Interim Payment Challenges in the Construction Industry: A Systematic Review

Anis Syafiqah Alias., Mohd Saidin Misnan*., Norhazren Izatie Mohd

Department of Quantity Surveying, Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia, 81310 Skudai, Johor Bahru, Malaysia

***Corresponding Author**

DOI: https://doi.org/10.47772/IJRISS.2026.100600408

Received: 03 June 2026; Accepted: 08 June 2026; Published: 25 June 2026

ABSTRACT

Interim payment challenges remain a major barrier to effective project delivery, prompting this systematic review to examine the financial, contractual, procedural, and technological factors influencing payment performance in the construction sector. The literature highlights widespread issues such as late payments, underpayments, valuation disputes, and insufficient regulatory enforcement, all of which disrupt cash-flow stability and contribute to delays, cost overruns, and strained stakeholder relationships. The study investigates how these factors interact and identifies gaps in current industry practices. A systematic review methodology was adopted, analysing abstracts and findings from SCOPUS and Web of Science sources. From an initial pool of studies, a final sample of 131 articles was selected based on relevance to interim payments, payment behaviours, contract administration, cash-flow management, and emerging technological solutions. The review categorised findings into five main themes: delay and performance issues, cash-flow and financial constraints, contractual and dispute-related challenges, risk factors affecting payment, and digital solutions for payment automation. Results indicate that administrative inefficiencies, subjective valuation processes, inadequate dispute-resolution mechanisms, and behavioural mistrust are key contributors to payment delays. Conversely, emerging technologies particularly blockchain and smart contracts show strong potential to automate certification, improve transparency, and reduce disputes. The review underscores the importance of establishing consistent payment practices, enhancing communication mechanisms, and strengthening contract enforcement to improve payment reliability. This study provides an integrated perspective on payment challenges and highlights the need for further empirical validation through industry-wide case studies, stakeholder surveys, and pilot implementations of digital payment frameworks. The findings contribute to ongoing discussions on improving payment governance and advancing digital transformation in construction payment administration.

Keywords: interim payment, challenges, construction industry, delay payment, late payment

INTRODUCTION

The construction industry is a cornerstone of economic development, yet it is persistently challenged by issues related to interim payments. Interim payments, which are periodic disbursements made to contractors for work completed during various stages of a project, are essential for maintaining cash flow and ensuring the smooth progression of construction activities. These payments enable contractors to finance ongoing expenditures such as labour, materials, and equipment, and are particularly critical given the high upfront investments and extended timelines typical of construction projects. However, the industry is plagued by frequent delays and disputes over interim payments, which can disrupt project delivery, strain relationships among stakeholders, and, in severe cases, lead to project abandonment or insolvency (Bolton et al., 2022; Ismail et al., 2023; Judi & Abdul Rashid, 2010).

The complexity of interim payment processes arises from several interrelated factors. Construction projects are inherently complex, involving multiple parties, customized deliverables, and evolving scopes of work. The

process of valuing and certifying interim payments often requires subjective judgment and meticulous documentation, which can be hampered by ambiguities in contract terms, changes in project scope, and bureaucratic inefficiencies especially in public sector projects (Ismail et al., 2023; Mustaffa et al., 2023; Zhu et al., 2023). Furthermore, the lack of standardized procedures and reliance on manual, paper-based systems can lead to errors, miscommunication, and delays. These challenges are compounded by the adversarial nature of contractual relationships in the industry, where a lack of trust and transparency between parties often results in disputes over payment claims and the quality of completed work (Das et al., 2020; Demachkieh & Abdul-Malak, 2019; Nanayakkara et al., 2021).

Despite the critical role of interim payments in sustaining construction projects, the industry continues to face significant challenges in ensuring their timely and accurate administration. Delays and disputes over interim payments are not only a source of financial strain for contractors particularly small and medium-sized enterprises but also a major contributor to project delays, cost overruns, and legal conflicts (Bolton et al., 2022; Ismail et al., 2023; Judi & Abdul Rashid, 2010). The persistence of these issues, despite legislative reforms and technological advancements, highlights the need for a comprehensive understanding of the underlying causes and the development of effective strategies to mitigate payment-related risks. Addressing the challenges associated with interim payments is therefore essential for improving project performance, fostering trust among stakeholders, and enhancing the overall sustainability of the construction industry (Ismail et al., 2023; Nanayakkara et al., 2021; Zhu et al., 2023).

This study seeks to systematically examine the progress payment challenges within the construction sector. The specific objectives are:

1. To examine the relationship between project delays, cost overruns, and their implications for efficiency in interim payment processes.
2. To identify the main causes of payment delays and cash flow challenges and evaluate their influence on the financial stability of construction stakeholders.
3. To analyze how claims, disputes, and contract-related inconsistencies contribute to disruptions in the processing of interim payments.
4. To investigate risk elements that affect the payment cycle and assess how these risks influence overall project delivery performance.
5. To evaluate the role of digital technologies, with an emphasis on blockchain and smart contracts, in improving transparency, accuracy, and automation in the interim payment mechanism.

