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Root Cause Analysis of Cost Overrun in Interior Projects

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Abstract

The construction industry is a path through which development of urban and rural India happens. The development of the project happens. The construction industry and its parties are associated with high degree of risk due to the nature of construction business activities, processes, environment and organization: Cost overrun is one of the most important problems in the construction one of the major problems faced by the construction industry is the cost overrun. The risk associated with the cost overrun for the stake holders are not defined which the root causes of the problems become. Therefore there is a need to study the root causes associated with the cost overrun and to solve the problem proactively to identify the real point of action to prevent the problem. Cost overrun is an unexpected increase in the money incurred in a construction project. Due to an underestimation of the actual cost of the project. The author has created a detailed analysis of the cause of cost overrun in Interior projects throughout the study of live case studies and arbitration and disputes. The Dissertation discusses in detail the causes of cost overrun in building projects. The thesis is a descriptive analysis of the causes of cost overrun in interior projects. Cost overrun is leading factor which affects the construction activities and it is more common in Fast track projects, the impacts of cost overruns are very high in developing countries fast track activities are much affected by cost overrun due to various factors throughout the project cycle. The deviations between the actual cost incurred during construction phase and primarily cost is known as cost overrun and it is one of the most predominant factors affecting the successful completion of the overall project, factors which are mostly influencing the cost overrun in interior fit-outs of mass construction projects and rank the factors identifies based on their impact mostly affecting the construction activities finally giving recommendations to overcome the critical factors

Keywords: Cost overrun, Interior Projects, Construction Projects, Environment, Construction

INTRODUCTION

The construction industry's intricate and dynamic nature often presents numerous challenges that can hinder successful project completion [1] [19]. Notably, cost overruns stand out as a pervasive issue, particularly impacting fast-track projects. These overruns, stemming from constraints in time, budget, and quality, are especially prevalent in such expedited operations. In developing nations like India, the ramifications of these cost escalations are particularly profound, disrupting project cycles significantly [2] [18]. Cost overrun as the discrepancy between the initially projected construction cost and the actual expenditure during the building phase. This disparity jeopardizes the completion of interior fit-out projects in India, often emanating from various factors throughout the project lifecycle. Identifies critical contributors to these overruns, including contractor site management inefficiencies, gaps in information and communication among stakeholders, human resource challenges, shortcomings in design and documentation, deficiencies in project management, and lapses in contract administration

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[3] [4].

Recognizing these influential factors is paramount. To address them effectively, it becomes essential to rank them based on their impact on construction activities. Subsequently, formulating targeted recommendations becomes feasible, aiming to mitigate these challenges. By enhancing coordination, improving management practices, and refining contractual frameworks, stakeholders can proactively address cost overruns, fostering more predictable and successful project outcomes [5] [6].

LITERATURE REVIEW

Cost overrun occurs when the actual costs incurred during a project exceed the initially budgeted or estimated costs. In other words, it is the excess expenditure beyond what was initially planned. Cost overruns can result from a variety of factors, including unexpected changes in project scope, delays, increases in material or labor costs, or poor cost management In the realm of construction management, cost overruns present a persistent challenge, often resulting from inadequate cost control mechanisms during design and project implementation phases [7] [8]. This complexity is exacerbated by the multifaceted nature of the construction industry, involving various stakeholders and intricate project dynamics. Several studies underscore the significance of effective cost control techniques to pre-emptively manage these overruns [5] [9]. For instance, the research emphasizes the imperative of strategic negotiations with subcontractors and vendors, meticulous cost-benefit analyses, and rigorous schedule management [10] [15].

A pivotal aspect highlighted in the literature revolves around proactive measures such as value engineering, safety protocols, worker training, and machinery selection to optimize productivity and curtail costs. Concurrently, factors triggering cost overruns have been extensively examined, encompassing issues like underestimated project durations, flawed cost estimations, methodological errors, and inaccuracies in quantity assessments. Additionally, challenges associated with subcontractor performance, labour shortages, and management-labour relationships emerge as critical determinants influencing project costs [11] [16].

