

# CAREER EPISODE 1

## Study on Factors influencing Construction Project Scheduling

### INTRODUCTION

#### CE 1.1

I was a Civil Engineering student at [REDACTED]. My final year project, titled "A Study on Factors Influencing Construction Project Scheduling," was undertaken from [REDACTED], and it had spanned a duration of 8 months. This project was a necessary step to complete my Bachelor's degree in Civil Engineering.

### BACKGROUND

#### CE 1.2.1

The project was selected as part of my final year requirement to address a significant challenge in the construction industry and then the complexity of construction projects has been steadily increasing, making effective scheduling a critical aspect of project management and so I had the primary goal of this study which was to analyze and identify the key factors that influence construction project scheduling, with a focus on mitigating delays and cost overruns.

#### CE 1.2.2

To understand these challenges better, I conducted a comprehensive literature review to examine various international construction projects and identify the dominant factors influencing construction scheduling and then I developed a questionnaire to gather insights from different stakeholders, including project owners, consultants, and contractors and the responses were analyzed using the RII method to rank the factors and provide a clear understanding of the primary causes of delays and cost overruns and this project was to enhance the overall efficiency of construction projects and also by identifying and addressing the key factors influencing construction scheduling, the study aimed to provide recommendations that could help industry professionals manage projects more effectively, ensuring timely completion and adherence to budgetary constraints.



## **PERSONAL ENGINEERING ACTIVITY**

### **CE 1.3.1**

I started with an extensive literature review to understand the key factors affecting construction scheduling, reviewing around 40 relevant articles published over the past 25 years, and this research helped me identify 32 time-overrun factors and 32 cost-overrun factors, forming the foundation for my study. My primary goal was to pinpoint the most significant factors affecting construction project scheduling, so I concentrated on understanding the causes of delays and cost overruns, which are critical issues in the construction industry, and then the insights gained from the literature review were essential for designing the subsequent phases of my project.

### **CE 1.3.2**

I then designed a detailed questionnaire to gather insights from various stakeholders in the construction industry, including project owners, consultants, and contractors, and the questionnaire aimed to capture the respondents' perspectives on the factors causing delays and cost. I used a Likert scale to quantify the significance of each factor, so to ensure the questionnaire's relevance and comprehensiveness, I conducted a pilot study before distributing it widely, and the pilot study helped me refine the questions and confirm that they adequately captured the factors relevant to the [REDACTED] construction context. Following the pilot, I distributed the questionnaire via Google Forms, targeting about 100 industry professionals, and I received 68 responses, representing various sectors such as buildings, roads/bridges, railways, and irrigation. During the questionnaire development phase, I consulted with my project supervisor, [REDACTED], to gain insights into the best practices for designing effective survey instruments, and his guidance was invaluable in refining the questionnaire and ensuring that it was comprehensive and easy to understand.

### **CE 1.3.3**

With the responses collected, I proceeded to analyze the data using the RII method and this statistical technique enabled me to rank the factors based on their significance as perceived by the respondents so I meticulously organized the data and performed Spearman's Rank Correlation to explore the relationships between different overrun factors.

