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FACTORS THAT AFFECT DELAYS IN SCHEDULE PERFORMANCE OF CONSTRUCTION PROJECTS

Nur Afiqah Zulkifli¹

*Universiti Teknologi MARA (UiTM) Kelantan Branch, Kota Bharu Campus, Kelantan, Malaysia,
n.afiqahzul@gmail.com*

Siti Nur Zahirah Omar^{2*}

*Faculty of Business and Management, Universiti Teknologi MARA, Perlis Branch, Arau Campus, Perlis,
Malaysia
sitinurzahirah@uitm.edu.my*

Mariam Setapa³

*Faculty of Business and Management, Universiti Teknologi MARA, Kelantan Branch, Machang Campus,
Kelantan, Malaysia
marial35@uitm.edu.my*

Abstract: Delays in construction projects is a pervasive issue that significantly impacts project performance. This study aims to identify and analyse the critical factors contributing to construction delays across different global regions. Employing a systematic literature review, we analysed data from 33 studies conducted in Africa, Western Asia, Eastern Asia, Southern Asia, South/North America, and globally. The review process began with the identification of key concepts and topics related to construction delays. Searches were conducted in Scopus and Google Scholar, focusing on articles published between 2019 and 2023. Advanced search techniques yielded an initial pool of 87 papers, which was refined to 33 relevant papers for detailed analysis using NVivo software. The results revealed that schedule performance is the most extensively studied aspect, particularly in Southern Asia, Eastern Asia, and Africa. Other performance metrics, such as cost performance, quality performance, and stakeholder satisfaction, receive less attention. Key delay factors identified include management and performance, resource availability, communication and coordination, financial uncertainties, and planning and scheduling. Significant regional variations were observed with the emphasis placed on different delay factors. In conclusion, understanding the multifaceted causes of project delays is crucial for enhancing project management practices and ensuring timely project delivery. This study provides valuable insights into regional differences in the study of construction delays, emphasising the need for targeted strategies to address these issues effectively. The findings aim to contribute to the global improvement of project management practices by identifying and mitigating critical delay factors in construction projects.

Keywords: Schedule performance, construction project, project delay, delay factors

1. Introduction

In the realm of construction project management, adhering to schedules is paramount for successful project completion. However, delays in construction projects persistently challenge industry professionals worldwide, resulting in significant financial losses and disruptions in project timelines. Addressing delay schedule performance in construction projects is crucial due to its substantial financial implications, potential disruptions to project timelines, and broader societal impacts. For instance, delays can strain relationships between clients, contractors, and consultants, potentially leading to disputes, legal battles, and contract cancellations (Sanni et al., 2022). Additionally, delays often result in cost and time overruns, reduced productivity and revenue, and hindered overall project progress (Ahmed et al., 2022; Shirvas & Singla, 2022; Yap et al., 2021). By shedding light on the intricate interplay of factors influencing delay schedule performance, this research aims to contribute to the ongoing discourse surrounding effective project management strategies in the construction industry.

^{2*} Corresponding author: Faculty of Business and Management, Universiti Teknologi MARA, Perlis Branch, Arau Campus, Perlis, Malaysia,

Ultimately, the insights gained from this investigation will serve as a foundation for further research endeavours aimed at enhancing the efficiency and effectiveness of construction project management practices, benefiting practitioners, policymakers, and academics alike.

2. Literature Review

Project delays are a ubiquitous challenge in the construction industry, often resulting in significant financial losses, disputes, and compromised project outcomes (Sanni et al., 2022; Ahmed et al., 2022; Shirvas & Singla, 2022; Yap et al., 2021). Understanding the critical causes of delays and their impact on project schedules is essential for effective project management and timely project delivery. The timely completion of construction projects is a critical aspect of project management, yet delays remain a persistent challenge in the industry. This literature review synthesises key findings from various studies across different categories of delay causes, highlighting trends, recurring patterns, and variations in conceptualisations and approaches.

