Strategies and Best Practices for Managing Cost Overruns in the Construction Industry of Pakistan

Sharjeel Ahmed
Visiting Faculty Bahria University Karachi Campus, Karachi, Sindh, Pakistan
motandas@gmail.com

Shuaib Ahmed
Assistant Editor Pakistan Business Review (corresponding Author)
Shuaib105@gmail.com

Asad Ullah Bararo
Visiting Faculty Bahria University Karachi Campus, Karachi, Sindh, Pakistan
asadullah.buriro@gmail.com

Abstract

Cost overruns pose a common challenge for the construction industry, leading to significant impacts on project profitability and sustainability. This research study aims to investigate effective strategies and best practices that can assist construction firms in managing and mitigating cost overruns. The study will employ a qualitative research method, specifically utilizing an in-depth review of existing literature on cost overruns in the construction industry, as well as conducting semi-structured interviews. The research findings will identify the root causes of cost overruns and provide practical measures for effectively managing them. This study contributes to the existing body of knowledge on cost overrun management in the construction industry, offering detailed and practical recommendations for construction professionals to address this critical issue, with a particular focus on Pakistan.

Keywords: *Cost, Cost overrun, Strategies, Construction Industry*

Introduction

The construction industry is widely recognized for its complex and ever-evolving nature, which involves a diverse range of stakeholders, tight schedules, and constrained budgets (Rashid, 2020). However, despite its significance, the industry faces an ongoing obstacle in the form of cost overruns. Cost overruns occur when the actual expenses incurred during a construction project exceed the originally planned or budgeted costs. This issue has been extensively examined and acknowledged as a significant barrier within the construction industry (Johnson and Babu, 2020). The consequences of cost overruns are extensive and can have adverse effects on multiple aspects of a project. Firstly, they directly impact project profitability by diminishing profit margins and potentially rendering a project financially unviable. Furthermore, cost overruns disrupt cash flow, placing strain on the financial resources of construction firms and impeding their ability to fulfill obligations in a timely manner. Moreover, stakeholders, including clients, investors, and contractors, are negatively affected by cost overruns as they can erode trust, harm reputations, and result in dissatisfaction with project outcomes (Rashid, 2020). Given the importance of addressing cost overruns, effective management becomes crucial for the survival and success of construction firms. It is imperative not only for enhancing individual project performance but also for ensuring the overall well-being of the construction industry. Managing and mitigating cost overruns requires a comprehensive approach that encompasses various strategies and best practices (Durdyev & Hosseini, 2020). These may include meticulous project planning and feasibility studies, accurate cost estimation, rigorous monitoring and control systems, proactive risk management, and effective communication and collaboration among stakeholders. By implementing robust measures for cost control, construction firms can strengthen their ability to manage and mitigate cost overruns. This involves regular monitoring of project expenses, identifying potential deviations, and taking prompt corrective

actions. It also necessitates cultivating a culture of cost consciousness and accountability throughout the organization. To overcome this challenge, construction firms should draw on lessons learned from previous projects and leverage industry knowledge. Conducting comprehensive evaluations after project completion and analyzing case studies of successful cost overrun management can yield valuable insights and serve as a guiding framework for future projects (Johnson and Babu, 2020).

To effectively handle and minimize cost overruns in the construction industry, it is crucial to engage in proactive planning and implement strategies for identifying and mitigating risks (Venkataraman & Pinto, 2023). Construction companies must adopt strategies and best practices that enable them to navigate and resolve this ongoing challenge (Dlamini & Cumberlege, 2021). The primary objective of this research study is to delve into these strategies and best practices, shedding light on the effective management of cost overruns in the construction industry. Through this exploration, the study aims to provide construction professionals with a deeper understanding of cost overrun management and equip them with the necessary knowledge to address it successfully. To achieve these goals, this research study takes a comprehensive approach by conducting interviews with construction project managers, CEOs, and owners. By capturing their perspectives on strategies and challenges related to cost overrun management within the industry, the study aims to gather valuable insights and data. These interviews will be thoroughly analyzed and synthesized to identify key themes, patterns, and recommendations for effectively managing cost overruns.

The anticipated findings of this study will make a significant contribution to the existing body of knowledge on cost overrun management in the construction industry. By highlighting successful strategies and best practices, the research aims to provide practical recommendations that construction professionals can apply in their day-to-day operations.

These recommendations will serve as a valuable guide for improving project performance, enhancing profitability, and sustaining operations in the face of a challenging business environment. Importantly, the impact of this study extends beyond theoretical contributions. By informing best practices for cost overrun management, construction firms can enhance their overall project outcomes and financial performance. The findings will empower construction professionals to implement proactive measures that effectively address cost overruns and foster project success. Ultimately, the research study aims to cultivate a culture of effective cost management within the construction industry, benefiting individual firms and the industry as a whole.

Research Questions

1. What are the main causes of cost overruns in the construction industry?
2. What is the impact of cost overruns on construction projects in terms of financial, schedule, and quality performance?
3. What are the effective strategies and best practices for managing cost overruns in the construction industry?

Related Literature

What is Cost?

