractors, Consultants, and Owners within the Indian construction industry. The data from the questionnaire was analyzed using the Relative Important Index method. It was determined that the primary causes of time overruns are the material market rate, contract adjustment, and high quality work requirements. Similarly, the main contributing factors to cost overruns are high shipping costs, changes in material specifications, and the escalation of materials prices.

Mulla and. Waghmare, (2015 ) found that projects are negatively affected by the client's tardiness in supplying certain materials that need to be delivered to the contractor as specified in the contract, or by delays in paying the contractor's Running Account bills. These issues, combined with other challenges such as delays in obtaining clearances, exacerbate the difficulty of completing the project within the designated timeframe and budget. The construction business encounters a significant obstacle in the form of inadequate resource productivity, particularly in relation to equipment.

Anant Narayan and Durwas Kothawade (2016) The main variables that contribute to cost overruns in construction projects include economic instability, political condition, material price volatility, rivals' levels, and currency exchange.

Vaibhav and Ghaitidak (2016) shown that a major contributing reason to cost overruns is the "delay in the initial delivery of the site". The contractor's delay in supplying materials and equipment, coupled with significant price inflation, has resulted in a cost overrun. "Insufficient productivity of workers", "Late payment of invoices", "Neglect of equipment upkeep", "Inadequate planning for material procurement", "Work stoppages, demonstrations, and other external factors were the primary cause of project delays."

Aftab Hameed et al. (2022) conducted a survey using questionnaires and interviews to gather expert opinions from experienced workers in order to identify the main factors that lead to cost overruns in Malaysia. The responses were evaluated using the average index method, which revealed a total of 59 common factors contributing to cost overruns. The results indicate that the most common and significant factors perceived by experts are: bad designs, design delays, unrealistic contract duration and requirements imposed, lack of experience, late delivery of materials and equipment, relationship between management and labor, delay in preparation and approval of drawings, inadequate planning and scheduling, poor site management and supervision, and mistakes during construction.

Sunil A. et al. (2020) have identified the primary factors that contribute to project delays and cost overruns in three distinct regions of the country: the eastern region (West Bengal and Orissa), the southern region (Karnataka and Tamilnadu), and the western region (Maharashtra and Gujarat). The data from previous studies conducted in each region was chosen for analysis. The most influential factors identified were: insufficient planning and scheduling, ineffective monitoring and feedback processes, subpar construction methods, underestimation of project costs, payment delays, inadequate site management, and insufficient contractor experience.

Key contributors to delays in building projects include modifications to the design, suboptimal efficiency of workers, insufficient planning, and lack of resources.

According to Ahmed et al (2003), construction projects' delay can be categorized into two types of factors: internal causes and external causes. The causes were internally attributed to four parties: the owner/client, designers, contractors, and consultants. External considerations encompass entities beyond the four parties mentioned, including the government, materials suppliers, and the weather.

Alwi and Hampson (2003). In the case of Malaysia, the reasons identified as creating delays in construction projects were inadequate site management, construction mistakes, delayed delivery of materials to the site, and insufficient coordination of materials. In addition, the owner's financial situation is also a significant contributing

aspect.

In their study, Chan et al. (1996) identified that according to consultants, the main reasons of time and expense overruns on construction sites were inadequate supervision, delayed on-site education, and a lack of expertise and experience on the part of the consultants.

#### **Understanding the Causes of Cost and Schedule Overruns:**

1. *Inaccurate Initial Estimates:* One of the primary causes of cost and schedule overruns is the inadequacy of initial project estimates. Factors such as incomplete project scope definition, inaccurate resource allocation, and unforeseen risks can contribute to underestimation.
2. *Scope Changes and Design Modifications:* Changes in project scope and design alterations during the construction phase can disrupt workflows, escalate costs, and extend project timelines. Poorly managed scope changes often lead to rework, delays, and additional expenses.
3. *Poor Risk Management:* Inadequate identification, assessment, and mitigation of project risks can result in costly disruptions and schedule delays. Unforeseen events such as adverse weather conditions, supply chain disruptions, and regulatory changes can significantly impact project timelines and budgets.
4. *Contractual Disputes and Legal Issues:* Disputes arising from contractual conflicts, claims, and litigation can escalate project costs and prolong completion timelines. Poorly drafted contracts, ambiguous clauses, and lack of dispute resolution mechanisms exacerbate the risk of cost and schedule overruns.
5. *Inefficient Project Management Practices:* Ineffective project management processes, such as inadequate communication, resource mismanagement, and lack of project controls, can impede progress, compromise quality, and lead to cost and schedule deviations.

