

A Conceptual Analysis of The Relationship Between Payment Delays and Construction Project Delay Risks

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ABSTRACT

Delayed payment is a critical issue in construction projects as it directly affects contractor cash flow and project performance. Payment delays may cause disruptions in material procurement, labor wages, equipment mobilization, and workflow continuity, which can increase the risk of project delays and cost overruns. This study aims to examine the conceptual relationship between delayed payments and project delay risks through a **Systematic Literature Review (SLR)** using the PRISMA framework. A total of 155 articles were identified from Scopus, Google Scholar, and ScienceDirect, of which 20 articles were selected for final analysis. The findings indicate that owner cash flow problems, slow approval processes, incomplete documentation, contractual disputes, and bureaucratic constraints are the main causes of payment delays. These delays lead to cash flow disruption, reduced productivity, and project schedule overruns. This study proposes a conceptual framework that explains the causal pathway from payment delay to project delay, contributing to a broader understanding of payment governance in construction management.

KEYWORDS: delayed payment, construction project, project delay, contractor cash flow, systematic literature review

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1. INTRODUCTION

The construction industry plays a significant role in economic development by contributing to infrastructure expansion, employment generation, and national productivity. However, construction projects are often characterized by high uncertainty, complex stakeholder interactions, and substantial financial dependencies. Among the many challenges faced in project execution, delayed payment has emerged as one of the most critical issues affecting project performance.

In construction projects, contractors rely heavily on periodic payments from project owners to sustain operational activities such as material procurement, labor wages, equipment mobilization, and subcontractor payments. Unlike many other industries, construction projects operate with continuous cash flow requirements due to the progressive nature of work execution. Therefore, any delay in payment can immediately disrupt project operations and financial stability.

Delayed payment occurs when the agreed payment schedule in the contract is not fulfilled within the specified time. This issue may arise due to various factors, including owner liquidity problems, bureaucratic approval procedures, incomplete documentation, and contractual disputes. According to several studies, delayed payments are frequently cited as one of the leading causes of contractor cash flow difficulties, especially in infrastructure and public-sector projects.

The consequences of delayed payment are not limited to financial pressure on contractors. In many cases, delayed payments trigger a chain of operational problems such as postponed procurement of materials, delayed labor payments, reduced workforce productivity, and interruptions in equipment mobilization. These disruptions eventually affect project schedules and may lead to significant project delays and cost overruns. This indicates that delayed payment should not be viewed solely as a financial issue, but rather as a systemic risk that affects the entire project delivery process.

Previous studies have examined payment delays from various perspectives, including financial management, contractual governance, and dispute resolution. However, much of the existing literature tends to analyze these issues in isolation. Limited studies have systematically synthesized how payment delays translate into operational inefficiencies and ultimately affect project completion time. This fragmented understanding creates a gap in the literature regarding the broader causal relationship between payment delays and project delays.

To address this gap, this study applies a **Systematic Literature Review (SLR)** using the PRISMA framework to analyze and synthesize previous studies on delayed payments in construction projects. The purpose of this study is to identify the major factors causing payment delays, examine their impacts on project performance, and develop a conceptual framework illustrating the relationship between payment delays and project delays. This study contributes to the construction management body of knowledge by providing an integrated conceptual model that links financial disruption to operational consequences and project performance deterioration. The findings are expected to support contractors, project owners, and policymakers in improving financial governance, contractual clarity, and risk mitigation strategies for more effective project delivery.

The remainder of this paper is structured as follows: Section 2 presents the research methodology, including the SLR and PRISMA approach. Section 3 explains the literature selection and data extraction process. Section 4 discusses the findings and develops the conceptual framework. Finally, Section 5 presents the conclusions and recommendations for future research.

2. RESEARCH METHODOLOGY

2.1 Research Design

This study employed a **Systematic Literature Review (SLR)** approach to examine the conceptual relationship between delayed payments and project delay risks in construction projects. The SLR method was chosen because it provides a structured and transparent process for identifying, evaluating, and synthesizing relevant literature. The review process followed the PRISMA framework to ensure systematic selection and analysis of the studies.

2.2 Literature Search Strategy

The literature search was conducted using three academic databases:

- Scopus
- Google Scholar
- ScienceDirect

The search covered articles published between **2019 and 2025** using keywords such as:

- *payment delay in construction projects*
- *contractor cash flow delay*
- *project delay due to payment delay*
- *financial risks in construction*

A total of **155 articles** were initially identified.