A noteworthy consensus among construction professionals underscores specific factors, with significant variance observed primarily in construction errors. This diversity necessitates advanced methodologies, such as factor analysis, to distill a comprehensive set of elements affecting cost overruns [20]. Notably, recent investigations, particularly in fast-track interior fit-out projects in India's southern region, accentuate the pronounced impact of design and documentation discrepancies on project timelines and costs [2] [17]. Moreover, emerging paradigms, like the integration of fuzzy logic in cost prediction models, offer innovative approaches to assess project conditions and anticipate cost escalations, especially in the context of external disruptors like the COVID-19 pandemic. Consequently, synthesizing these insights facilitates a holistic understanding of cost overrun dynamics, informing future research endeavours and strategic interventions in construction project management [10] [25].

Cost overruns persistently plague construction and infrastructure projects, notably within India's residential building sector. [23] [25] This study undertakes a meticulous analysis, employing methodologies such as the Relative Importance Index (RII) and ranking techniques, to discern the predominant factors precipitating these cost escalations. The research delineates eight pivotal factors, encompassing elements like precise project planning, vigilant monitoring, adept site management, contractor efficiency, and streamlined design processes. Furthermore, the study underscores the nuanced roles of clients, consultants, and contractors, advocating for tailored management strategies to mitigate cost overruns effectively [24] Emphasizing the intrinsic interplay of expense, time, and quality, this investigation underscores the imperative of astute management practices, positioning effective management of these identified variables as paramount in ensuring the fiscal integrity and timely completion of residential building projects in India [12] [4].

RESEARCH METHODOLOGY

Cost overruns are a significant concern in the construction industry, particularly in fast-track interior fit-out projects. To effectively address this issue, it is crucial to identify the root causes of cost overruns and implement measures to prevent their recurrence. This research aims to conduct a root cause analysis of cost overruns in interior projects and provide recommendations for mitigating these issues. A comprehensive literature review will be conducted to identify and categorize the various factors contributing to cost overruns in interior projects. [29] This will involve reviewing academic journals, industry reports, and case studies to gain a thorough understanding of the problem. [21][26] The identified factors will be classified into different categories based on their nature and impact. Primary data will be collected to assess the prevalence and impact of the identified cost overrun factors. Expert Interviews will be conducted with experienced professionals in the construction industry, including project managers, contractors, and interior designers, to gather insights into their experiences with cost overruns and their perspectives on the underlying causes. In-depth case studies of interior projects that experienced significant cost overruns will be analysed to identify the specific factors that contributed to the overruns and to draw lessons from these experiences. [22][27] The collected data will be analysed using appropriate statistical methods to identify the most significant factors contributing to cost overruns [13][28]. The analysis will focus on the root causes of cost overruns will be identified by examining the underlying reasons behind the occurrence of the most significant factors. Based on the findings of the root cause analysis, recommendations will be formulated to mitigate the risk of cost overruns in future interior projects.

ANALYSIS AND DISCUSSION

Cost overruns in interior projects can be likened to an unexpected crescendo in a symphony; they disrupt the harmony of meticulously planned spaces. These overruns occur when the actual expenditures within these creative endeavors surpass the initial budgetary projections, creating a discordant note in what should be a well-orchestrated composition. Interior projects, whether they involve the transformation of a cozy home, the revamp of a bustling commercial space, or the creation of a public haven, are not immune to the siren call of cost overruns

Identifying the factors and reasons for cost overruns in interior projects is crucial for effective cost management and project success. While these factors can be project-specific and influenced by various circumstances, several common causes are often observed in interior projects.

The majority of respondents (83.3%) are clients, with 11.1% being consultants, 5.6% contractors, and 0.7% others.38.9% of respondents have experienced cost overrun in recent projects, while 61.1% have not.

The most common type of project to experience cost overrun is commercial interior projects (38%), followed by office fitout projects (10.7%) and institutional projects (10.7%).

The top three factors contributing to cost overrun are client changes (44.4%), changes in the scope of work (27.8%), and inaccurate estimates (27.8%)

According to the description given below, the highest overall ranking was given to inaccurate planning and scheduling of activities. (Table 1) As a matter of fact all the groups had the same opinion on the matter. The planning of activities are the most important factors and they come in the initial or preconstruction stage of a project, but the control and monitoring of this happens in the execution phase of the project. Being the most important among the execution phase person, the contractor needs to create a very clear understanding of the schedule of the activities and a proper change control monitoring needs to be identified by the contractor. Therefore, the competency of the contractor is very important in determining the failure or success of the activities.