#### **Strategies for Mitigating Cost and Schedule Overruns:**

1. *Comprehensive Project Planning:* Thorough project planning, including accurate cost estimation, detailed scheduling, and risk identification, is crucial for mitigating cost and schedule overruns. Adopting standardized project management methodologies such as the Project Management Institute's (PMI) Project Management Body of Knowledge (PMBOK) framework facilitates robust planning processes.
2. *Stakeholder Collaboration and Communication:* Effective communication and collaboration among project stakeholders, including owners, contractors, subcontractors, and suppliers, are essential for aligning expectations, resolving conflicts, and proactively addressing issues that may lead to cost and schedule overruns.
3. *Risk Management:* Implementing robust risk management processes, including risk identification, assessment, mitigation, and contingency planning, helps

anticipate and mitigate potential threats to project cost and schedule objectives. Regular risk reviews and updates ensure proactive risk management throughout the project lifecycle.

4. *Change Management: Establishing structured change management procedures, including rigorous change control processes and documentation requirements, helps manage scope changes and design modifications effectively. Clear change approval protocols and impact assessment mechanisms mitigate the risk of scope creep and associated cost and schedule overruns.*
5. *Enhanced Project Controls: Implementing robust project controls, including performance monitoring, progress tracking, and variance analysis, enables early detection of cost and schedule deviations. Utilizing advanced project management software and analytics tools enhances data visibility and facilitates informed decision-making to address issues promptly.*
6. *Contract Management: Developing clear, well-defined contracts with explicit scope, deliverables, milestones, and dispute resolution mechanisms minimizes the risk of contractual disputes and legal issues. Engaging legal experts to review and negotiate contracts helps mitigate potential conflicts and protect project interests.*

### 3. CONCLUSION

The management of cost and schedule overruns in construction projects is a critical aspect of project delivery, influencing not only the financial performance but also the overall success and reputation of construction firms. Throughout this review article, we have explored the multifaceted nature of cost and schedule overruns, examining their root causes, impacts, and potential mitigation strategies.

It is evident from the literature that cost and schedule overruns are pervasive challenges faced by the construction industry, stemming from a myriad of factors including inadequate project planning, scope changes, design errors, resource constraints, and unforeseen site conditions. These overruns not only result in financial losses but also lead to delays, disputes, and compromised project quality, undermining client satisfaction and eroding stakeholder trust.

In response to these challenges, construction firms must adopt a proactive and integrated approach to cost and schedule management, beginning from the project inception phase through to completion and post-project evaluation. Key to this approach is the establishment of robust project controls, encompassing effective planning, monitoring, and control mechanisms to track progress, identify deviations, and implement timely corrective actions.

Moreover, fostering a culture of collaboration and communication among project stakeholders, including

owners, contractors, designers, and subcontractors, is essential for mitigating the risk of cost and schedule overruns. By promoting transparency, trust, and accountability, construction teams can navigate challenges more effectively, anticipate issues, and work collectively towards achieving project objectives.

Furthermore, the adoption of advanced technologies and project management methodologies, such as Building Information Modeling (BIM), Earned Value Management (EVM), and Integrated Project Delivery (IPD), holds promise for enhancing cost and schedule performance in construction projects. These tools facilitate real-time data analysis, improve decision-making, and enhance collaboration among project participants, thereby reducing the likelihood of overruns.

In conclusion, while cost and schedule overruns remain persistent challenges in construction projects, they are not insurmountable. By embracing a holistic approach to project management, integrating best practices, leveraging technology, and fostering collaboration, construction firms can mitigate the risk of overruns, enhance project predictability, and deliver successful outcomes that meet client expectations. Ultimately, the pursuit of excellence in cost and schedule management is essential for sustaining competitiveness, driving innovation, and advancing the construction industry towards a more efficient and resilient future.

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