Table 1: The Respondents' Demographics

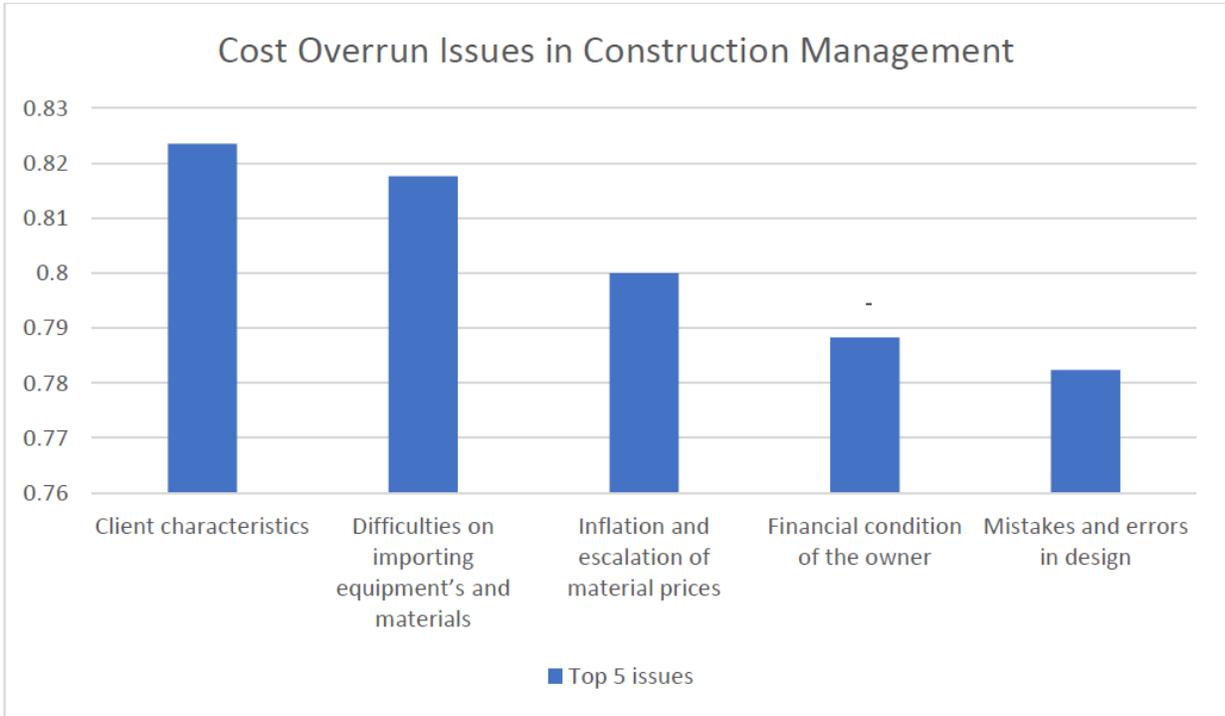
Highest Academic Qualification		
Respondents' qualification	Number	Percent
Diploma	3	4.41
Graduation	21	30.88
Post-graduation	37	54.41
Ph.D.	7	10.29
Total	68	100.00
Types of Organisations		
Sectors wise respondents' involvement	Number	Percent
Government	14	20.58
Private	54	79.42
Total	68	100.00
Major type of work involved		
Industry wise respondents' involvement	Number	Percent
Building industry	33	48.52
Roads / Bridges industry	11	16.17
Railways industry	4	5.88
Irrigation industry	8	11.76
Others industry	12	17.64
Total	68	100.00

Table 2: Details of RII of cost overrun issues

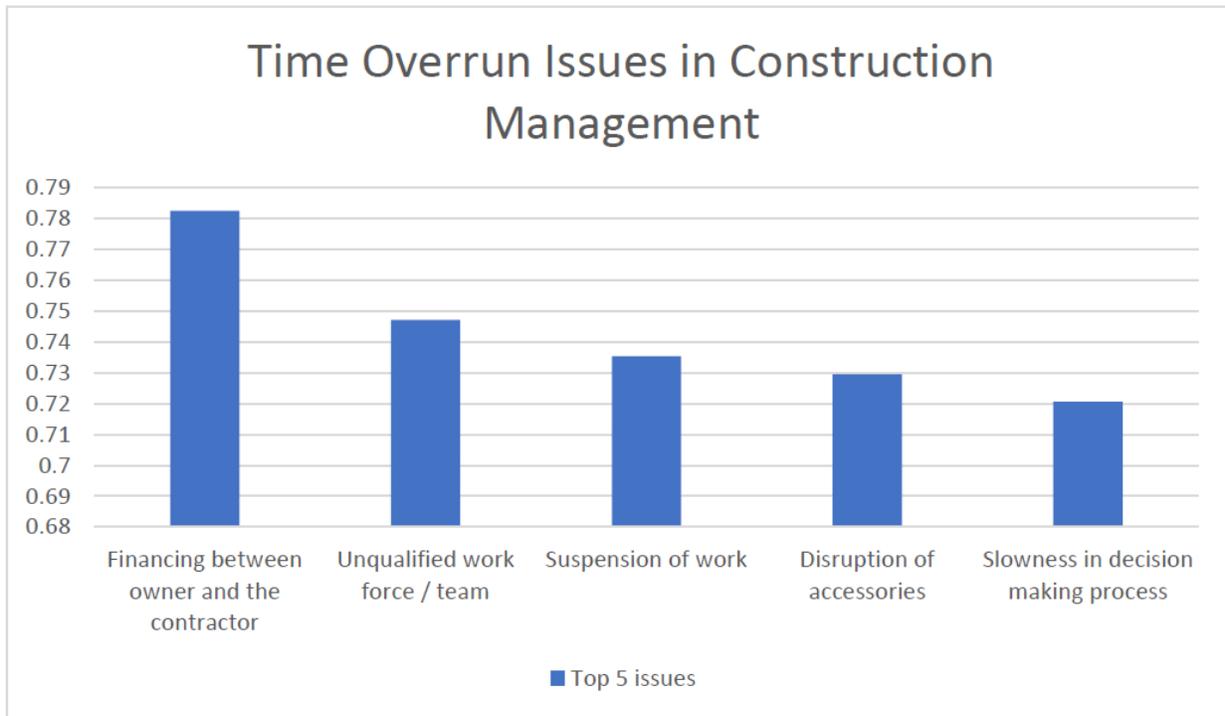
S. no	Cost Overrun issues	Relative Importance					Total	ΣW	RII	Rank
		1	2	3	4	5				
1	Inflation and escalation of material prices	0	5	13	27	23	68	272	0.8	3
2	Change in project by owner	4	12	23	18	11	68	224	0.658824	27
3	Frequent breakdown of the construction plant and equipment	4	5	11	29	19	68	258	0.758824	8
4	Poor communication and coordination with other parties	1	8	23	27	9	68	239	0.702941	18
5	Inappropriate construction method	3	12	24	18	11	68	226	0.664706	24
6	High maintenance cost of machinery	5	6	19	18	20	68	246	0.723529	13