The second rank was given to frequent design changes and change in material specification by the

client in overall ranking, while there was a shift to rank 4 for clients and consultants. The ranking remained 2 for the contractors. (Table 2) This is justified, as the ranking for the factor has been of high importance, when the work comes to the site. The chances of client changing the specifications has always been a matter of importance as they have created a variation in the development of the project during the construction stage of the work. Identification of site constraints is ranked as number 3 in the list usually in any project in which site constraints are not identified a problem arises when the construction phase starts. While the ranking varies for the client and the consultant, the ranking 3 is for the wrong estimate preparation.

Improper planning of equipment usage and storage is ranked 5 among the different factors. This is ranked as 2 by the client. The client has to face huge losses due to the unavailability of money due to the problems caused by the same. This is ranked as 5 by the contractor and 8 by the consultant. As the factor is important for the contractor and is not considered as the responsibility of the consultant.

After the RII and selected the top 5 factor, for further root cause analysis the factor that are reason for cost overrun is provide below (Figures 1–3)

Table 1. Relative importance as per survey (Source: Author)

RII Value		
Factor	***From respondents***	***Site investigation***
Poor site management and supervision	2.497	1.11
Incompetent subcontractors	2.299	0.742
Schedule Delay	1.625	1.85
Inadequate planning and scheduling	2.695	1.11
Lack of experience	2.378	0.74
Inaccurate Time and Cost estimates	2.338	1.11
Mistakes during construction	2.259	1.85
Inadequate monitoring and control	2.061	1.85
Frequent design changes	2.695	3.33
Mistakes and Errors in design	2.576	1.48
Delay in Decision making	2.418	1.11
Delay in design and approval of design	2.404	2.22
Cash flow and financial difficulties faced by contractors	1.863	0.37
Poor financial control on site	2.299	0.74
Delay in progress payment by client	2.14	1.11
Financing and payment for completed works (Delays in payments)	1.863	1.11
Contractual claims, such as, extension of time with cost claims	2.22	2.59
Lack of coordination between parties	2.18	3.33
Slow information flow between parties	1.823	1.85
Lack of communication between parties	1.982	2.22

Table 2. Relative importance as per survey (Source: Author)

S.N.	**Factor**	**Rank**
1	Frequent design changes	1
2	Mistakes and Errors in design	2
3	Delays in decisions making.	3
4	Delay in design and approval of design	4
5	Poor site management and supervision	5
6	Mistakes during construction	6

7	Inadequate monitoring and control.	7
8	Slow information flow between parties	8
9	Lack of communication between parties	9
10	Change in the scope of the project	10

