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Mitigating Delay Impacts in Construction Projects: An Evaluation of Causes and Strategies

Ijaz Ahmad*, Syed Saad, Syed Nouman Shah, Muhammad Bilal, Fabiha Fatima Agha, Sumayya Obaid[1]

CECOS University of Information Technology and Emerging Sciences Peshawar, Pakistan.

***Email:** ijazahmad@cecos.edu.pk

Abstract

Construction plays a crucial role in driving national economic growth for sustainable development. Nonetheless, delays in many building projects emerged due to various challenges. Identifying and addressing these delays proved essential for ensuring project success. Timely completion stood as a key indicator of project success, whereas delays could result in increased costs and disputes among stakeholders. This study aimed to explore the causes of delays in construction projects and their remedial measures. Specifically, the research investigated delay factors in construction projects across Khyber Pakhtunkhwa, including the Machai Hydro Power Project in Mardan, the Golen Gol Hydro Power Project in Chitral, the KOTO Hydro Power Project in Lower Dir, and the rehabilitation of the Peshawar to Dara Adam Khel carriageway. Data was collected through Google Forms, with participants providing valuable responses. The analysis was conducted using IBM SPSS. Results indicated that land acquisition, client issues, consultant problems, general factors, and budget conflicts had the most significant impact on delays. This study offered important insights into the construction industry, highlighting strategies to mitigate these issues and improve project efficiency.

Keywords

Mitigating, Delay Impacts, sustainability, Strategies, Construction Projects, SDG 9

Introduction

Infrastructure of a country is vastly dependent on the construction industry and serves as a booster for economic growth. Nevertheless, building project delays are frequent and costly with ruined projects tended to finished off at smaller profits from penalties or dispute resolution against contractors (Aydın & Mihlayanlar, 2018). These delays not only increase costs and delay project completion dates, but destroy stakeholder relationships as well (Mejía et al., 2023).
This study is concerned with the research questions that follow.

1. Why most of the Building Projects are postponed?
2. How justified are they really and how do these delays alter the ending or overall productivity of construction projects?

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3. What can be done to mitigate the effects of these delays?

Investigate the variables which causing delay in construction project and suggest recommendation for minimizing it to increase the efficiency of the projects (Zidane & Andersen, 2018).

For these reasons, the aims of this study are to:

1. How much of an impact do these delays have on the results of your work-related projects?
2. Evaluate present delay mitigation techniques.
3. Develop new ideas for construction delay management control and prevention.

This study is driven by the dilemma of project cost and time overruns within the construction industry (Idrees & Shafiq, 2021). The study is intended to support better project outcomes and efficiencies by tackling the root causes of delays, as well as provide practical ways for mitigating it. It is designed to provide information that would be of value on a wide range of construction projects from complex infrastructure projects, large and small style developments (Rasheed et al., 2022).

The most Important feature of this study is that it presents a full examination of the cause of construction projects delays and the potential effectiveness of different mitigation methods (Aziz & Abdel-Hakam, 2016). I used a mixed approach that combines interviews with professionals, allowing for a thorough understanding of the reasons for the delay and the methods that are considered. This study will produce an extensive division of classification of delaying reasons and its effect and various useful reduction methods for building processes (Gebrehiwet & Luo, 2017). These results plan to guide policymakers and business owners.

Despite an abundance of research in this subject area, there exists a less coherent framework that unites the reasons and mitigation measures for construction project delays (Vu, 2017). This study attempts to fill this gap by providing insights and operational recommendations.

There is still a lack of a cohesive framework that unifies the causes and mitigation techniques of construction project delays, despite a wealth of research on the subject. This study aims to close this gap by offering a thorough analysis and practical suggestions.

Delay has become rampant and severe in construction projects and affects the performance of projects that are deemed with time and money. Determining the key factors that are causing delays is necessary to provide remedies or preventive measures next time (Aziz & Abdel-Hakam, 2016). The methods that are generally employed to classify the delays, in which excusable, non-excusable, compensable, non-compensable as well as critical or non-critical (EL-Ghrory, 2015). This kind of categorization helps in apprehending the basis for delays, which in turn aids us to implement the right approach to manage them with ease.

A. Types of Delays

1. Excusable Delays

The meaning of the kind of delays that happen due to some contingency which is beyond the control of the contractor and the owner. More often than not the delay in the works is not the blame of the contractor or the owner but form may support an extension of time.

2. Non-excusable Delays

These delay on the other hand takes place based on matters that are within the control of the contractor or the owner. These delays are typically the responsibility of the contractor or owner and do not warrant time extensions or compensation (Khahro & Memon, 2018).

3. Non-compensable Delays

These are delays that cannot be compensated because, they are as a result of conditions beyond the control of the contractor as well as the owner. Such risks are judicial orders, natural disasters, climatic conditions, employees' strike, and actions of the government.

4. Compensable Delays

These delays are those that are as a result of the owner or other persons contracted by the owner, for instance delays in providing plans or other relevant information (Fakunle & Fashina, 2020).

5. Critical and Non-critical Delays

These are called critical delays - the ones that delay project completion beyond an agreed-upon deadline. On the other hand, a project can also have non-critical delays which do not relate to the entire timeline of task but are related specifically for few activities (Ismaila et al., 2022)

Methodology

The concept of research methodology utilized in this study is a structured approach based on questionnaires to identify the reasons for delays and how these contribute towards delay completion time in construction projects.