To address these objectives, the systematic review is guided by the following research questions:

1. How do project delays and cost overruns influence the effectiveness and reliability of interim payment processes in construction projects?
2. What are the key factors contributing to payment delays and cash flow instability, and how do these issues impact stakeholders' financial performance in construction projects?
3. How do claims, disputes, and inconsistencies in contractual requirements affect the administration and timely disbursement of interim payments?
4. What risk factors within the construction project environment create vulnerabilities in payment cycles and overall project delivery?
5. How do emerging digital technologies, particularly blockchain and smart contracts, address inefficiencies and enhance automation in the interim payment process?

LITERATURE REVIEW

The construction industry faces significant challenges related to interim payments, which can adversely affect project timelines and cash flow management. Legal and contractual challenges are prevalent, with issues such

as late payments, underpayments, and non-payments being common. These problems often stem from a disparity between stipulated payment conditions in contracts and actual practices. For instance, contractors frequently resort to persistent notifications to clients rather than pursuing legal action, indicating a lack of trust and effective dispute resolution mechanisms in place (Ismail et al., 2023; Ting et al., 2025). The consequences of these payment issues can lead to project delays, cash flow problems, and strained relationships among stakeholders, ultimately jeopardizing project success (Chadee et al., 2023; Umar et al., 2024).

Stakeholder perceptions of interim payments vary significantly among contractors, subcontractors, and clients, impacting project outcomes. Contractors often experience cash flow difficulties due to delayed payments, which can lead to increased debt and project delays (Chadee et al., 2023; Francis et al., 2016). Subcontractors, in particular, are vulnerable, as they may rely heavily on timely payments from main contractors to maintain their operations. Research indicates that a lack of trust and communication between clients and contractors exacerbates these issues, leading to disputes and project inefficiencies (Judi & Mustaffa, 2021; Umar et al., 2024). Furthermore, the perception of interim payments as a bureaucratic hurdle rather than a facilitative mechanism can hinder acceptance and implementation across different project types (Zhu et al., 2023; Zhu & Xiong, 2023).

Other than that, technology can be used as a method to improve efficiency in construction payment process. Hao et al. (2026) found that manual communication approaches tended to lead to record duplication, delayed obtaining information, limited oversight by management, and diminished stakeholder coordination.

However, utilising advanced technology via a centralised cloud-based digital database improves structured documentation control, integrates project data streams, and offers real-time visibility into work progress, thereby enhancing information governance and facilitating evidence-based decision-making. Hence, technology plays a crucial role in addressing the challenges associated with interim payments. The integration of smart contracts and blockchain technology offers a promising solution to enhance transparency and efficiency in payment processes.

Smart contracts can automate payment transactions based on predefined conditions, reducing the potential for disputes and ensuring that payments are made promptly (Benecke et al., 2023; Pham et al., 2024; Son et al., 2024). Additionally, blockchain technology can provide a secure and immutable record of all transactions, fostering trust among stakeholders and facilitating better cash flow management (Benecke et al., 2023; Das et al., 2020). By leveraging these technologies, the construction industry can mitigate the risks associated with delayed payments and improve overall project performance.

Cultural and regional differences also influence the challenges faced in interim payments within the construction industry. For example, in some regions, the acceptance of interim payments is low due to entrenched practices favouring completion settlements, which can lead to disputes and poor contract performance (Zhu et al., 2023; Zhu & Xiong, 2023).

In contrast, jurisdictions with prompt payment legislation have seen improvements in cash flow and project delivery, although the effectiveness of such legislation can vary based on local practices and stakeholder awareness (Dorrah & McCabe, 2023b; Mewomo, 2019). Best practices to mitigate these challenges include establishing clear payment terms, enhancing communication among stakeholders, and adopting technology-driven solutions to streamline payment processes (Dorrah & McCabe, 2023b; Pham et al., 2024; Ting et al., 2025). By addressing these cultural and regional nuances, the construction industry can work towards a more equitable and efficient payment ecosystem that supports timely project delivery and financial stability for all parties involved.

Other than that, a significant challenge lies in the valuation and certification process for interim payments. Quantity surveyors and contract administrators must ensure accuracy, impartiality, and adherence to statutory guidelines, yet ambiguities in contract terms and subjective assessments often lead to disputes. The process is further complicated by project-specific factors such as scope changes, ground uncertainties, and bureaucratic hurdles, especially in government projects. These factors contribute to frequent delays in payment, which can cascade through the supply chain, affecting suppliers, subcontractors, and ultimately project delivery (Haron &

Arazmi, 2020; Ismail et al., 2023; Mustaffa et al., 2023; Zhu et al., 2023). The lack of standardized procedures and the prevalence of manual, paper-based processes exacerbate these challenges, making timely and transparent payment administration difficult to achieve.

The literature indicates that interim payment challenges in the construction industry arise from a combination of legal, financial, managerial, and cultural factors that collectively hinder efficient project delivery. Persistent issues such as late payments, underpayments, and non-payments highlight ongoing misalignments between contractual provisions and actual industry practices, reflecting both weak enforcement and inadequate dispute resolution mechanisms.