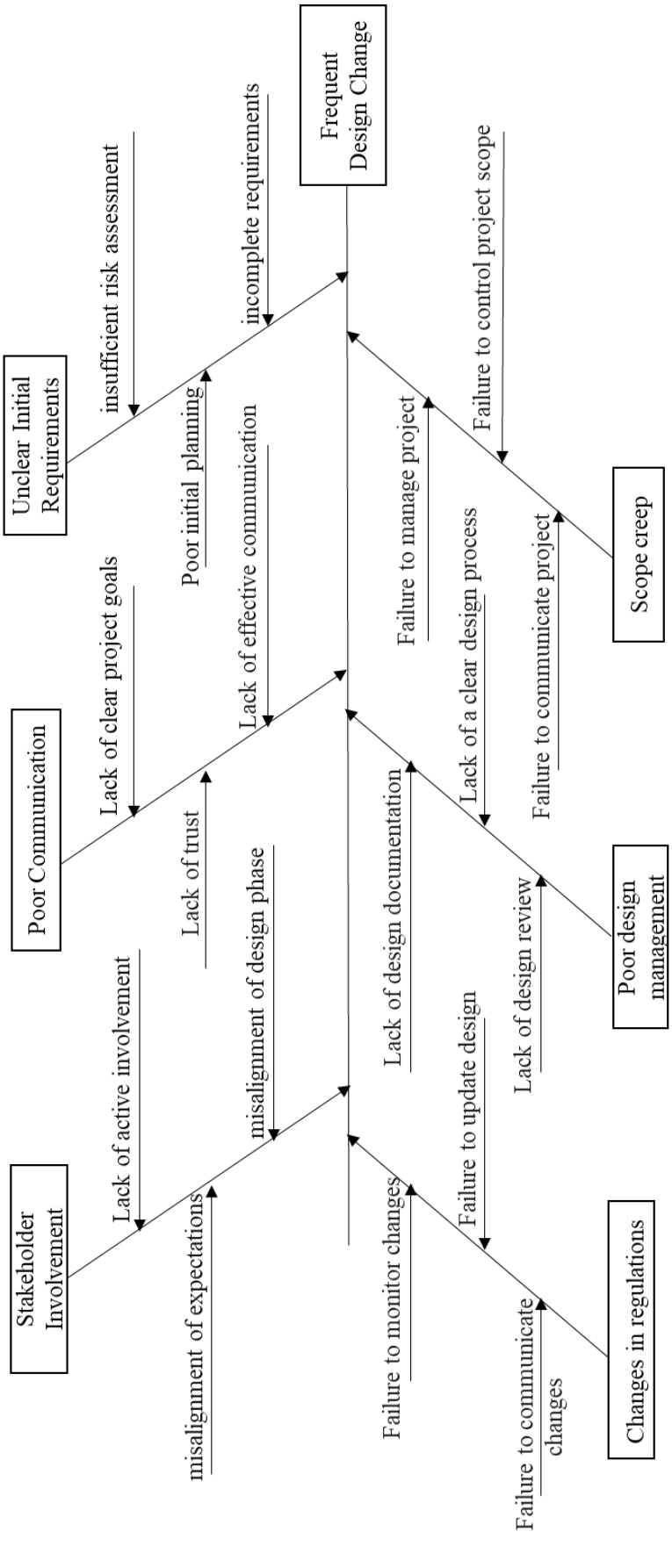

Figure 1. Root Cause analysis of frequent design change factor.

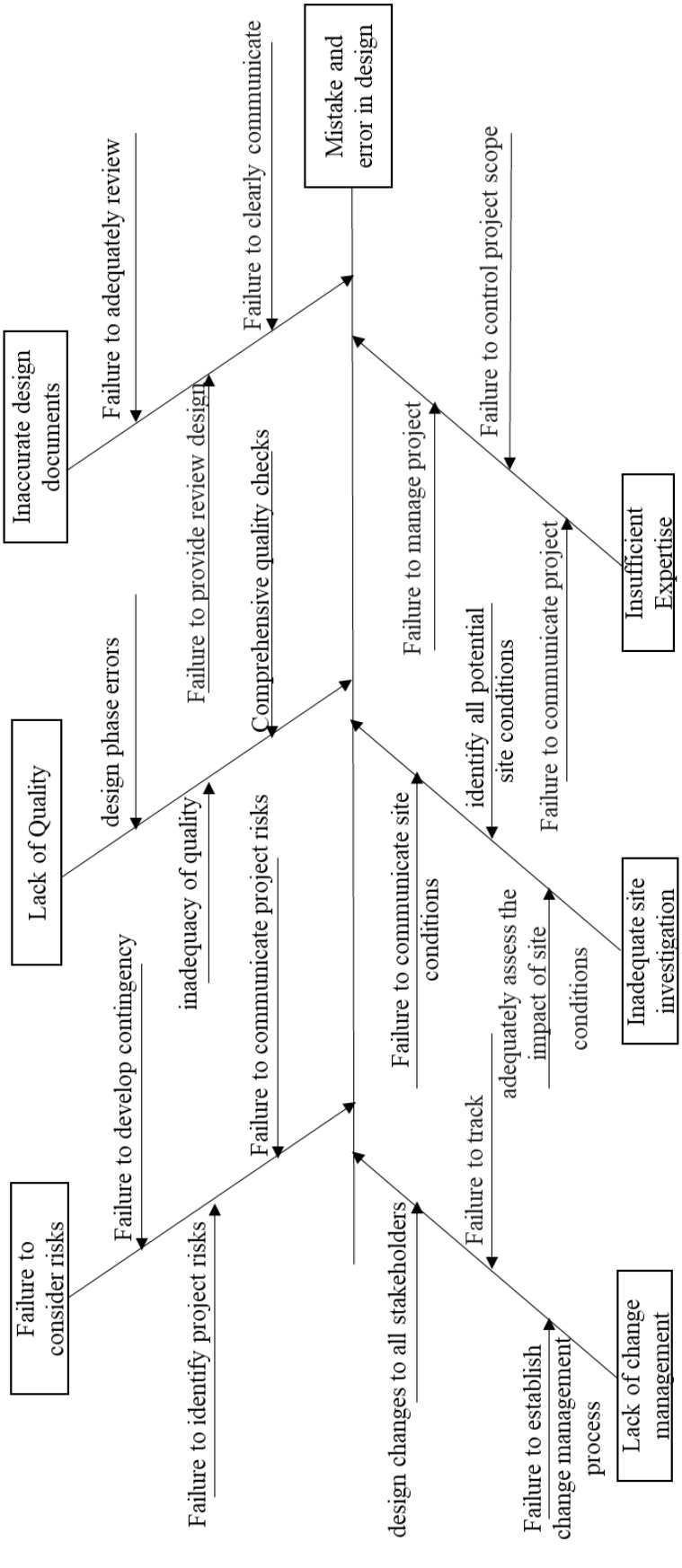

Figure 2. Root cause analysis of mistake and error in design.