2.3 Inclusion and Exclusion Criteria

The selection process applied the following criteria:

Inclusion Criteria

- Published between 2019–2025
- Written in English
- Peer-reviewed journal articles
- Related to payment delays in construction projects
- Full-text accessible

Exclusion Criteria

- Duplicate articles
- Non-construction studies
- Conference abstracts only
- Irrelevant financial topics
- Low methodological quality

2.4 Screening Process (PRISMA)

The screening process followed four PRISMA stages:

- **Identification:** 155 articles collected
- **Screening:** 25 duplicates removed, 130 screened
- **Eligibility:** 55 full-text articles assessed
- **Included:** 20 articles selected for final review

This process ensured that only relevant and high-quality studies were included.

2.5 Data Extraction and Analysis

After the final selection process, the 20 eligible articles were systematically extracted using a structured data extraction table.

The purpose of the data extraction process was to organize key information from each study to support thematic analysis and conceptual framework development.

Table 1: The extracted variables included

Variable	Description
Author(s)	Name of researchers and publication year
Research Focus	Main topic investigated
Main Findings	Key findings related to delayed payment
Relevance	Degree of contribution to the research objective

This extraction process enabled consistent comparison across studies and facilitated the identification of recurring themes.

The extracted data were summarized in **Table 2**.

Table 2. Data Extraction of Selected Studies

Data Extraction Table

No	Author(s)	Research Focus	Main Findings	Relevance
1	Chadee et al. (2023)	Delayed payments and contractor cash flow	Payment delays disrupt contractors' cash flow and increase debt exposure	Very High
2	Xie et al. (2019)	Payment chain delay simulation	Delays from owner to contractor and subcontractor create systemic impacts on project progress	Very High
3	Abd Aziz et al. (2022)	Delay mitigation strategies (SLR)	Identified mitigation strategies to minimize project delays caused by financial disruptions	High
4	Balogun et al. (2019)	Cash flow problems in construction projects	Delayed payments are among the main causes of negative contractor cash flow	High
5	Chadee et al. (2023)	Risk response framework	Proposed mitigation frameworks for delayed payment management	High
6	Rathnayake et al. (2023)	Contractor debt escalation	Payment delays significantly increase contractors' debt ratios	High
7	Zheng et al. (2019)	System dynamics in payment chains	Payment delays amplify project schedule slippage through cascading effects	High
8	Gilbert (2025)	Industry survey on delayed payments	Most contractors experience payment delays affecting operational continuity	Medium
9	Balogun et al. (2019)	Cash flow and project performance relationship	Poor cash flow contributes directly to project delays	High
10	Xie et al. (2019)	Payment policy scenario analysis	Faster payment systems reduce project delays and improve resource flow	High
11	Chadee et al. (2023)	Variation orders and payment delays	Late variation order approvals trigger payment delays	High
12	Chadee et al. (2023)	Subcontractor payment issues	Payment delays create a domino effect throughout the subcontracting chain	High
13	Xie et al. (2019)	Resource mobilization constraints	Delayed payments limit resource mobilization efficiency	High
14	Abd Aziz et al. (2022)	Contract clarity and delay prevention	Clear contractual clauses reduce payment-related risks	Medium
15	Balogun et al. (2019)	Budgetary control and payment issues	Poor budgetary planning worsens delayed payment impacts	Medium
16	Chadee et al. (2023)	Public sector construction projects	Public projects are more vulnerable to delayed payment occurrences	High
17	Xie et al. (2019)	Owner-contractor payment chain	Owner payment delay is the root cause of cascading delays in construction supply chains	Very High
18	Balogun et al. (2019)	Profitability impacts of delayed payments	Delayed payments reduce contractor profitability and increase financial pressure	High
19	Chadee et al. (2023)	External factors and payment delays	Political and economic instability influence delayed payment frequency	Medium
20	Xie et al. (2019)	Systemic causal modeling	Developed a causal model linking payment delays to project delays	Very High

3. RESULTS AND DISCUSSION

3.1 Overview of Selected Studies

This study reviewed 20 selected articles through the Systematic Literature Review (SLR) process using the PRISMA framework. The selected literature spans from 2019 to 2025 and covers diverse aspects of payment delay in construction projects, including contractor cash flow management, contractual administration, dispute resolution, financial risks, and project performance outcomes.