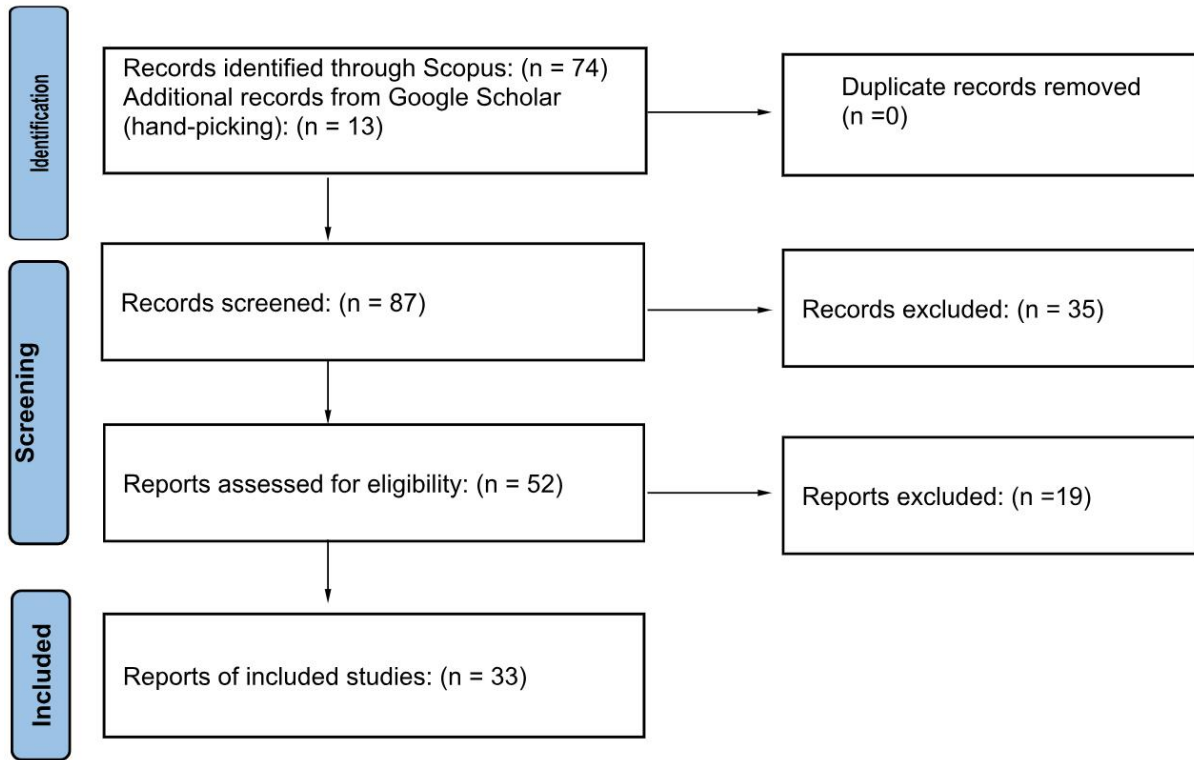
Previous research has identified numerous factors contributing to delays in construction projects, with some studies examining up to 56 causes. In Malaysia, studies often investigate schedule delay factors without specific categorisation. However, Adham (2023) ranked 25 contractor-related delay causes into five management factors. In China, Chen et al. (2019) studied 20 delay causes in grain bin construction. Egwim et al. (2023) analysed 23 common delay factors in Nigeria, while Hossain et al. (2022) identified 50 causes. Mahamid et al. (2022) investigated 14 delay factors in Saudi Arabia, and Memon et al. (2023) examined six in Pakistan. Sharma et al. (2021) studied 48 factors influencing delays in Indian highway projects, and Shirvas and Singla (2022) identified 56 critical delay factors from a literature review. Yap et al. (2021) conducted a meta-analysis of 52 common delay causes, categorising 20 under clients, contractors, consultants, labour and equipment, materials, and other factors. To address the variety of delay causes, Amarkhil et al. (2023) proposed a standardised framework categorising them into 14 distinct groups.