Cost refers to the amount of money, time, effort, or resources required to produce or acquire something (Khan and Khan, 2022) . It can be measured in different ways depending on the context, such as direct costs of materials, labor, equipment, indirect costs overhead, administrative expenses, opportunity costs the value of foregone alternatives, or social costs (Obi, Arif, Islam, Gupta & Walton, 2021). However, some of the costs are not tangible and easily quantifiable like bad reputation, inflation effects, damage to brand and goodwill (Nyoni, 2019). Cost becomes a critical factor in many decision-making processes, such as budgeting, pricing, investment, and procurement (Mahmood and Mubarik, 2020). By

analyzing costs and comparing them to the expected benefits, organizations and individuals can make informed decisions about whether to proceed with a project or purchase, how to allocate resources, and additionally determines how to optimize efficiency and profitability (Shehu, Endut, Akintoye & Holt, 2014). Effective cost management involves identifying and estimating all relevant costs then budgeting these costs and afterwards tracking and controlling expenses (Zaman et al., 2018). It also includes minimizing waste and inefficiency, and continuously improving processes and performance (Xu, 2021).

Cost in construction industry

In the construction industry, cost refers to all the expenses incurred while creating your deliverables which contains the construction of a building, infrastructure, or other type of construction project (KHAN et al., 2022b). The costs in the construction industry can be broadly divided into two categories: direct costs and indirect costs (Goel, Oberoi & Vats, 2021). Direct costs are those that are directly related to the construction of the project, such as materials, labor, equipment, and subcontractor fees (Mubarik et al., 2021a). Indirect costs, on the other hand, are those that are not directly tied to the construction of the project but are still necessary for the project's success, such as insurance, permits, inspections, and project management fees (Hwang, Shan, Zhu & Lim, 2020). Construction costs are typically estimated during the planning phase of a project and are used to determine the overall budget for the project. Accurate cost estimation is critical to the success of a construction project, as inaccurate estimates can lead to cost overruns, delays, and subsequently project failure (Shafiei, Eshtehardian, Nasirzadeh & Arabi, 2020). To manage costs effectively in the construction industry, project managers must carefully track all expenses and regularly update the project budget to ensure that the project stays on track (Miao et al., 2022). Effective cost management can help to ensure that the project is completed on time, within

budget, and to the required quality standards. This leads to achieving Stakeholder's whether internal or external expectations and needs (Razek, Bassioni & Mobarak, 2008).

Effective cost management

According to Alzara, Kashiwagi and Tassan (2016) effective cost management is a critical aspect of project management that involves controlling project costs to ensure that the project is completed within the approved budget. Effective cost management involves several key activities, including: Accurate cost estimation is critical to effective cost management (Liu, Chang, Zuo, Xiong & Dong, 2023). Project managers must estimate all project costs, including direct and indirect costs, and ensure that they are accounted for in the project budget (Khan et al., 2022a). Here it is prudent to highlight that Project Managers must be aware and expert of various estimation techniques like Analogous or Parametric estimation. In high risk environment 3 point estimations (Using Optimistic, most likely and pessimistic estimations) provide as accurate as possible estimates (Haseeb, Bibi & Rabbani, 2011). Budgeting through various techniques: Budgeting means arranging funds which have been identified in cost estimation process (Mubarik et al., 2021b). Project Management Institute has suggested various tools like Expert Judgement, Reserve analysis and historical information review which ultimately generates Cost Baseline for monitoring and controlling of entire project budget (PMBOK 6th edition). Regular budget monitoring: Project managers must regularly monitor project costs to ensure that the project is staying within budget. This involves comparing actual costs against the project budget, identifying any variances, and taking corrective action as needed. Variance analysis, S curve are some of the tools to keep project on track (Johari & Jha, 2021). Risk management: Effective cost management also involves identifying and managing project risks that could lead to cost overruns (Mazhar et al., 2022). Project managers must identify potential risks, assess their impact on the project budget, and develop strategies to mitigate those risks (Phan, 2020). Resource optimization:

Effective cost management also involves optimizing project resources, including labor, equipment, and materials, to ensure that they are used efficiently and effectively (Xu, 2021). Continuous improvement: Effective cost management is an ongoing process, and project managers must continuously review and improve cost management processes and procedures to ensure that they are effective. According to Nawaz et al. (2019) effectively managing project costs, project managers can ensure that the project is completed within budget, on time, and to the required quality standards. Effective cost management can also help to reduce waste, improve efficiency, and increase profitability.

What is cost overrun?

According to Ghazal and Hammad (2022) cost overrun is a situation where the actual cost of a project exceeds the budgeted or planned cost. Cost overruns are a common problem in many projects and can be caused by a variety of factors, including inaccurate cost estimation if the initial cost estimate for the project is inaccurate or incomplete, it can lead to cost overruns (Annamalaisami, & Kuppuswamy, 2021). This may be due utilization of wrong tool, under estimating risk (Probability and Impact) and lack of Project team's expertise. Changes in project scope can result in additional costs that were not initially planned for (Zafar et al., 2022). Unforeseen events such as natural disasters, accidents, and regulatory changes can result in additional costs that were not planned for. That too shows poor skills of project team to anticipate risks associated with their projects (Bin Seddeeq, Assaf, Abdallah & Hassanain, 2019). Delays in the project schedule can result in additional costs, such as overtime or extended rental of equipment i.e. increasing indirect costs of the project and the situation get worse when project require resource optimization. Delays bring dissatisfaction amongst Owners and customers (Durdyev, & Hosseini, 2020). Inflation can lead to an increase in the cost of materials and labor, which can result in cost overruns (Khan et al., 2022c). The reason to get trapped into inflation may be inappropriate risk assessment and

delays (Musarat, Alaloul & Liew, 2021). Cost overruns can have serious consequences for a project, including delays in completion, reduced quality, increased debt, and damage to the reputation of the project manager or organization. To avoid cost overruns, it is essential to develop a detailed project plan and budget, monitor and control costs throughout the project lifecycle, and identify and address any issues or risks as early as possible. Effective communication and collaboration between stakeholders can also help to prevent cost overruns and ensure the success of a project (Gamil, Rahman & Nagapan, (2019).