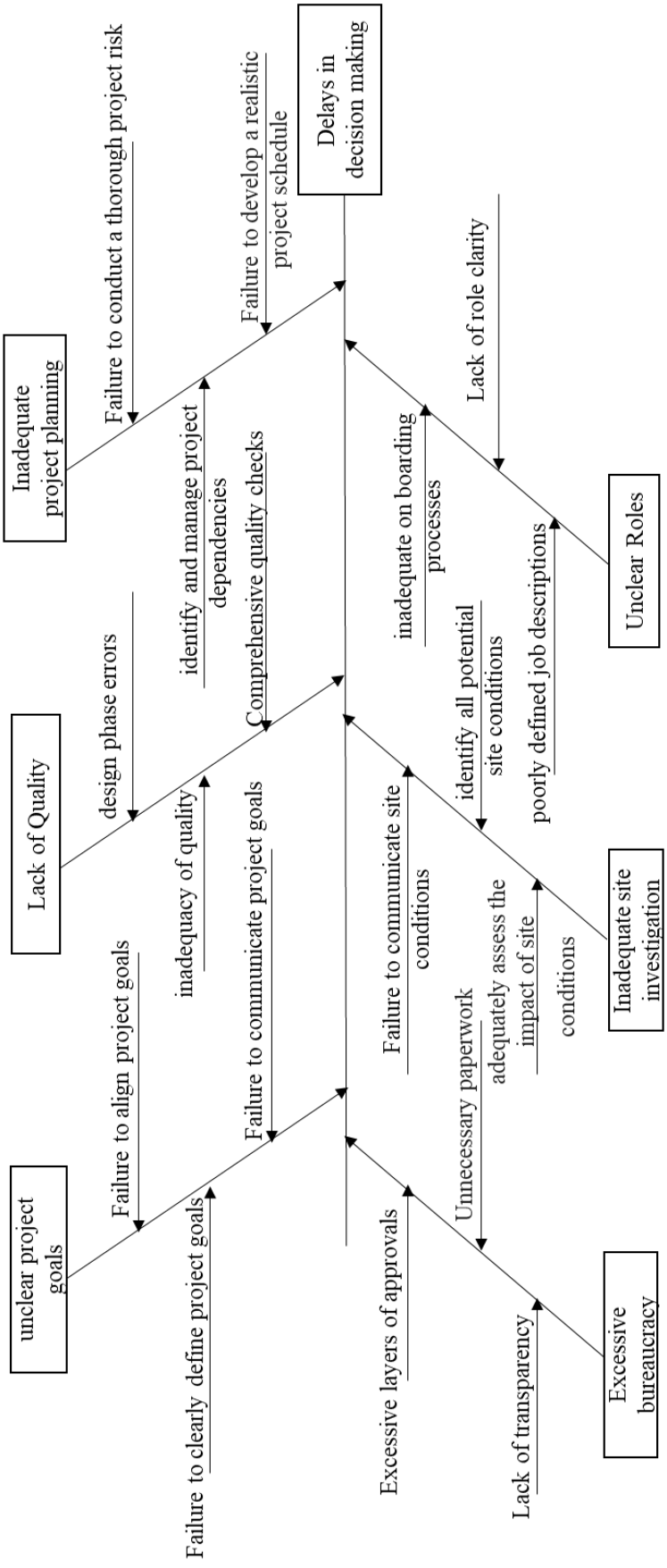

Figure 3. Root Cause analysis of delays in decision making.