These deficiencies contribute directly to cash flow instability, strained stakeholder relationships, and project delays, with contractors and subcontractors particularly exposed to financial vulnerability due to their dependence on timely progress payments. Stakeholder perceptions further complicate the issue, as interim payments are sometimes viewed as administrative burdens rather than mechanisms designed to facilitate smooth project cash flow, leading to inconsistent application across different project environments. The valuation and certification processes present another critical bottleneck, where ambiguities in contract terms, subjective assessments by certifiers, and bureaucratic hurdles especially within public sector projects create frequent delays that propagate throughout the supply chain and undermine overall project performance.

In regions where traditional payment cultures dominate, resistance to interim payment adoption remains strong, whereas jurisdictions with clearer prompt-payment regulations show comparatively better outcomes, though effectiveness varies depending on local compliance and awareness. Amid these challenges, digital technologies such as blockchain and smart contracts offer transformative potential by introducing automation, transparency, and immutable record-keeping to reduce disputes and ensure timely disbursement aligned with verified progress.

The integration of these technologies, combined with clear payment conditions, improved communication, and standardized procedures, is widely recognized as essential to addressing long-standing inefficiencies. Overall, the literature emphasizes that enhancing interim payment practices requires not only technological innovation but also regulatory strengthening, capacity building, and cultural shifts towards greater transparency and collaborative project governance.

Figure 1 presents a conceptual overview of the major challenges associated with interim payment processes in the construction industry. The diagram groups these challenges into four overarching domains: Cash Flow Management, Project Management Issues, Economic Impacts, and Legislation and Regulations. Each domain encompasses several interconnected sub-issues that collectively influence the efficiency and reliability of payment cycles.

Cash flow-related challenges emerge as critical concerns, where late payments and supply chain impacts indicate how delayed cash circulation disrupts procurement, material delivery, and contractor liquidity. From the project management perspective, issues such as budget control and delay and disruption highlight how ineffective planning and unforeseen site events can hinder timely certification and release of interim payments. Economic impacts further extend these challenges, where social effects and cash shortage effects reflect broader consequences on workforce stability, subcontractor sustainability, and project continuity.

Lastly, the regulatory dimension introduces concerns about compliance challenges and persistent construction payment problems, showing that statutory requirements, contract interpretations, and enforcement mechanisms continue to constrain smooth payment administration. Overall, Figure 1 illustrates that interim payment difficulties arise from a complex interaction of financial, managerial, economic, and regulatory factors. These interconnected challenges demonstrate that inefficiencies in one area can trigger cascading effects across the entire project ecosystem, emphasizing the need for comprehensive solutions that address the payment process holistically.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue VI June 2026

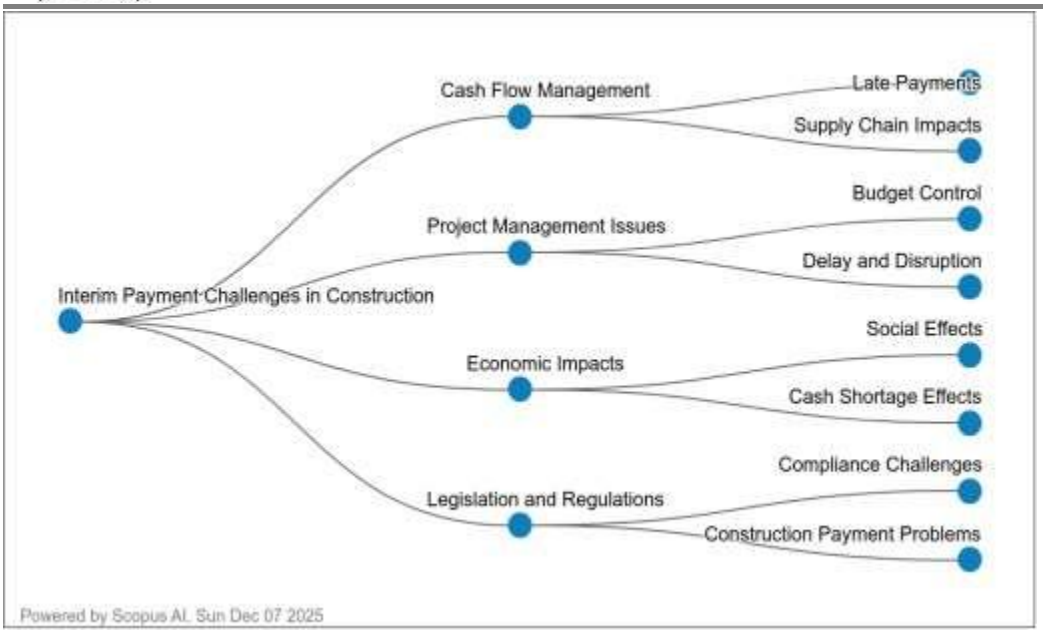

Figure 1 Concept map for the Interim Payment Challenges in the Construction Industry (Source: Powered by Scopus AI, Sun Dec 07 2025)

RESEARCH METHODOLOGY

Research Design

This study adopts a Systematic Literature Review (SLR) approach to synthesis existing research on the challenges in interim payment within the construction sector. The SLR method was selected to enable an exhaustive, transparent, and replicable examination of scholarly evidence, consistent with established review protocols. The review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring methodological rigor in the identification, screening, eligibility assessment, and final selection of relevant literature. The review focuses on peer-reviewed journal articles to ensure reliability and academic integrity, while excluding non-scholarly sources that may lack methodological robustness.