⋮

I also used descriptive statistics to summarize the data, providing a clear picture of the respondents' demographics and their experiences with construction project delays and cost overruns, and this analysis helped in identifying patterns and trends that were critical for the subsequent phases of the project.



*Figure 2: Top 5 issues for Cost Overrun in Construction Management*



*Figure 3: Top 5 issues for Time Overrun in Construction Management*



Diagram was instrumental in identifying the root causes of scheduling issues and proposing targeted solutions. I created several Ishikawa Diagrams, each focusing on different aspects of construction project scheduling, and for instance, one diagram highlighted the impact of material selection on project delays, while another focused on labor-related issues, so this detailed categorization allowed me to pinpoint specific areas that required attention and improvement. So, to develop the Ishikawa Diagrams, I had conducted brainstorming sessions with my team members, and these sessions provided diverse perspectives and helped in identifying a comprehensive list of factors affecting construction scheduling, and then the diagrams were reviewed and refined to ensure accuracy and completeness.

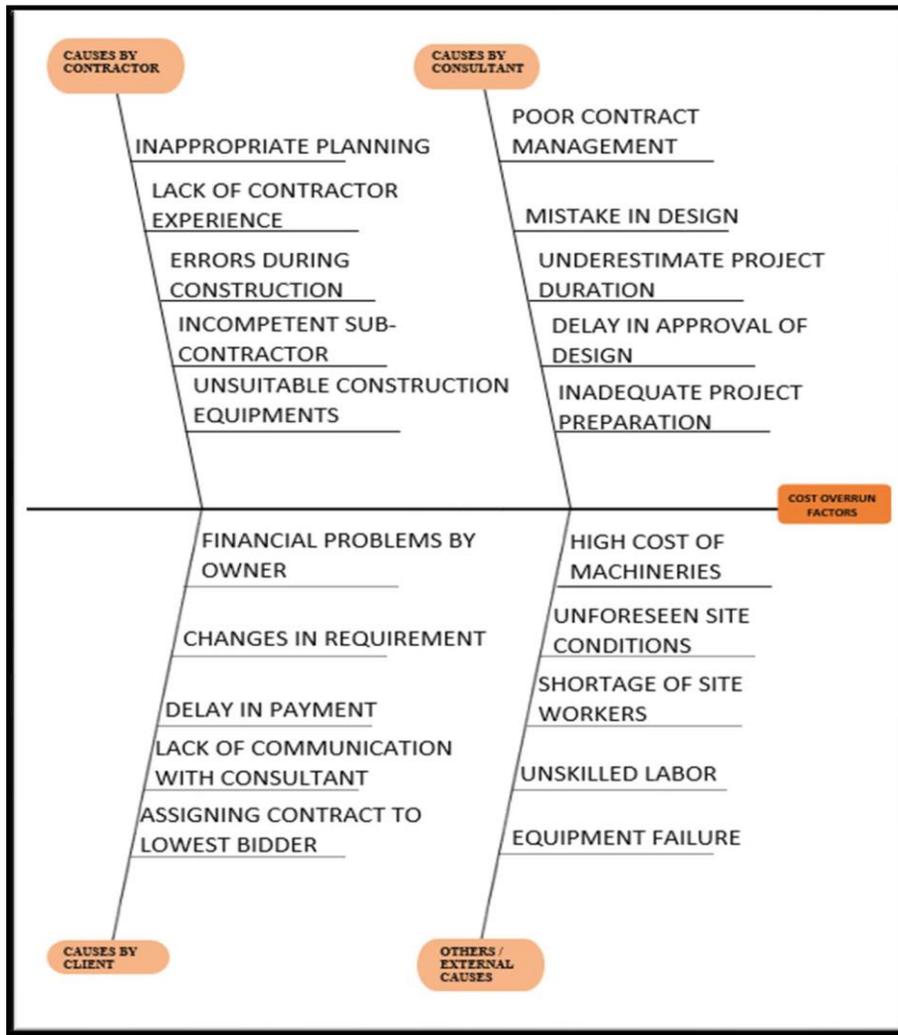


Figure 5: Time Overrun Factors

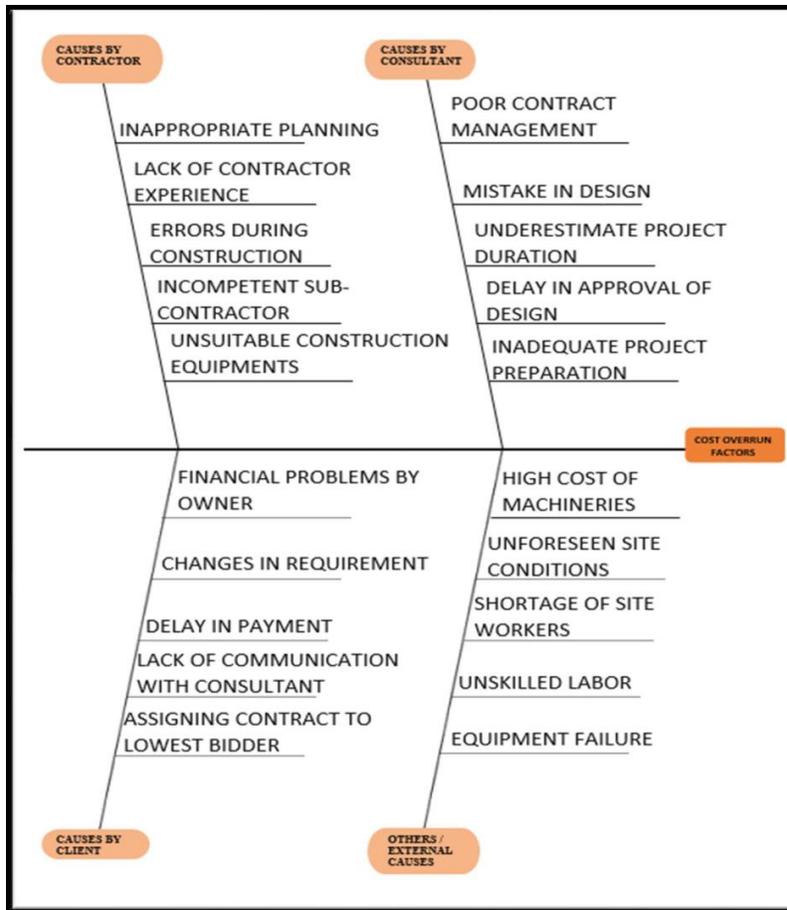


Figure 6: Cost Overrun Factors

### CE 1.3.6

To address the identified issues, I explored various scheduling techniques, including the CPM, PERT, and GERT, and I compared these techniques to determine their effectiveness in managing the scheduling constraints faced by the construction industry. Using CPM, I created a detailed project schedule that outlined all activities, their durations, and dependencies, which helped in identifying the critical path and focusing efforts on tasks that had the most significant impact on the project timeline and in addition to CPM, I used PERT to manage uncertainty in project scheduling, which provided a more realistic schedule and helped in anticipating potential delays, so GERT was also utilized to model complex project networks with multiple execution paths, which was particularly useful for projects with high variability in activity durations and dependencies and by simulating different scenarios, I was able to identify the most efficient project execution strategies.