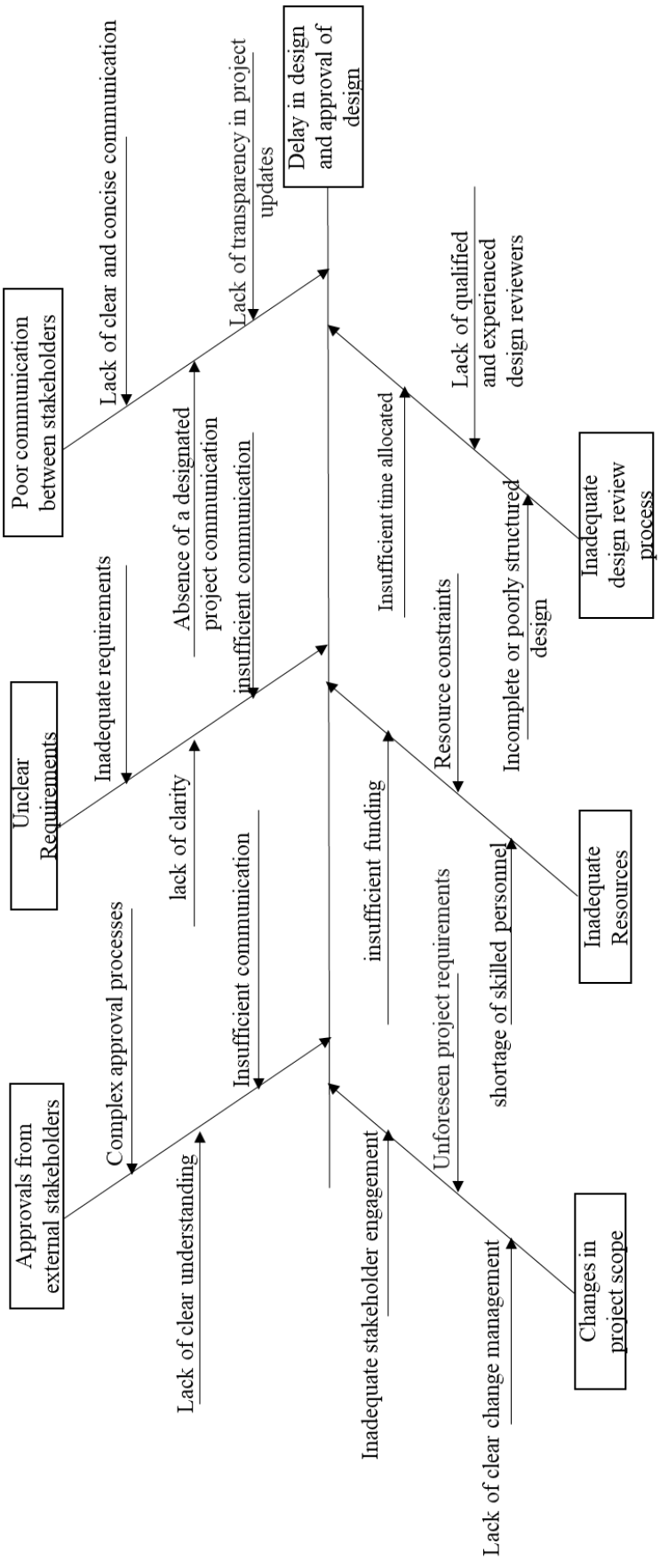

Figure 4. Root cause analysis delay in design and approval of design factor.