Screening

Two major academic scientific databases Scopus and Web of Science (WoS) were selected as the primary data sources due to their extensive coverage of high-impact and peer-reviewed publications across engineering, construction management, and digital technology domains. The search strategy was developed through iterative refinement of keywords and Boolean operators, informed by preliminary scoping studies and terminology mapping using thesauri and subject indexing references.

The final search strings were constructed to capture studies that simultaneously addressed challenges, interim payment and the construction industry. The search terms included variations and synonyms to maximise retrieval sensitivity, as shown in Table 2. The searches were conducted in December 2025, resulting in an initial dataset of 1,813 records across both databases.

Table 1 Search string

Scopus	(TITLE-ABS-KEY ("challenge*" OR "issue*" OR "problem*" OR "barrier*" OR "dispute*" OR "delay*") AND TITLE-ABS-KEY ("payment*" OR "construction payment*" OR "interim payment*" OR "progress payment*" OR "payment certification*" OR "payment process*") AND TITLE-ABS-KEY ("construction industr*" OR "construction sector*" OR "construction project*" OR "building construction*" OR "building industr*" OR "architecture, engineering and construction*" OR "AEC")) Date of Access: December 2025

Wos	"challenge*" OR "issue*" OR "problem*" OR "barrier*" OR "dispute*" OR "delay*" (Topic) and "payment*" OR "construction payment*" OR "interim payment*" OR "progress payment*" OR "payment certification*" OR "payment process*" (Topic) and "construction industr*" OR "construction sector*" OR "construction project*" OR "building construction*" OR "building industr*" OR "architecture, engineering and construction*" OR "AEC" (Topic) Date of Access: December 2025

Screening and Eligibility

The screening phase involved the systematic removal of duplicate entries and the evaluation of remaining records based on relevance to the research objectives. Duplicate elimination reduced the dataset to 582 unique records. These records underwent a title and abstract screening according to predefined inclusion and exclusion criteria is shown in Table 2.

To enhance the transparency and replicability of the review process, predefined inclusion and exclusion criteria were systematically applied during the title, abstract, and full-text screening stages. Studies were included only if they were (i) published in English, (ii) published between 2020 and 2026, (iii) peer-reviewed journal articles, and (iv) explicitly addressed challenges related to interim payment practices in the construction industry. Studies were excluded if they were non-English publications, conference papers, books, theses, editorials, review articles, or if their primary focus was unrelated to interim payment challenges in construction. During the full-text eligibility assessment, additional exclusions were made where articles lacked sufficient relevance to the research objectives, did not provide adequate methodological or empirical evidence, or where the full text was inaccessible. The screening process was independently conducted according to the PRISMA guidelines to ensure methodological rigor, consistency, and reproducibility in the selection of the final sample of 131 articles.

Table 2 Selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeframe	Studies published between 2020 - 2026	Studies published before 2020 and after 2026
Manuscript type	Peer-reviewed journal articles	Books, theses, conference papers, reviews, editorials
Research focus	Studies that address challenges in construction interim payment	Studies that not discuss challenges in interim payment in construction sector

Following screening, 381 articles proceeded to full-text eligibility review. Full-text examination resulted in the exclusion of 250 records due to lack of relevance, insufficient empirical grounding, or unavailability of full text. A final set of 131 articles was selected for qualitative synthesis. A PRISMA-compliant flow diagram summarising the identification, screening, eligibility, and inclusion stages is presented in Figure 2.

Data Abstraction and Analysis

To derive systematic insights from the selected literature, an integrative thematic synthesis approach was applied. First, a structured data extraction matrix was developed to record key attributes from each study, including research objectives, methodology, technological focus, implementation context, and reported outcomes. This facilitated systematic comparison and categorization.

Second, the extracted data were analysed to detect conceptual patterns, recurring research foci, and thematic linkages across studies. Codes were generated inductively through iterative reading, cross-verification among the research team, and memo-logging to trace interpretive decisions. Through successive refinement, these

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue VI June 2026

codes were clustered into five overarching themes representing the core dimensions of challenges in interim payment in construction sector:

1. Delay, Cost Overrun & Performance Issues in Construction Projects
2. Payment Delay, Cash Flow Problems & Financial Issues
3. Claims, Disputes & Contractual Issues Affecting Payments
4. Risk Factors Affecting Payment & Project Delivery
5. Technological and Digital Solutions for Payment Automation

The thematic synthesis ensured that findings were not merely aggregated but conceptually interpreted, thus providing meaningful insights into the technological, procedural, and organisational implications of issues of interim payment in construction industry.

However, this study is primarily designed to synthesize and analyse existing scholarly evidence rather than generate primary empirical data. Consequently, the findings and thematic classifications are derived from published literature and were not empirically validated through industry case studies or stakeholder consultations. While this approach enables a comprehensive understanding of the current state of knowledge, future research is recommended to validate the identified themes and proposed insights through interviews, surveys, focus groups, or case studies involving construction practitioners and relevant stakeholders.