The distribution of studies demonstrates that delayed payment is a persistent issue across various construction sectors, including residential, commercial, and infrastructure projects. Public infrastructure projects were found to have a higher tendency for payment delays due to more complex administrative procedures and budget approval systems. In contrast, private-sector projects mainly experienced payment delays due to cash flow instability and contractual disputes.

The literature also reveals that delayed payment is not an isolated financial issue. Instead, it functions as an interconnected risk factor affecting multiple dimensions of project execution. This finding supports the idea that financial management and project performance are closely interdependent. Another important observation is the increasing attention from researchers on payment-related risks after 2020, especially as economic uncertainties and supply chain disruptions intensified globally. This indicates the growing recognition of financial governance as a key determinant of project success.

3.2 Major Factors Causing Payment Delays

The thematic analysis identified five major causes of delayed payments. These factors were repeatedly mentioned across the reviewed studies, indicating strong consistency in the literature.

3.2.1 Owner Cash Flow Problems

Owner cash flow instability emerged as the most dominant cause of payment delays. This occurs when project owners fail to maintain sufficient liquidity to meet scheduled payment obligations. Financial difficulties may arise from budget mismanagement, delayed funding from external financiers, or broader economic downturns. In public projects, budget disbursement often depends on fiscal cycles, which may not align with project timelines.

The significance of this factor lies in its direct influence on contractors' operational capacity. Since construction projects depend heavily on regular cash inflow, any disruption at the owner level creates immediate downstream consequences. This finding aligns with financial dependency theory, where contractors are highly dependent on external capital inflow for sustaining operational continuity.

3.2.2 Slow Approval and Certification Process

Payment certification is an essential process in verifying completed work before payment release. However, the review found that administrative inefficiencies frequently delay this process. The complexity of verification procedures, especially in projects involving multiple consultants and engineers, creates bottlenecks. In many cases, approval delays are not caused by financial shortages but by procedural inefficiencies.

This issue is particularly critical in public infrastructure projects where hierarchical approval systems often involve multiple layers of bureaucracy. The findings suggest that improving approval efficiency may significantly reduce payment delays even without changing the owner's financial capacity.

3.2.3 Incomplete Documentation

Documentation quality plays a crucial role in payment processing. Contractors are required to submit accurate progress claims, invoices, supporting evidence, and change order documentation. Incomplete or inconsistent documentation often results in claim rejection or delayed verification.

This issue reflects weak administrative capacity and poor document management systems. It also highlights the importance of integrating digital documentation systems into construction contract administration.

In practical terms, this factor is highly preventable compared to financial or institutional constraints.

3.2.4 Contractual Disputes

Contractual disputes are another major contributor to payment delays. These disputes usually arise from disagreements regarding:

- work quality,
- variation order valuation,
- measurement quantities,
- contract interpretation.

Unclear contractual clauses significantly increase the likelihood of disputes. When disputes occur, owners often suspend payment until clarification is achieved. This creates not only financial delays but also trust issues between project stakeholders.

The review indicates that stronger contractual governance could reduce uncertainty and improve payment reliability.

3.2.5 Bureaucratic and Institutional Constraints

Institutional inefficiencies are especially common in government-funded projects. Budget approvals often require multiple authorizations, and payment disbursement can be affected by administrative regulations. These institutional barriers create systematic delays regardless of project performance.

Unlike technical issues, bureaucratic constraints are often beyond the contractor's control, making them more difficult to mitigate. This finding emphasizes the role of governance reform in improving construction payment systems.

3.3 Impacts of Payment Delays on Project Performance

The reviewed literature consistently shows that delayed payments generate significant negative impacts on project performance.

These impacts are both direct and indirect, creating a chain reaction across the project lifecycle.

3.3.1 Contractor Cash Flow Disruption

Cash flow disruption is the immediate and most critical consequence of payment delays. Contractors rely on periodic progress payments to finance day-to-day activities. When payments are delayed, contractors often face liquidity shortages, forcing them to use internal reserves or external borrowing.

This increases financial stress and reduces profit margins. In severe cases, prolonged cash flow disruption can lead to insolvency or project abandonment. This finding confirms that payment reliability is central to contractor sustainability.