Relationship between effective cost management and cost overrun

According to Blocher, Stout, Juras, and Smith (2019) effective cost management is the process of planning and controlling the budget and expenses of a project or organization. It involves identifying all costs associated with a project or business operation, monitoring those costs closely, and taking steps to minimize them where possible. Effective cost management is crucial for ensuring that projects are completed on time and within budget. Cost overrun occurs when the actual costs of a project exceed the budgeted or planned costs. Cost overrun can occur due to various reasons such as poor project planning, inaccurate cost estimation, unforeseen events, or changes in project scope which is also known as scope creep (Ghallab & Hosain, 2020). Cost overrun is neither the desire of project team, management not the customer as it brings misalignments to the strategic goals of both. Effective cost management can help to prevent or minimize cost overrun by identifying potential cost risks and taking steps to mitigate them. It involves regular monitoring and tracking of project expenses to identify any deviations from the budgeted costs. Effective cost management also involves identifying cost-saving opportunities and implementing measures to reduce unnecessary expenses (Durdyev, & Hosseini, 2020).

Impact of Cost Overrun

Cost overrun can have a significant impact on a project in different way, including: Budget constraints in which cost overruns can strain the project budget and result in reduced funding for other essential activities (Bilgin, 2019). This can lead to delays or cuts in project scope, resulting in a lower quality deliverable and sometimes reduced profitability of the organization (Alfreahat, & Sebestyén, 2020). Delayed timelines in a project experiences a cost overrun, it can result in delays to the project timeline, impacting the overall project completion date. This delay can result in lost opportunities or reduced revenue (KV & Bhat, 2019). Another consideration of going behind schedule is that time consumed for completing a delayed project can deprive organizations and teams to grab a bigger and profitable projects. Loss of stakeholder confidence also connected with cost overruns can negatively impact stakeholder confidence in the project team's ability to manage the project effectively (Ghallab & Hosain, 2020). This can lead to a lack of support from stakeholders and decreased morale among team members (Bilgin, 2019). Reputation damage with cost overruns of the project team and the organization as a whole. This can impact future opportunities for funding, partnerships, or collaboration. Cost overruns can result in legal and contractual issues; such as breach of contract or legal disputes. This can result in additional costs and delays to the project (Arantes, & Ferreira, 2021).

How **to survive in cost overrun**

According to Gamil and Alhagar (2020) surviving a cost overrun can be challenging, but it is possible with careful planning and execution. Few strategies of the management that can help: Review your budget and identify areas where you can cut costs. Look for items that are not essential and see if you can eliminate them. You can also consider negotiating with suppliers for better prices or delaying purchases until a later date. Here is an important point to be considered that in planning phase always bring your vendors and contractors as experts, revisit Project Management Office to get lesson learned of similar projects and analyze issue

logs and change requests (Wang, Cai & Liu, 2022). This will enable project teams to identify risks with their appropriate impact and probability before furnishing cost baselines and reserves (Ghallab & Hosain, 2020). Communicate with stakeholders: Keep stakeholders informed of the situation and the steps you are taking to address it. This can include clients, team members, and anyone else who may be impacted by the cost overrun. Focus on completing tasks that are critical to the project's success and deprioritize non-essential tasks (Wang, Cai & Liu, 2022). This can help you allocate resources more effectively. Always use Project Management Office recommendations for prioritizing project as they always stay connected to strategic and business objectives of the firm. Reassess the project scope determine if the scope of the project needs to be adjusted to account for the cost overrun (Gamil & Alhagar, 2020). This may involve reducing the scope or extending the timeline. However, this could be effectively done in planning phase as if the project has been started and moved up to some milestones of have produced deliverables then it would be a risky and costly business. Look for ways to streamline processes and reduce waste. This can help you save money and stay within budget. The point to understand that not all risks are negative there are some positive risks which are called opportunities e.g. if a project was required to be completed in 6 weeks but now revised timeline is asked as 4 weeks then there will be increased cost due enhancing labors however, it may be possible that after completing this job something bigger, newer and more profitable may be grabbed in remaining 2 weeks which could have missed if project timeline remained as actual of 6 weeks (Arantes, & Ferreira, 2021). Monitor progress keep track of progress and adjust your strategy as needed. Regularly reviewing your budget and project plan can help you identify potential issues before they become bigger problems. Use monitoring tools that is your Cost, Time and Scope baselines to self-assess the performance of team before it is being assessed by clients in the form of complaints (Annamalaisami, & Kuppuswamy, 2021).

How to control cost overrun?