A. Data Collection

The study employed structured questionnaires for data of this research. It was formulated following a systematic literature review to identify causes of constriction delays and consultations with experts in the field, developing scope for all potential elements that contribute towards construction delay. This questionnaire was circulated among professionals working in different areas of construction industry like engineers, project managers and other concerned persons from various sites across the Khyber Pakhtunkhwa (KPK), Pakistan.

The Likert scale, also five-point rating system was utilized to measure respondents' opinions regarding the project delay causes (Seman et al., 2023).

Figure 1. Flow chart of Methodology

B. Data Analysis

Analysis Data was analyzed using IBM SPSS and MS Excel. We analyzed the data using following steps;

1. Relative Importance Index (RII)

RII was applied to measure the importance of each delay factor It weights the mean weight of each factor and therefore provides a ranked degree of importance as perceived by respondents.

$RII = \Sigma W / (N \times A)$

$RII = \sum W / (A \times N) \times 100$ (In Percentage)

Where,

W = weighting as assigned on Likert's scale by each respondent in a range from 1 to 5.

Where

1 describes as Strongly Disagree 2 describes as Disagree

3 describes as Neutral 4 describes as Agree

5 describes as Strongly Agree A = Highest weight

N =Total number in the sample

2. Cronbach's Coefficient Alpha Method

Cronbach's alpha assesses reliability by examining the proportion of variance shared among items compared to excessive or random variation as detection error. It can vary between 0-1, but higher values are better (indicating a stronger agreement among items) (Hajjar, 2018).

Table 1. Demographic Information

Table 1	Types of respondents	No of Respondents	Experience
1	Corporate level	2	>12 years
2	Senior level	15	5-12 years
3	Field level	55	3-5 years
4	Others	28	<3 years

Results and Discussion

A. Reliability statistics

Cronbach's alpha is one of the reliability statistics that examines the consistency of a specific measuring device. The range of Cronbach's alpha values is 0 to 1, with a value closer to 1 indicating greater instrument dependability. 0.70+: Good reliability, 0.80+: Better reliability, 0.90+: Excellent reliability.

Table 2. Reliability Statistics Data

Categories	Number of items	Cronbach's Alpha
Overall	40	0.931
Impacts on delay due to Covid-19 Pandemic	4	0.779
Impact due to Clients	4	0.691
Impact due to Contractors	2	0.534
Impact due to Consultants	2	0.708
Impact due to Language Barriers	2	0.610
Impact due to Material Suppliers	4	0.614
Impact due to Budget Conflicts	2	0.684
Impact due to Contract Variances	3	0.606
Impact due to Land Acquisition	3	0.651
Impact due to Equipment supplier	2	0.703
Impact due to Market Inflation	3	0.629
Impact due to climatic conditions	2	0.622
Impact due to General factors	5	0751

B. RII score of Factors causing delay in construction projects

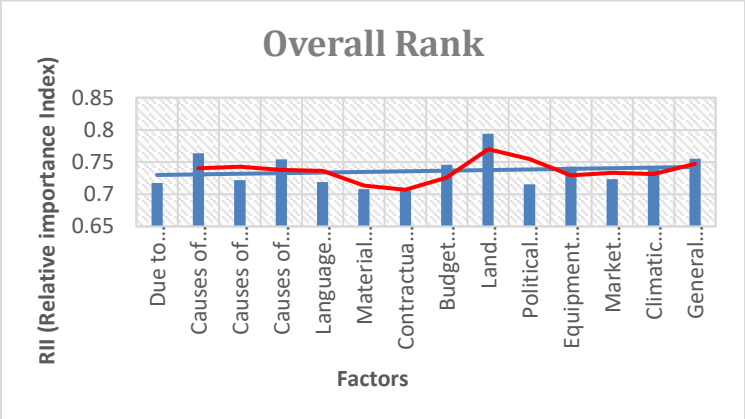

Figure 2. Overall Rank

C. Remedial Measures

The structure that follows is recommended in order to reduce delays in construction projects.

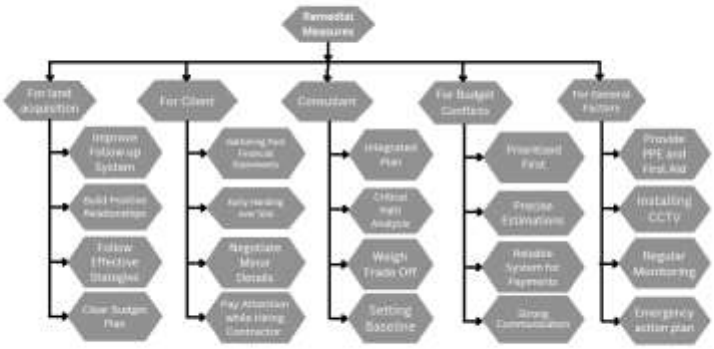

Figure 3. Remedies Strategies

Conclusion

Avoiding delays is crucial due to their detrimental effects on construction projects. Project participants identified potential delay factors and categorized them as critical success criteria to prevent construction delays. Based on our research in the building construction sector, the top five most frequent and impactful delays identified were Land Acquisition, Client-related Issues, General Factors, Consultant-related Issues, Budget Conflicts. By understanding common causes of delays, implementing effective solutions to reduce their impact, and maintaining clear communication throughout the project, the risk of delays can be minimized, ensuring successful outcomes.

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