3.3.2 Material Procurement Delays

Material procurement is one of the first operational activities affected by cash shortages. Without adequate funds, contractors may postpone material purchases, leading to interruptions in critical construction activities.

This issue becomes more severe in projects relying on imported materials or long-lead items. The review found that procurement delays often act as the earliest indicator of broader project schedule risks.

3.3.3 Labor Payment Delays

Labor wage payment is highly sensitive to contractor liquidity. Delayed wages reduce workforce morale, increase absenteeism, and may trigger labor strikes. Since labor productivity is directly linked to project progress, payment instability at this level can severely affect site performance. This finding shows that financial problems quickly translate into human resource challenges.

3.3.4 Productivity Decline

Productivity decline occurs as a cumulative effect of multiple disruptions, including material shortages, workforce instability, and equipment underutilization. From a lean construction perspective, workflow interruptions reduce process efficiency and increase waste. This supports the theory that stable resource flow is essential for maintaining project productivity.

The review indicates that payment delays are a hidden driver of productivity loss.

3.3.5 Project Delay and Cost Overrun

Project delay is the final and most visible consequence. As operational disruptions accumulate, project milestones become difficult to achieve. Schedule overruns often result in cost escalation due to:

- prolonged overhead,
- extended equipment rental,
- inflation,
- additional supervision costs.

This creates a dual burden on contractors: reduced income and increased expenditure. The literature strongly supports the conclusion that delayed payment is one of the major contributors to project delay.

3.4 Conceptual Relationship Between Payment Delay and Project Delay

The synthesis of the reviewed studies enabled the development of a conceptual framework illustrating the causal relationship between payment delays and project delays. The relationship is not linear but progressive. A delay in owner payment first creates contractor cash flow instability. This financial stress then limits access to critical resources such as materials, labor, and equipment. As resource availability decreases, workflow continuity becomes unstable, reducing productivity and increasing idle time. Eventually, these operational inefficiencies accumulate and result in schedule overruns.

This conceptual framework contributes to the literature by integrating fragmented findings into a single causal pathway. It provides a stronger theoretical basis for understanding payment delay as a systemic project risk.

3.5 Proposed Conceptual Framework

The following is the proposed framework of this study:

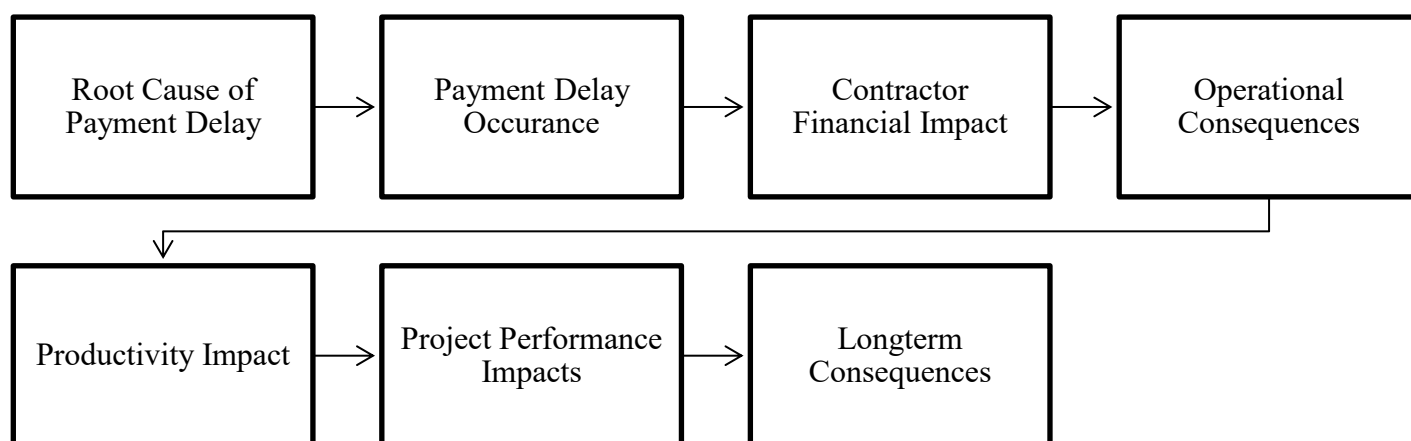


Figure1. Proposed Framework

Explanation of the Framework

This conceptual framework illustrates the causal relationship between delayed payments and project performance deterioration in construction projects.