### CE 1.3.7

Recognizing the importance of technology in modern project management, I incorporated tools such as Enterprise Resource Planning (ERP) systems into my study, which were used to plan and control the flow of materials and resources during the project and by integrating ERP with traditional scheduling techniques, I was able to create a more efficient and responsive project management system and I implemented an ERP system to track project resources, manage inventory, and monitor project progress in real-time, which provided a centralized platform for project stakeholders to collaborate and share information, reducing communication gaps and improving decision-making and the ERP system also allowed me to generate real-time reports on project performance, enabling proactive management of potential issues and so by analyzing these reports, I could identify trends and take corrective actions before small problems escalated into significant delays or cost overruns.

### **CE 1.3.8**

Throughout the project, I encountered several challenges, including unforeseen delays and resource constraints, so I addressed these issues by implementing flexible scheduling techniques, such as fuzzy sets in scheduling, which allowed for adjustments based on incomplete or imprecise data, ensuring that the project remained on track despite the uncertainties and like for example, during the data collection phase, I faced challenges in obtaining timely responses from industry professionals, so to mitigate this, I followed up persistently and provided additional context to encourage participation and additionally, I utilized software tools to automate data analysis, which improved efficiency and accuracy and this analysis helped in identifying the most critical variables and prioritizing them in the project management plan and so by focusing on these key factors, I was able to develop targeted solutions that addressed the root causes of delays and cost overruns and to further enhance the project management process, I implemented risk management strategies, which included identifying potential risks, assessing their impact, and developing mitigation plans and for instance, I created contingency plans for material shortages and equipment breakdowns, ensuring that alternative resources were available to prevent project delays.

### **CE 1.3.9**

In the final phase of the project, I compiled all the findings and developed a set of recommendations aimed at improving construction project scheduling, which were based on the quantitative and qualitative analysis conducted throughout the study and for instance, I suggested adopting more rigorous project planning and monitoring processes to mitigate the impact of identified factors such as material price fluctuations and equipment breakdowns and so I presented my findings in a detailed report, highlighting the significant factors influencing construction scheduling and proposing practical solutions to mitigate delays and cost overruns and the report was well-received by my professors and peers, which provided valuable insights for industry professionals seeking to improve project management practices and my recommendations included the adoption of advanced project management tools, continuous training for project managers, and the establishment of clear communication channels among stakeholders and so I also emphasized the importance of regular project reviews and audits to ensure adherence to the project schedule and budget and then, to facilitate the implementation of these recommendations, I even developed a comprehensive action plan outlining the steps required to improve project

scheduling practices which included timelines, resource allocations, and performance metrics to measure the success of the proposed solutions.

### **CE 1.3.10**

During the course of this project, I also identified the need for a cultural shift within the construction industry towards proactive risk management and continuous improvement and so I suggested that companies invest in building a culture that values thorough planning, regular training, and the use of technology to enhance project management practices and one key insight was the importance of stakeholder engagement, so I recommended that project managers actively involve all stakeholders in the planning and execution phases to ensure alignment of expectations and effective communication and this approach helps in identifying potential issues early and collaboratively developing solutions and moreover, I proposed the integration of sustainability considerations into project scheduling, which includes assessing the environmental impact of construction activities and optimizing resource use to minimize waste and by incorporating sustainability into project planning, the construction industry can contribute to broader environmental goals while also achieving cost and time efficiencies and to ensure the long-term impact of my recommendations, I suggested establishing a framework for continuous learning and improvement, which involves setting up mechanisms for capturing lessons learned from each project and applying these insights to future projects and this project was a comprehensive exercise in applying theoretical knowledge to practical problems in the construction industry, so through systematic research, data analysis, and the application of modern project management techniques, I was able to identify key factors influencing construction scheduling and propose effective solutions.

## **SUMMARY**

### **CE 1.4.1**

By addressing the critical issues of delays and cost overruns, my study contributed valuable insights to the field of construction project management and so the practical solutions developed during this project have the potential to improve scheduling practices and enhance the overall efficiency of construction projects and in summary, my work on this project underscored the importance of rigorous planning, effective stakeholder engagement, the use of modern technology, and continuous improvement in managing projects and the lessons learned and the skills acquired during this project will undoubtedly be invaluable as I advance in my career, contributing to more successful and sustainable construction projects in the future.