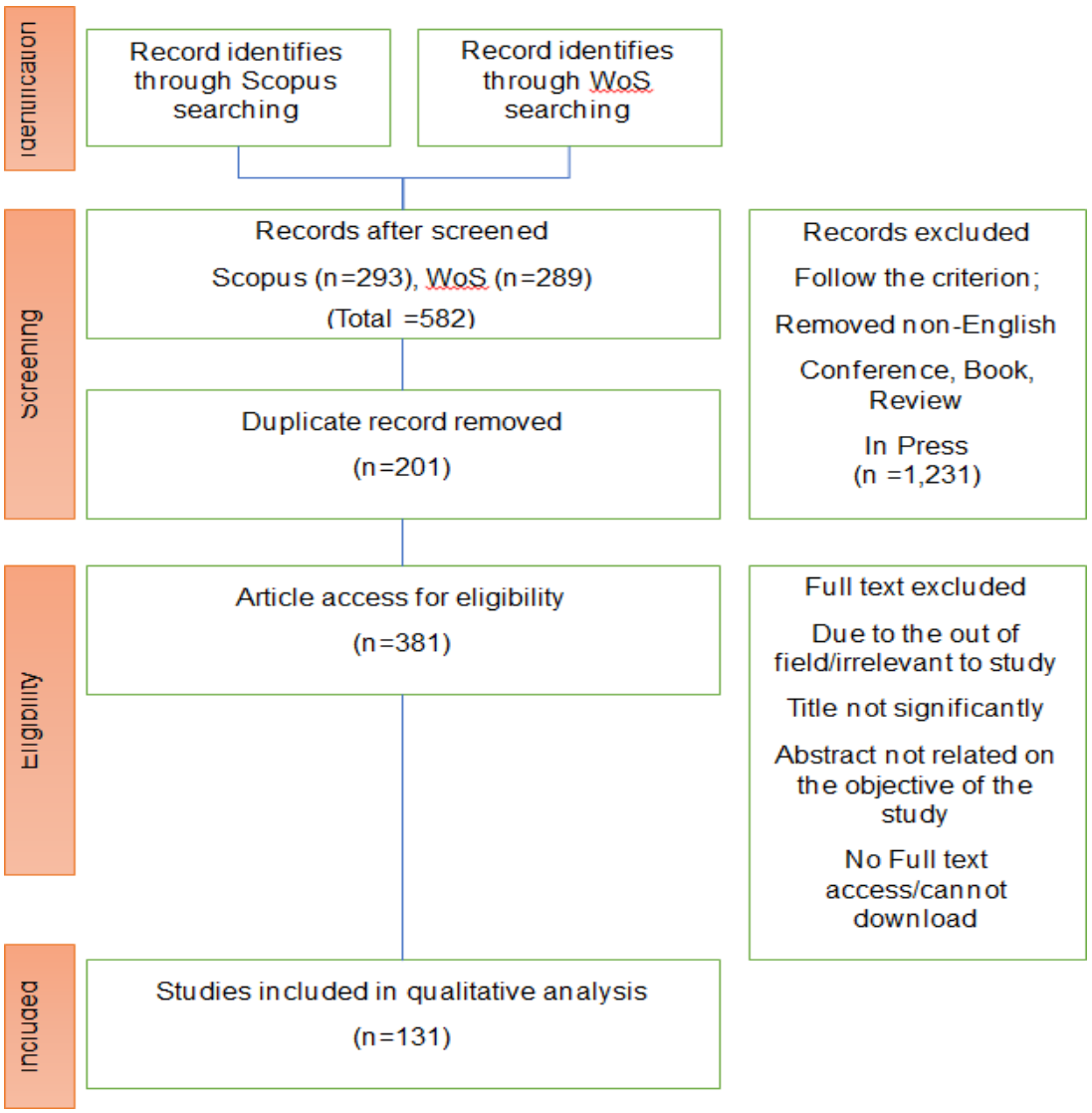

Figure 2 Flow diagram of the proposed searching study

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue VI June 2026

FINDINGS AND DISCUSSIONS

Theme 1: Delay, Cost Overrun & Performance Issues in Construction Projects

The collected studies converge on a set of recurrent drivers that produce schedule slip and cost escalation in construction projects. It is identified that structural and management deficiencies that repeatedly precipitate project failure in Ethiopian building works est that cultural, gove(Abate et al., 2024). Studies on large-scale Egyptian megaprojects show that interacting technical, contractual and resource shortfalls amplify time and budget overruns (Daoud et al., 2023). Other research describes context-sensitive causes of cost escalation in highway works, where unclear scope, weak planning and contractor weaknesses appear as persistent contributors (Mahmud et al., 2021). Across these studies, inadequate planning, deficient contract administration and resource misallocation appear as common antecedents to interim payment difficulties because such failures produce claims, extension requests and disputed valuations that delay certification and disbursement.