According to Goel, Oberoi and Vats (2021) controlling cost overruns is a critical part of project management. Here are some strategies that can help you keep costs under control:

Create a detailed budget for your project that includes all costs and timelines. Be sure to include contingency funds for unexpected expenses (Rashid, 2020). Monitor expenses keep track of all expenses throughout the project and compare them to the budget. Regularly reviewing your expenses will help you identify potential issues early on and make adjustments as needed (Durdyev & Hosseini, 2020).

Identifying causes of cost overruns

Identify the causes of cost overruns: Determine the reasons behind the cost overruns. This can include unexpected expenses, scope changes, delays, or other factors. Once you understand the root cause of the overruns, you can take steps to address them (Xu, 2021). Use cost management tools: Utilize cost management tools such as Earned Value Management (EVM) or Cost Performance Index (CPI) to track progress and identify potential cost overruns (Rashid, 2020). Communicate with stakeholders: Keep stakeholders informed of the project's progress and any cost overruns. This will help you maintain transparency and gain support for potential solutions (Hwang, Shan, Zhu & Lim, 2020). Review the project plan and adjust it as needed to address cost overruns. This may involve reducing the scope or extending the timeline. Implement cost-saving measures for opportunities to reduce costs without compromising the quality of the project. This can include negotiating with suppliers, finding more efficient processes, or eliminating unnecessary expenses (Xu, 2021).

Responsibilities of Manager in Cost Overrun

When a project incurs a cost overrun, it is the responsibility of the manager to take appropriate actions to control the situation. Here are some responsibilities of a manager in case of cost overruns by (Shoar, Yiu, Payan & Parchamijalal, 2023): The manager should

identify the reasons for the cost overrun. This can include unforeseen events, changes in scope, poor estimation, or inadequate planning. Identifying the root causes can help the manager develop an action plan to address them. Project Manager must always be one step ahead of his team. He should be understanding what is coming next and must be preparing his team proactively. He must be proactive rather than reactive risks (Phan, 2020). The manager should review the project's budget and schedule to determine if they need to be adjusted to account for the cost overrun. This can include revisiting the project scope, timeline, and resource allocation. It is responsibility of project manager to safeguard the reserves of the project so they may be efficiently converted into profits. Sometimes better negotiations with vendors through bargaining chips can result in reduced costs and increased performance (Nyoni, 2019). The manager should communicate the situation with stakeholders, such as the project sponsor, team members, and customers. Clear and transparent communication can help manage expectations and prevent further cost overruns (Hwang, Shan, Zhu & Lim, 2020). The manager should develop a cost control plan to manage the remaining project costs. This can include identifying cost-saving measures, renegotiating contracts, and prioritizing project deliverables. The manager should monitor progress against the cost control plan and report regularly to stakeholders. This can include tracking actual costs, analyzing cost variances, and identifying potential risks (Dlamini & Cumberlege, 2021). Learn from the experience: Finally, the manager should take the lessons learned from the cost overrun experience and apply them to future projects. This can help prevent similar situations from occurring in the future and improve the manager's ability to manage project costs (Haseeb, Bibi & Rabbani, 2011.

Research Methodology

In this research study “qualitative” research method used and semi-structured interview conducted with experienced peoples’ involved in management of large construction

projects in Karachi. Respondents were also requested to suggest and categorize mitigation measures for cost control according to appropriate implementation strategies. For the study total 10 selected respondents were contacted, however the authors managed interview 5 respondents after that data saturated. Demographic characteristics of each respondent interviewed are;

Table 1

Demographic information of the respondents

S. No	Organization	Education	Experience	Position
1.	Commander Builders	BE (civil engineering)	10 Years	Project manager
2.	Pyramid Constructors	BS (civil engineering)	07 Years	Senior Supervisor
3.	GFS Builders and Developers	BE (civil engineering)	08 Years	Project manager
4.	Lakhani Builders	Master (project management)	07 Years	Project Site manager
5.	Royal Builders and Developers	Master (project management)	12 Years	Senior Project manager

Table 2

Factors positions in cost overrun

S. No	Factors	Position
1.	Project Site Management	1 according to respondents Project Site Management is major factor of Cost overrun
2.	Project Administration	2 respondents said that project administration include in major factor of Cost overrun
3.	Labor related issues	3 according to respondents in construction projects labor issues increase the cost common issue in Pakistan
4.	Financial management	4 respondents said that site supervisor unknown about financial management that's why this factor also play a role in cost overrun
5.	Design and Documentation issues	5 according to respondents in construction projects changing in design and legal documentation also increase the cost

In the study researcher selected senior employees of different construction organizations in Karachi, Pakistan. Respondents of the study working with large construction companies/firms with rich experience of handling projects as manager/site manager/ supervisor. All the participants have high qualification regarding their fields. Respondents qualification, experience and working origination shows that the interviewees of the study were skilled, capable, expert and trustworthy to explore the underpinning problems connected to the cost overrun in construction industry.

Factors involved in cost overrun

The major factors of cost overrun are:

- Project site management
- Project administration
- Labor related issues
- Financial management
- Design and documentation

Participants of the study categories all the factors according to their position in contributing to cost overrun in construction industry of Karachi Pakistan. Table 2 shows the results of interview sessions major factors positions. According to Table 2, project site management is the supreme severe category of cost overrun and minimum severe factor is design and documentation. This study show that project site supervision plays very critical role in achieving project effectiveness and cost management. In depth discussion on the above factors in succeeding sections.