A review of the literature identifies several key factors contributing to construction project delays. Poor site management and subcontractor performance account for 70% of delays (Adham, 2023). Changes to project design or scope are among the most critical factors affecting schedule performance (Zhoa et al., 2023), alongside scheduling issues (Sharma et al., 2021; Yap et al., 2021). Financial challenges are highlighted as critical contributors to delays (Qazi et al., 2021). Manpower issues and inadequate scheduling and control techniques are also significant (Mahamid, 2022), while changes, material availability, and financial problems emerge as crucial delay factors (Hossain et al., 2022). Additionally, rework due to construction errors, poor site management, inexperienced project managers, and design changes are identified as key causes of time overruns (Ellis et al., 2019). Addressing these issues requires a thorough understanding of the multifaceted causes of delays and proactive strategies to improve project management, enhance coordination, and optimize schedules for timely delivery.

3. Methodology

This study employs a systematic literature review (SLR) combined with a strategic hand-picking approach to comprehensively identify, analyse, and synthesise research findings on factors contributing to delays in construction projects across different regions. The dual approach of database searching and handpicking ensures a robust selection of literature, particularly capturing region-specific studies that are less indexed in major academic databases. The database search focused on articles published between 2019 and 2023. In addition to the database search, a hand-picking strategy was implemented to capture key studies that may not be included in Scopus but are influential or regionally focused. The figure below shows the PRISMA flow diagram which illustrates the overall SLR and strategic hand-picking approach.

Figure 3.1: PRISMA Flow Diagram



4. Findings

The collected data from these investigations was analysed to investigate significant delay factors that will affect the performance of the project schedule in construction projects.

Table 4.1: Independent variable versus location of studies

	CB	CC	DA	DS	EK	FP	MP	PS	PSP	RC	RA	RU	SC	WC
Africa	3	6	4	4	3	5	6	5	3	5	6	2	3	3
Western Asia	0	2	1	2	1	3	2	0	1	1	1	2	2	2
Eastern Asia	1	4	3	4	3	6	6	5	0	3	4	3	4	1
Southern Asia	1	4	4	4	3	3	5	5	2	4	3	2	2	0
South / North America	0	2	2	2	2	2	1	2	1	1	2	1	1	1
Global	1	5	4	4	3	4	4	4	3	4	5	4	6	4

CC - Communication and coordination
 CB - Corruption and bureaucracy
 DA - Decision making and approving
 DS - design and specification
 EK - experience and knowledge
 FP - financial and price escalation uncertainty
 MP - management and performance

PS - planning and scheduling
 PSP - political and security problem
 RC - regulation and contract requirement
 RA - Resources Availability (Equipment/ Labour/ Material)
 RU - risk assessment and uncertainty
 SC - scope change and work variation
 WC - weather and climate

Table 4.1 presents a detailed analysis of the number of articles focusing on various factors influencing construction performance across different regions. In Africa, a diverse range of factors is studied extensively, with the highest focus on management and performance (6 studies), followed by resource availability (6 studies), communication and coordination (6 studies), planning and scheduling (5 studies), and financial and price escalation uncertainty (5 studies). Western Asia has a narrower

focus, with 3 studies on financial and price escalation uncertainty, 2 studies each on communication and coordination, scope change and work variation, decision making and approving, planning and scheduling, experience and knowledge, and risk assessment and uncertainty. Eastern Asia shows a more balanced distribution, with 6 studies each on financial and price escalation uncertainty, management and performance, and planning and scheduling.

Southern Asia displays a strong focus on management and performance, planning and scheduling, and decision making and approving, each with 5 studies. South/North America has a limited focus, with most factors having 1 to 2 studies. The highest number of studies are on planning and scheduling (2), followed by communication and coordination, decision making and approving, design and specification, experience and knowledge, financial and price escalation uncertainty, regulation and contract requirements, resource availability, and scope change and work variation. Globally, the focus is relatively well-distributed with 6 studies on scope change and work variation, 5 studies on communication and coordination, regulation and contract requirements, and resource availability. This data highlights the varying emphasis on different factors affecting construction performance across regions, with some regions focusing more on certain areas while neglecting others. This disparity suggests regional differences in the perceived importance of these factors and the need for more balanced research to comprehensively address construction performance issues worldwide.