Interim payment problems are closely linked to productivity loss and cash-flow stress within contracting firms. Late payments frequently trigger time overruns by limiting contractors' ability to mobilize labor and equipment according to the planned schedule (Mahamid, 2021). Reductions in on-site productivity have also been reported following disruption events, which subsequently create a backlog in progress payment triggers (Gohunuwatta et al., 2024). Evidence from pandemic-era studies further shows that interruptions to supply chains and site operations can translate into payment friction when payment milestones become unattainable or contested (Ogunnusi et al., 2022). Collectively, these analyses indicate that payment timeliness and productivity are mutually reinforcing: payment delays reduce productive capacity, while lower productivity complicates progress measurement and payment validation.

The COVID-19 pandemic intensified risk pathways affecting interim payments by introducing new operational constraints and accelerating pre-existing vulnerabilities. Pandemic-related restrictions on labour and material availability created uncertainty in payment schedules for construction firms (Agyekum et al., 2022). Similarly, pandemic conditions generated additional delay contingencies that complicated contractual fulfilment and payment certification processes (Alajmani et al., 2024). Residential construction projects also experienced altered risk profiles during the COVID-19 period, which elevated disputes regarding scope and cost allocation and consequently prolonged payment cycles (Badawy et al., 2023). These findings highlight the role of systemic shocks in transforming operational disruptions into prolonged payment delays.

Contextual and stakeholder perspectives reveal how institutional, contractual, and relational factors shape interim payment outcomes. Contextual constraints within Tanzanian public sector delivery have been shown to interact with governance and procurement norms, thereby influencing payment performance (Abdallah et al., 2025). Stakeholder perceptions in Ghana similarly attribute delayed payments to procurement inefficiencies and limitations in client capacity (Dick-Sagoe et al., 2023). Performance challenges in construction projects in the Democratic Republic of the Congo are also embedded in broader institutional fragility, which hinders timely certification and payment processes (Bitamba & An, 2020). Comparable institutional bottlenecks have been observed in Ethiopian municipal projects rnance, and procurement environments create structural frictions that translate into recurring interim payment challenges.

Methodological developments used to investigate delay and payment phenomena increasingly incorporate rule-based and data-driven analytical techniques that provide predictive and diagnostic insights. Naïve Bayesian classification has been applied to forecast portfolio delays, enabling probabilistic identification of projects that are at risk of delay (Erzaij et al., 2021). Neural network multilayer perceptron models have also been employed to identify factors contributing to slow completion of school construction projects, which subsequently leads to late certification and deferred payment events (Ghanam et al., 2025). In addition, fuzzy Analytic Hierarchy Process (AHP) methods have been used to rank contractor delay causes where subjective judgments require fuzzy evaluation (Mahdi et al., 2025). Statistical and machine learning techniques have also been integrated to examine the relationship between delay magnitude and dispute incidence in construction projects in India (Sahu et al., 2024). The convergence of algorithmic models and multi-criteria decision-

making approaches highlights the growing capability to predict potential interim payment problems and quantify their underlying drivers.

Research addressing mitigation and control emphasises process improvements, quality frameworks, and targeted risk management to reduce payment friction. Total quality management measures have been proposed to rectify procedural weaknesses that produce delays and claims in construction projects (Elsherbiny et al., 2024). Measures to reduce delays in social housing projects have also been suggested, including strengthened planning and improved stakeholder coordination, both of which can shorten the chain between work completion and payment certification (Zemra, 2023). Targeted mitigation strategies have similarly been recommended for building projects in Ghana to absorb delay risks and protect payment flows (Wepari et al., 2024). In addition, the importance of resilience in disruption management has been highlighted to ensure that interim payment triggers remain reliable even under conditions of stress (Rajapakshe, 2025). Overall, the mitigation literature indicates that administrative strengthening, clearer valuation protocols, and adaptive risk management controls can reduce both the frequency and severity of interim payment breakdowns.

Across the literature, smart contracts consistently emerge as a core mechanism for reducing payment delays, enhancing transparency, and improving trust among contracting parties. Their effectiveness relies on accurate, verifiable progress data, which underscores the importance of integration with BIM and reality capture technologies. Decentralization reduces dependency on third-party institutions and lowers administrative burdens. While technical feasibility is well established, wider adoption depends on alignment with legal frameworks and industry-standard contracting practices.

Lastly, across the reviewed studies, delay, cost escalation, and performance breakdowns consistently emerge as structural precursors to interim payment problems. Weak planning, unclear scope, and deficient contract administration create valuation disputes and certification delays, while productivity loss and disrupted work sequences further complicate progress verification. Systemic shocks such as the COVID-19 pandemic magnify these vulnerabilities by destabilising labour, material supply, and contractual certainty. Contextual findings additionally show that institutional weaknesses, procurement norms, and governance capacity strongly influence payment reliability. Methodological advances ranging from machine learning to multi-criteria decision tools could support early detection of delay and payment-risk patterns, while mitigation research emphasises administrative strengthening, transparent valuation practices, and resilience-oriented risk controls. Overall, the synthesis indicates that interim payment challenges are deeply interconnected with fundamental project delivery weaknesses, and effective resolution requires both operational and institutional reforms.