Project Site Management

After in depth interviews with the respondent's study shows that project Site management factor major contributor in cost overrun. According to them site management directly link

with material, machinery and labor. Study shows that site supervisor and management team play a vital role in cost management and overrun. This study finding relate with the previous study conducted by Subramani, Sruthi and Kavitha (2014) site management involve in cost overrun when the site supervisor ignore minor issues related to labor and material.

Project Administration

Project Administration also a key factor in cost overrun, Doloi (2013) stated that administration is a back bone of any construction project. According to respondent administration working as umbrella stick in the construction project in which all horizontal bridging sticks relay. Future planning and estimation is the key responsibility of project administration (Durdyev, 2021).

Labor related issues

Labor related issues in construction industry are safety, working time, working condition, wages and benefits, unskilled, unionization and labor shortage. These issues directly handled by site management if not these issues increase cost of the project (Albtoush & Doh, 2019)..

Financial management

One of the primary causes of cost overruns is poor financial management. This can occur for a variety of reasons, including inaccurate budgeting, inadequate cost tracking, Poor cash flow management and ineffective contract management. According to Vijayalaxmi and Khan (2022) to avoid cost overruns, it is essential that construction project managers have a solid understanding of financial management principles and implement effective financial management practices. This includes accurate budgeting, regular cost tracking, effective cash flow management, efficient procurement processes, and effective contract management.

Design and documentation

One of the primary causes of cost overruns is poor design and documentation. This can occur for a variety of reasons, including inadequate design, insufficient detail in the documentation, design changes, incomplete documentation and inadequate communication between all project departments. Design and documentation are critical factors in determining whether a construction project will experience cost overruns (Iqbal, et al, 2019).

Managing Cost Overruns

Cost overrun management in construction industry is very important to achieve project success. Inappropriately, it is very rarely achieving operative cost management and often suffering significant amount of extra cost called cost overrun (Amri, & Marey-Pérez, 2020). In the previous section cost overrun factors discussed on the bases of these factors this research study suggested some cost management and cost mitigation measures for effective cost control to avoid cost overrun factors for achieving project success through interviews.

Table 3

Managing cost overrun Measures

S. No	Measures	Position
1.	Develop a Detailed Budget	According to respondents detailed budget minimize extra expenditure.
2.	Use Accurate Cost Estimation Methods	Respondents said that cost estimation provide base for developing budget fairly.
3.	Establish Clear Project Goals and Objectives	According to respondent's experience establish clear project goals and objectives increase project success through common direction.
4.	Monitor Progress Regularly	Respondents said that monitoring progress regularly also play a role to control cost overrun
5.	Implement a Change Management Process	According to respondents in construction projects changing in design and legal documentation also increase the cost that's why implement a change management process
6.	Use Technology to Manage Costs	Interview respondents said that now a days is better for project success to use

	technology to manage cost as much as possible.
7. Risk Management	According to respondents in the existing scenario in our construction industry risk management not implement properly that's why many projects in crises.
8. Scope Management	According to respondents experience that scope management also a unique measures to control cost effectively.
9. Effective Communication	Respondents share their experiences and suggested effective communication between all stakeholders of the project also beneficial for the cost management.
10. Resource Management	According to respondents resource management measure is a backbone of project success.
11. Contingency Planning	According to respondents risk management and contingency planning is very useful measures to avoid cost overrun in construction industry.

Develop a Detailed Budget

The first step in managing cost overruns is to develop a detailed budget that includes all anticipated costs. This budget should be reviewed regularly and updated as necessary to reflect any changes to the project scope or schedule.

Use Accurate Cost Estimation Methods

Accurate cost estimation is critical to managing cost overruns. Construction managers should use reliable cost estimation methods, such as historical data, industry benchmarks, and expert opinions, to develop accurate estimates.

Establish Clear Project Goals and Objectives

Clear project goals and objectives help to ensure that everyone involved in the project is working towards the same end goal. This helps to avoid confusion, rework, and other inefficiencies that can lead to cost overruns.

Monitor Progress Regularly

Regular monitoring of project progress can help identify potential cost overruns early. This allows project managers to take corrective action before the problem becomes too significant.

Implement a Change Management Process

Changes to the project scope or schedule can quickly cause cost overruns. Implementing a change management process that includes a clear approval process and communication plan can help to prevent these issues.

Hire Experienced Project Managers

Experienced project managers have the skills and knowledge necessary to manage costs effectively. They understand the risks associated with cost overruns and can implement strategies to mitigate them.

Implement Lean Construction Practices

Lean construction practices are designed to reduce waste and improve efficiency, resulting in lower costs. By implementing lean practices such as just-in-time delivery and prefabrication, construction managers can reduce the risk of cost overruns.

Use Technology to Manage Costs

There are many software solutions available that can help construction managers manage costs effectively. These tools can help track expenses, monitor progress, and identify potential cost overruns.

Risk Management

Risk management is an essential component of any project. Project managers should identify potential risks and develop mitigation strategies to deal with them. By identifying

potential risks and developing strategies to mitigate them, project managers can reduce the chances of cost overruns.

Scope Management

Uncontrolled scope creep can lead to cost overruns. Project managers should ensure that the project scope is well-defined and agreed upon by all stakeholders. Changes to the scope of the project should be managed through a formal change control process.