5. Discussion

The findings from the analysis of the collected data on significant delay factors in construction projects reveal important insights into regional variations and focus areas within the field of construction performance. This discussion will delve into the implications of these findings, highlight key patterns, and suggest areas for future research.

Dominant Delay Factors by Region

In Africa, a broad range of factors affecting construction performance is studied extensively, with putting particular attention to management and performance, resource availability, and communication and coordination. The emphasis on these areas suggests that African construction projects may face significant challenges related to resource management, effective communication, and project management capabilities.

Western Asia's narrower focus, primarily on financial uncertainties and management-related factors, indicates that economic instability and project management practices are significant concerns in this region. This might reflect the region's economic environment and the need for robust financial planning and effective management strategies.

Eastern Asia exhibits a more balanced distribution of studies across various factors, highlighting a comprehensive approach to understanding construction performance. The focus on financial uncertainties, management and performance, and planning and scheduling suggests that these areas are critical for the success of construction projects in this region. Southern Asia's strong focus on management, planning, and decision-making reflects the importance of strategic project management and effective planning in mitigating delays. The significant number of studies on these topics indicates that these factors are perceived as primary contributors to project success in Southern Asia. South/North America's limited focus, with a relatively even distribution across different factors, suggests a more generalised approach to studying construction performance. However, the low number of studies in this region points to a potential need for more in-depth research to understand the unique challenges faced by construction projects in these areas.

Research Gap

The novelty of this research lies in its systematic exploration of the distinct factors contributing to construction delays across various global regions. Unlike previous studies that often examine construction delays within a single country or region, this study compares findings from diverse geographic areas, highlighting both universal delay factors and unique regional challenges. This regional analysis is critical because, while many factors affecting construction delays

are recognised globally, the ways in which they manifest and are managed can vary significantly based on local economic conditions, regulatory frameworks, and resource availability. According to Selcuk et al. (2024), different countries or regions may change the causes of delays. This methodological approach not only identifies common delay factors but also provides actionable insights for policymakers and construction managers, emphasising the need for region-specific strategies.

Implications for Future Research

The findings underscore the necessity for a more balanced and comprehensive approach to studying construction performance globally. Future research should aim to bridge the gaps identified in cost and quality performance studies and increase the focus on stakeholder satisfaction. While significant progress has been made in understanding the factors contributing to delays in construction projects, there remains a need for more diversified and balanced research. By addressing the identified gaps and regional disparities, future studies can contribute to more effective strategies for managing delays and enhancing the overall performance of construction projects worldwide.

6. Conclusion

This study has systematically analysed the significant delay factors affecting the performance of construction project schedules across various regions. The findings underscore the predominant focus on schedule performance in construction projects, particularly in Southern Asia, Eastern Asia, and Africa. This emphasis reflects the critical impact of time delays on the overall success of construction projects. Key delay factors such as management and performance, resource availability, communication and coordination, financial uncertainties, and planning and scheduling were identified as significant contributors to construction delays. The regional variations in the emphasis on these factors highlight the different challenges faced by construction projects in diverse geographical contexts. For instance, Africa's extensive focus on resource management and communication issues suggests specific regional challenges that may not be as prominent in other areas. Overall, the study emphasises the need for a balanced and holistic approach to researching construction performance, addressing not only schedule delays but also other critical dimensions such as cost, quality, and stakeholder satisfaction. In conclusion, while this study has provided valuable insights into the delay factors affecting construction projects, continued research is essential to address the identified gaps and enhance the overall understanding of construction performance. By adopting a comprehensive and balanced approach, future studies can contribute to more effective management practices, leading to timely and successful project delivery.

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