Theme 2: Payment Delay, Cash Flow Problems & Financial Issues

The literature indicates that delayed interim payments frequently arise from combined operational and contractual deficiencies that impede timely certification and cash disbursement. Payment postponements have been shown to reduce contractor capacity to sustain labour and equipment, thereby producing slower progress and further delay (Al Alawi, 2021). Subcontractor vulnerability also increases when payments lag, intensifying dispute potential and disrupting project rhythm (Bolton et al., 2022). Studies modelling the downstream cash-flow effects of payment postponement further demonstrate that cumulative liquidity shortfalls propagate schedule risk (Chadee et al., 2023). These works collectively imply that payment delays are not isolated events but rather operate within a feedback loop in which delayed cash weakens delivery capacity, while weakened delivery complicates certification and payment release.

Several studies link payment reliability directly to firm-level productivity and business continuity outcomes. Persistent late payments or cash shortages are associated with reduced on-site productivity and increased resource idling (Al Alawi, 2021; Mahamid, 2021; Voigt et al., 2023). Payment variability has also been found to undermine subcontractor cash management, deteriorating financial stability and service delivery (Youssef et al., 2023). Data-driven and risk-assessment studies further confirm that cash-flow constraints translate into reduced contractor performance and, in some cases, insolvency risk (Ikediashi & Okolie, 2022; Kazar, 2025). The literature therefore demonstrates a strong empirical relationship between payment practices and measurable productivity outcomes.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue VI June 2026

Empirical and doctrinal investigations highlight valuation and certification processes as common friction points that delay interim remuneration. Recurring issues in valuation practice often generate disputes between certifiers and contractors (Mustaffa et al., 2023). Legal analyses of interest provisions for late interim payments suggest that existing frameworks frequently fail to deter prolonged delays (Hamdan et al., 2022). Analytical modelling of nonpayment dynamics also indicates that ambiguous valuation criteria and procedural bottlenecks are causal factors in extended payment chains e et al., 2023). Collectively, these studies emphasise th(Lee et al., 2023). Collectively, these studies emphasise that technical weaknesses in measurement processes and limited effectiveness of legal remedies contribute to slow payment cycles.

Predictive analytics and simulation approaches are increasingly used to identify where and when interim payment problems may arise. Machine learning approaches combining supervised and unsupervised techniques have been used to assess owner payment reliability and generate probabilistic indicators of future payment performance (Hojat & Hosseinian, 2025). Data-driven modelling has also been applied to forecast the cash-flow capability of project owners (Kazar, 2025), while agent-based simulations integrated with game-theory constructs explore strategic interactions influencing payment timing (Dorrah & McCabe, 2023a). Additional studies demonstrate that machine-learning classifiers and neural networks can identify delay-prone projects, thereby enabling proactive mitigation of payment risk (Erzaij et al., 2021; Ghanam et al., 2025). These developments indicate growing capacity to detect payment risk before severe cash-flow disruptions occur.

Technological interventions present potential mechanisms for reducing friction in interim payment processes, particularly through automation and distributed ledger technologies. Systems combining Scan-to-BIM technologies with blockchain-enabled smart contracts have been proposed to automate progress verification and trigger payments (Elsharkawi et al., 2025). Blockchain-based smart contract architectures have also been examined for embedding conditional payment disbursement and payment-freezing mechanisms to protect project stakeholders (Wu et al., 2022). Further developments address power asymmetries in payment relationships by designing smart contracts that enforce proportional allocation of payments (Wu et al., 2023). These studies demonstrate the technical feasibility of automated adjudication and coded payment rules to shorten the interval between work completion and payment settlement.

Policy-oriented and context-specific studies emphasise the importance of legal reform, contractual design, and relational practices in improving interim payment outcomes. Proactive solution models have been proposed to prevent late payment and underpayment within the Malaysian construction sector (Judi & Mustaffa, 2021, 2023). Sector-specific research has also identified human and dispute-related factors requiring targeted policy responses (Mastan et al., 2025). Additional studies examining relationships between main contractors and subcontractors propose contractual safeguards and behavioural remedies to mitigate payment disputes (Fateh et al., 2024; Haron & Arazmi, 2020). These works collectively recommend a combination of enforcement mechanisms, preventive contractual design, and stakeholder capacity building to ensure more reliable interim payment flows.

Cross-cutting reviews further indicate that payment failures are multi-dimensional and require integrated responses combining procedural, financial, and technological approaches. Studies examining predictive modelling, legal frameworks, and valuation systems show that these dimensions interact to generate payment risk (Lee et al., 2023; Masrom et al., 2021; Wang et al., 2023). Additional modelling research demonstrates that isolated policy or technological interventions may be insufficient; instead, systemic alignment among procurement, certification, and payment execution processes is necessary (Chadee et al., 2023; Dorrah & McCabe, 2023a; Kazar, 2025). Overall, the literature advocates hybrid strategies that combine improved valuation transparency, contractual safeguards (such as interest provisions or escrow mechanisms), and selective automation through technologies such as blockchain-enabled smart contracts to stabilise construction cash-flow and accelerate interim payment settlement.