Effective Communication

Effective communication is crucial to the success of any project. The project manager should keep all stakeholders informed of any changes to the project plan, schedule, or budget. This will ensure that everyone is on the same page and that there are no surprises that could lead to cost overruns.

Resource Management

Effective resource management is essential to avoiding cost overruns. Project managers should ensure that resources are allocated appropriately and that they are used efficiently. This includes managing the use of labor, materials, equipment, and other resources.

Contingency Planning

It is always essential to have contingency plans in place to deal with unforeseen events that could cause cost overruns. Project managers should set aside contingency funds and plan for the unexpected.

Research gap for future researches

Many research studies on strategies and best practices for managing cost overruns in the globe conducted very well in the construction industry, there are still many areas that

require further research in Pakistani construction industry. Here are some future research areas:

Cost Estimation Methods

Future research can focus on developing new cost estimation methods that are more accurate and reliable. This research can involve the use of data analytics, machine learning, and other advanced technologies.

Risk Management

While risk management is an essential component of cost overrun management, there is still much to learn about the most effective risk management strategies. Future research can focus on developing new risk management frameworks and tools that can help construction managers identify and mitigate potential risks.

Lean Construction Practices

There is still much to learn about the effectiveness of lean construction practices in managing cost overruns. Future research can focus on identifying the most effective lean practices and developing new tools and methodologies to support their implementation.

Change Management

Change management is critical to managing cost overruns, but there is still much to learn about the most effective change management strategies. Future research can focus on developing new change management frameworks and tools that can help construction managers manage changes more effectively.

Technology in Construction

Technology is playing an increasingly important role in cost overrun management, and there is still much to learn about the most effective technologies and tools. Future research can focus on developing new technologies that can help construction managers manage costs more effectively.

All above gaps are few in numbers there are still many areas that require further research to improve cost overrun management in the construction industry. By addressing these research gaps, construction managers, supervisors, owners and CEOs can develop new and more effective strategies and best practices that can help to minimize the risk of cost overruns and ensure the success of their projects.

Conclusion

In this qualitative research study well organized semi-structured interviews were to discover the major factors of cost overrun for huge construction projects in Karachi, Pakistan. This study also identified managing measures for controlling the cost overrun in projects. Interviews for this study were conducted with well experienced manger, supervisor and project site manager in handling large construction projects. Cost overrun is a significant challenge in the construction industry, and they can have a significant impact on the success of a project. However, with the implementation of effective strategies and best practices, construction managers can mitigate the risk of cost overruns and ensure the success of their projects. Accurate cost estimation, clear project goals and objectives, regular progress monitoring, and the implementation of a change management process are all essential components of cost overrun management. Additionally, hiring experienced project managers, implementing lean construction practices, and using technology to manage costs can also be effective in managing cost overruns. By adopting these strategies and best practices, construction managers can reduce the risk of cost overruns and deliver projects on time and within budget.

References

Arantes, A., & Ferreira, L. M. (2020). A methodology for the development of delay mitigation measures in construction projects. *Production Planning & Control*, *32*(3), 228–241. https://doi.org/10.1080/09537287.2020.1725169

Albtoush, A. M., Doh, S. I., Rahman, A. R., & Albtoush, J. A. A. (2020). Factors effecting the cost management in Construction Projects. *International Journal of Civil Engineering and Technology (IJCIET), 11*(1). **DOI.**org/10.34218/ijciet.11.1.2020.011

Alfreahat, D., & Sebestyén, Z. (2022). A construction–specific extension to a standard project risk management process. *Organization, Technology and Management in Construction: An International Journal*, *14*(1), 2666–2674. https://doi.org/10.2478/otmcj-2022-0011

Alzara, M., Kashiwagi, J. & Al-Tassan, A. (2016). Analysis of cost overruns in Saudi Arabia construction projects: A university case study. *Journal for the Advancement of Performance Information and Value, 10*(1), 84-101.DOI:10.37265/japiv.v10i1.24

Alwi, S. K. K., & Shaiq, M. (2021). ROLE OF HUMAN RESOURCE PRACTICESAND STAFF SATISFACTION ONORGANIZATIONAL PERFORMANCE. Journal of Contemporary Issues in Business and Government Vol, 27(6)

Annamalaisami, C. D., & Kuppuswamy, A. (2021). Managing cost risks: Toward a taxonomy of cost overrun factors in building construction projects. *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering*, *7*(2), 04021021. DOI:10.1061/ajrua6.0001132

Abd El-Razek, M. E., Bassioni, H. A., & Mobarak, A. M. (2008). Causes of delay in building construction projects in Egypt. *Journal of Construction Engineering and Management, 134*(11), 831-841. doi.org/10.1061/(ASCE)0733-9364(2008)134:11(831)

Amri, T., & Marey-Pérez, M. (2020). Towards a sustainable construction industry: Delays and cost overrun causes in construction projects of Oman. *Journal of Project Management*, *5*(2), 87-102. DOI: 10.5267/j.jpm.2020.1.001

Blocher, E. J., Stout, D. E., Juras, P. E., & Smith, S. (2019). *Cost Management (A Strategic Emphasis) 8e*. McGraw-Hill Education. ISBN10: 1259917029 | ISBN13: 9781259917028

Bilgin, P. (2019). *Project-based innovation performance assessment in the housing sector: a case study using innovation radar* (Master's thesis, Middle East Technical University).