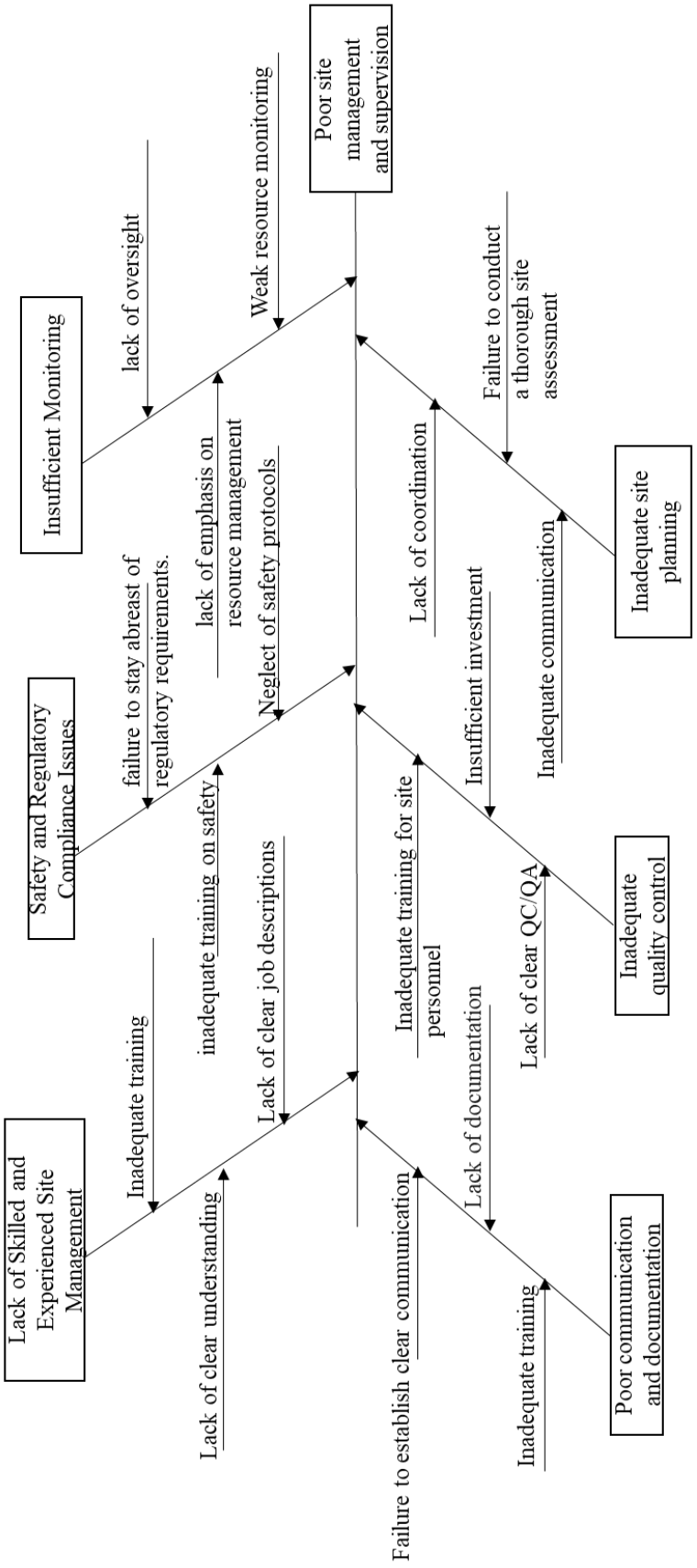

Figure 5. Root cause analysis Poor site management.

To address prevalent challenges in construction projects, (Figures 4–5) several key strategies emerge as paramount. Firstly, for managing frequent design alterations, it's essential to institute a transparent change management protocol, leveraging technology like 3D modelling for precise communication. Secondly, to mitigate errors in design, rigorous review mechanisms involving seasoned professionals and adherence to design checklists become indispensable. Thirdly, combatting decision-making delays necessitates empowering project managers with decisive authority and clear escalation pathways. Additionally, to counteract design-related delays, early stakeholder engagement and parallel approval processes are pivotal. Lastly, to counteract deficiencies in site management, fostering stakeholder collaboration, devising structured supervision plans, and harnessing advanced project management tools emerge as critical imperatives. Collectively, these strategies advocate for proactive, collaborative, and technology-driven approaches to streamline construction processes, ensuring efficiency, quality, and timely project completion.

CONCLUSION

The study delved into the complexities of cost overruns in interior projects, employing a systematic approach to identify and analyze root causes. Through comprehensive literature review, a set of pivotal factors contributing to cost overruns emerged. Utilizing root cause analysis and factor mapping, interlinked factors influencing cost escalations were delineated, emphasizing the multifaceted nature of these challenges [1]. Stakeholder perspectives, including clients, contractors, and consultants, converged on inadequate and inaccurate planning as a predominant catalyst for cost overruns. The study further integrated regression analysis, culminating in a weighted model that elucidates the relative significance of each factor [10]. Emphasizing proactive mitigation strategies, the research underscores the imperative of early-stage interventions, emphasizing the escalating importance of technical acumen and enhanced site management practices. Ultimately, the study provides a nuanced framework for understanding and addressing cost overruns, advocating for holistic strategies informed by empirical insights and stakeholder collaboration [14].

Limitation

The study was performed for all type of interior projects. The survey results are specifically for the private sector projects. The results developed is to considered as taking into account the projects from private sector majorly including commercial, office fitout and industrial.

Future Scope of Work

The research can be extended to the development of analysis of only a single type of project as for the commercial projects so as to develop a better understanding of the reasons and the impact of the reasons for those Projects. This will help in creating a better understanding of the projects in the sector.

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