The framework begins with **root causes**, where financial, administrative, and contractual factors trigger payment delays. Among these, owner cash flow problems and slow approval systems are the most dominant drivers.

Once payment delays occur, contractors immediately experience **financial impacts**, particularly cash flow disruption. Since construction activities depend on regular progress payments, contractors face difficulties maintaining operational liquidity. This financial pressure then leads to **operational consequences**, such as delayed procurement of materials, postponed labor payments, and limited equipment mobilization. These disruptions create instability in project workflows.

The accumulation of operational disruptions results in **productivity impacts**, where labor efficiency decreases, idle time increases, and workflow continuity is interrupted. Ultimately, these productivity losses translate into **project performance impacts**, including schedule overruns, cost escalation, and intensified contractual disputes. In the long term, if delayed payments persist, contractors may face severe financial distress, reduced profitability, damaged stakeholder relationships, and even project failure.

3.6 Mitigation Strategies

The reviewed studies suggest several strategies to reduce the occurrence and impact of delayed payments.

A. Improving Contractual Clarity

Clear contract clauses reduce ambiguity in payment procedures. Well-defined payment terms improve accountability and reduce disputes. Standardized contracts such as FIDIC provide strong guidance for payment governance.

B. Digital Payment Monitoring Systems

Digital tools improve transparency, reduce administrative errors, and speed up approval processes. Platforms such as Autodesk Construction Cloud allow real-time documentation and claim verification. This improves efficiency and reduces documentation-related delays.

C. Financial Risk Assessment Before Contract Award

Assessing owner financial capability before contract signing is critical. This helps contractors evaluate payment reliability and avoid high-risk projects. Such assessments can improve financial decision-making.

D. Early Dispute Resolution Mechanisms

Early intervention mechanisms such as Dispute Boards can resolve payment disagreements before they escalate. This improves trust and reduces prolonged payment suspension. It also strengthens collaborative project governance.

3.7 Research Gap and Future Research Opportunities

Despite extensive literature on payment delays, several gaps remain. Most studies focus on isolated variables rather than integrated causal relationships. There is limited development of conceptual frameworks that explain how delayed payments evolve into operational risks.

Comparative studies between public and private projects remain scarce.

Additionally, the role of digital financial governance in reducing payment delays is still underexplored. Future research should validate the proposed conceptual framework through empirical studies and explore technology-based solutions for payment management.

4. CONCLUSION

This study examined the conceptual relationship between delayed payments and project delay risks in construction projects through a **Systematic Literature Review (SLR)** using the PRISMA framework. A total of 20 relevant studies published between 2019 and 2025 were reviewed and analyzed to identify the main causes, impacts, and mitigation strategies related to delayed payments.

The findings indicate that delayed payment is a significant and recurring issue in construction project management. The review identified five major factors contributing to delayed payments: owner cash flow problems, slow approval and certification processes, incomplete documentation, contractual disputes, and bureaucratic constraints. Among these, owner cash flow instability and delayed administrative approval were found to be the most dominant factors.

The study also found that delayed payments have substantial impacts on project performance. The most immediate effect is contractor cash flow disruption, which directly affects the ability to finance materials, labor, and equipment. This financial pressure creates operational constraints, including delayed material procurement, postponed labor payments, reduced workforce productivity, and interrupted workflow continuity. These cumulative disruptions ultimately increase the risk of project delays and cost overruns.

Based on the synthesis of the reviewed literature, this study developed a conceptual framework that explains the causal pathway between payment delay and project delay. The framework demonstrates that payment delays should not be viewed solely as financial issues but as systemic project risks that influence operational efficiency and project delivery performance.

The main contribution of this study lies in integrating fragmented findings from previous studies into a unified conceptual model. This framework provides a clearer understanding of how delayed payments affect construction projects and may serve as a reference for contractors, project owners, and policymakers in improving financial governance and contractual management.

From a practical perspective, the study highlights the importance of clear contractual clauses, efficient payment certification systems, digital payment monitoring, and early dispute resolution mechanisms as key strategies to reduce payment-related risks.

However, this study is limited to conceptual analysis based on secondary data and does not include empirical validation. Therefore, future research is recommended to test the proposed framework using case studies, surveys, or quantitative models to strengthen its practical applicability. Overall, this study confirms that effective payment management is essential for improving project stability, minimizing delays, and enhancing overall construction project performance.

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