Bin Seddeeq, A., Assaf, S., Abdallah, A., & Hassanain, M. A. (2019). Time and cost overrun in the Saudi Arabian oil and gas construction industry. *Buildings*, *9*(2), 41. https://doi.org/10.3390/buildings9020041

Dlamini, M., & Cumberlege, R. (2021). The impact of cost overruns and delays in the construction business. In *IOP Conference Series: Earth and Environmental Science* (Vol. 654, No. 1, p. 012029). IOP Publishing. DOI 10.1088/1755-1315/654/1/012029

Durdyev, S., & Hosseini, M. R. (2020). Causes of delays on construction projects: a comprehensive list. *International journal of managing projects in business*, *13*(1), 20-46. https://doi.org/10.1108/IJMPB-09-2018-0178

Durdyev, S. (2021). Review of construction journals on causes of project cost overruns. *Engineering, Construction and Architectural Management*, *28*(4), 1241-1260. DOI: https://doi.org/10.1108/ECAM-02-2020-0137

Doloi, H. (2013). Cost overruns and failure in project management: Understanding the roles of key stakeholders in construction projects. Journal of construction engineering and management, 139(3), 267-279. DOI:10.1061/(ASCE)CO.1943-7862.0000621

Ghazal, M. M., & Hammad, A. (2022). Application of knowledge discovery in database (KDD) techniques in cost overrun of construction projects. *International Journal of Construction Management*, 22(9), 1632-1646. DOI:10.1080/15623599.2020.1738205.

Gamil, Y., & Alhagar, A. (2020). The impact of pandemic crisis on the survival of construction industry: a case of COVID-19. *Mediterranean Journal of Social Sciences*, 11(4), 122-122. DOI: https://doi.org/10.36941/mjss-2020-0047

Ghallab, A. H. O., & Hosain, M. S. (2020). Factors affecting the cost accuracy of construction projects: Arab contractors in Egypt. *International Journal of Construction Project Management*, 12(2), 175-211.

- Gamil, Y., Abd Rahman, I., & Nagapan, S. (2019). Investigating the effect of poor communication in terms of cost and time overruns in the construction industry. *Management*, 9(2), 94-106. DOI:10.14424/ijcscm902019-94-106

Goel, S., Oberoi, S., & Vats, A. (2021, December). Construction cost estimator: an effective approach to estimate the cost of construction in metropolitan areas. In 2021 3rd International Conference on Advances in Computing, Communication Control and Networking (ICAC3N) (pp. 122-127).IEEE.DOI: 10.1109/ICAC3N53548.2021.9725740

Haseeb, M., Bibi, A., & Rabbani, W. (2011). Problems of projects and effects of delays in the construction industry of Pakistan. *Australian Journal of Business and Management Research*, 1(5), 41-50. DOI:10.52283/NSWRCA.AJBMR.20110106A05

Hwang, B. G., Shan, M., Zhu, L., & Lim, W. C. (2020). Cost control in megaprojects: efficacy, tools and techniques, key knowledge areas and project comparisons. *International Journal of Construction Management*, 20(5), 437-449. DOI:10.1080/15623599.2018.1484976

Iqbal, A., Rehman, H. S. U., Munir, M., Ashiq, M., Omar, A., Haider, Z., ... & Jahanzaib, M. (2019). Time and cost overrun in construction projects of Pakistan. *Pakistan Journal of Engineering and Technology*, 2(2), 22-29. DOI: https://doi.org/10.51846/vol2iss2pp22-29

Johnson, R. M., & Babu, R. I. I. (2020). Time and cost overruns in the UAE construction industry: a critical analysis. International Journal of Construction Management, 20(5), 402-411. DOI:10.1080/15623599.2018.1484864

Johari & Jha, (2021). Learning curve models for construction workers. Journal of Management in Engineering, 37(5), 04021042. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000941

Khan, m., ghauri, s., khan, s., hasan, j. & shaikh, r. 2022a. A phenomenological study to analyze people trust over zakat mustahiq institutions. Periodicals of social sciences, 2 (2).

Khan, s., rasheed, r., rashid, a., abbas, q. & mahboob, f. 2022b. The effect of demographic characteristics on job performance: an empirical study from pakistan. *The journal of asian finance, economics and business*, 9, 283-294. DOI: 10.13106/jafeb.2022.vol9.no2.0283

Khan, s., zaman, s. I. & rais, m. 2022c. Measuring student satisfaction through overall quality at business schools: a structural equation modeling: student satisfaction and quality of education. *South Asian Journal of Social Review* (issn: 2958-2490), 1, 34-55. https://doi.org/10.57044/SAJSR.2022.1.2.2210

KV, P., V, V., & Bhat, N. (2019). Analysis of causes of delay in Indian construction projects and mitigation measures. *Journal of Financial Management of Property and Construction*, 24(1), 58-78. https://doi.org/10.1108/JFMPC-04-2018-0020

Liu, Y., Chang, R. D., Zuo, J., Xiong, F., & Dong, N. (2023). What leads to the high capital cost of prefabricated construction in China: perspectives of stakeholders? *Engineering, Construction and Architectural Management*, 30(2), 805-832. https://doi.org/10.1108/ECAM-06-2021-0538

Mahmood, t. & mubarik, m. S. 2020. Balancing innovation and exploitation in the fourth industrial revolution: role of intellectual capital and technology absorptive capacity. Technological forecasting and social change, 160, 120248. DOI: 10.1016/j.techfore.2020.120248

Mazhar, w., jalees, t., asim, m., alam, s. H. & zaman, s. I. 2022. Psychological consumer behavior and sustainable green food purchase. *Asia pacific journal of marketing and logistics*.

Miao, m., jalees, t., zaman, s. I., khan, s., hanif, n.-u.-a. & javed, m. K. 2022. The influence of e-customer satisfaction, e-trust and perceived value on consumers repurchase intention in b2c e-commerce segment. *Asia pacific journal of marketing and logistics*, 34, 2184-2206. DOI:10.1108/APJML-03-2021-0221

Mubarik, m. S., kazmi, s. H. A. & zaman, s. I. 2021a. Application of gray dematel-anp in green-strategic sourcing. Technology in society, 64, 101524. DOI: 10.1016/j.techsoc.2020.101524

Mubarik, m. S., naghavi, n., mubarik, m., kusi-sarpong, s., khan, s. A., zaman, s. I. & kazmi, s. H. A. 2021b. Resilience and cleaner production in industry 4.0: role of supply chain mapping and visibility. *Journal of cleaner production*, 292, 126058. doi.org/10.1016/j.jclepro.2021.126058

Musarat, M. A., Alaloul, W. S., & Liew, M. S. (2021). Impact of inflation rate on construction projects budget: A review. *Ain Shams Engineering Journal*, 12(1), 407-414. https://doi.org/10.1016/j.asej.2020.04.009

Nyoni, T. (2019). Cost overrun factors in construction industry: a case of Zimbabwe. MPRAPaperNo.96788, posted03Nov201909:58UTC, P.1-13.

Nawaz, A., Waqar, A., Shah, S. A. R., Sajid, M., & Khalid, M. I. (2019). An innovative framework for risk management in construction projects in developing countries: evidence from Pakistan. Risks, 7(1), 24. https://doi.org/10.3390/risks7010024

Obi, L. I., Arif, M., Awuzie, B., Islam, R., Gupta, A. D., & Walton, R. (2021). Critical success factors for cost management in public-housing projects. Construction Innovation, 21(4), 625-647. DOI:10.1108/CI-10-2020-0166.

Phan, V. T. (2020). Contractor's attitude towards risk and risk management in construction in two western provinces of Vietnam. *Engineering, Technology & Applied Science Research*, 10(6), 6418-6421. https://doi.org/10.48084/etasr.3339.

Rashid, Y. (2020). Analysis of delay factors and their effects on construction projects. Management Science Letters, 10(6), 1197-1204. *DOI: 10.5267/j.msl.2019.11.039*.

Shoar, S., Yiu, T. W., Payan, S., & Parchamijalal, M. (2023). Modeling cost overrun in building construction projects using the interpretive structural modeling approach: a developing country perspective. *Engineering, Construction and Architectural Management*, 30(2), 365-392. DOI:10.1108/ECAM-08-2021-0732.

Shehu, Z., Endut, I. R., Akintoye, A., & Holt, G. D. (2014). Cost overrun in the Malaysian construction industry projects: A deeper insight. *International Journal of Project Management*, 32(8), 1471-1480. DOI:10.1016/j.ijproman.2014.04.004.

Shafiei, I., Eshtehardian, E., Nasirzadeh, F., & Arabi, S. (2020). Dynamic modeling to reduce the cost of quality in construction projects. *International Journal of Construction Management, 23(6):*1-14. DOI:10.1080/15623599.2020.1845425.

Subramani, Sruthi, P. S., & Kavitha, M. (2014). Causes of cost overrun in construction. *IOSR Journal of Engineering*, *4*(6), 1-7. DOI: 10.4236/wjet.2020.81001.

Venkataraman & Pinto, (2023). Cost and value management in projects. John Wiley & Sons. DOI:10.1002/9781394207190.

Wang, Z., Cai, X., & Liu, Z. (2022). Survival and Revival: Transition Path of the Chinese Construction Industry During the COVID-19 Pandemic. *Engineering Management Journal*, 1-13. DOI:10.1080/10429247.2022.2108670.

Vijayalaxmi, J., & Khan, U. (2022). Assessment of factors affecting time and cost overruns in construction projects. In Risk, Reliability and Sustainable Remediation in the Field of Civil and Environmental Engineering (pp. 511-521). Elsevier. https://doi.org/10.1016/B978-0-323-85698-0.00028-9

Xu, J. (2021, April). Construction project cost management model based on big data. In Journal of Physics: Conference Series (Vol. 1852, No. 2, p. 022017). IOP Publishing. DOI:10.1088/1742-6596/1852/2/022017.

Zafar, d., khan, s. & khan, m. I. 2022. The factors influencing entrepreneurship capabilities in pakistan. *International journal of social science & entrepreneurship*, 2, 47-71. DOI: https://doi.org/10.58661/ijsse.v2i2.36

Zaman, s. I., jalees, t., jiang, y. & kazmi, s. H. A. 2018. Testing and incorporating additional determinants of ethics in counterfeiting luxury research according to the theory of planned behavior. Psihologija, 51, 163-196. DOI:10.2298/PSI170211014Z