The literature converges on the finding that payment delay and cash-flow stress arise from intertwined operational, financial, and procedural deficiencies. Payment postponements reduce contractor liquidity, impair productivity, and trigger cascading schedule impacts, while valuation disputes and certification bottlenecks

deepen uncertainty. Predictive modelling and simulation studies enhance understanding of payment-risk emergence, offering probabilistic tools for early detection. Technological interventions particularly blockchain-enabled smart contracts demonstrate strong potential to automate verification, reduce subjective judgements, and protect stakeholders through conditional disbursement logic. However, policy-oriented research stresses that technological fixes alone are insufficient; sustainable payment reliability requires reforms in valuation transparency, contractual design, legal enforcement, and stakeholder capacity building. The overall insight is that payment problems are multi-dimensional, and durable improvement demands integrated financial, procedural, and technological solutions.

Theme 3: Claims, Disputes & Contractual Issues Affecting Payments

The existing literature indicates that there is a recurrent pattern in which inadequate contractual clarity, deficient valuation processes, and weak stakeholder relations act as core antecedents of claims and disputes. Misclassification of claim types and unclear cause–effect pathways have been shown to increase dispute incidence (Al Malki & Alam, 2021). Literature syntheses further indicate that claims often arise from overlapping contractual obligations and ambiguous scope definitions (Shaikh et al., 2020). Litigation case analyses also reveal clusters of dispute triggers that recur across different project types (K. A. Alrasheed et al., 2023), while stakeholder perspectives frequently attribute the root causes to inconsistent contract administration practices (Cakmak, 2022). These findings collectively suggest that weak contractual drafting and insufficient early-stage alignment generate conditions conducive to interim payment disputes and subsequent claim escalation.

Several studies identify specific contractual provisions and behavioural practices that intensify payment-related conflicts, particularly conditional payment clauses, valuation disagreements, and opportunistic behaviour among contracting parties. Conditional payment provisions may produce cascading liquidity problems when certification becomes contested, thereby triggering secondary disputes (Rostiyanti et al., 2020). Behavioural practices such as delayed certification or restrictive interpretation of payment clauses have likewise been found to exacerbate tensions between project participants (Ismail et al., 2021). Trust erosion between main contractors and subcontractors has also been documented where valuation practices are perceived as unfair (Omotayo et al., 2023). In addition, the adoption of modern methods of construction introduces new contractual arrangements that require explicit reallocation of valuation risks (Saad, 2023). These findings underscore the need for clearer contractual wording and more transparent valuation protocols to limit friction in interim payment processes.

Empirical evidence highlights significant consequences when disputes remain unresolved, including contract termination, costly change orders, and concentration of project risk. Prolonged disputes concerning payment and performance have been shown to precede contract termination in public projects, producing substantial cost and schedule implications (Habetemeherit et al., 2025). Studies examining construction projects in Palestine also demonstrate that change orders and weak change-control procedures frequently escalate disputes and create ripple effects on payment flows (Mahamid, 2024; Mahamid & Abdelaal, 2025). Furthermore, research linking project characteristics such as size, complexity, and procurement arrangements indicates that these factors increase dispute severity and thereby affect interim payment reliability (Francis et al., 2022). These documented impacts suggest that unresolved claims are not merely transactional problems but may destabilise overall project delivery and financial viability.

Methodological approaches across the reviewed studies reveal a wide range of analytical tools used to classify causes and predict dispute emergence, supporting both diagnostic and prescriptive purposes. Fuzzy multi-criteria decision methods and analytic hierarchy process (AHP) techniques have been applied to categorise conflict drivers and prioritise mitigation strategies (B. et al., 2024; Chaturvedi et al., 2021). Text-mining and natural language processing techniques have also been used to analyse litigation records and uncover latent patterns in subcontracting disputes (Ye et al., 2024). Statistical and machine-learning approaches further quantify the relationship between project delays and dispute incidence (Sahu et al., 2024). Additional studies integrate analytic hierarchy process techniques with enhanced claims-management frameworks, demonstrating how multi-criteria analysis can inform administrative improvements (K. Alrasheed et al., 2025). The diversity

of these methodological approaches suggests that hybrid quantitative–qualitative techniques are particularly effective for mapping the complex causal networks underlying interim payment disputes.

Policy frameworks, adjudication practice, and legal instruments are also presented as practical mechanisms for containing disputes and securing payment flows. Studies examining the implementation of statutory adjudication under Malaysian legislation report mixed contractor perceptions regarding its effectiveness, highlighting gaps between legislative intent and practical enforcement (Zulkhairi et al., 2022). Research synthesising adjudicators' perspectives proposes practical strategies to improve adjudication outcomes, including faster determinations and clearer evidentiary requirements (Loke et al., 2025). Additional legal scholarship suggests targeted regulatory responses, such as criminalisation of deliberate late payment practices (Arewa et al., 2024). Complementary work recommends strengthening claims-management frameworks through structured analytical prioritisation to improve dispute handling (K. Alrasheed et al., 2025). Overall, the literature indicates that legal reform, improved dispute-resolution practice, and stronger claims-administration systems can collectively reduce interim payment disruptions when their implementation aligns with industry behaviour.

The collective evidence demonstrates that claims and disputes often originate from contractual ambiguity, weak valuation protocols, and behavioral misalignments among project participants. Ambiguous clauses, conditional payment terms, and inconsistent certification practices increase dispute incidence and prolong payment cycles. Empirical studies show that unresolved claims escalate into terminations, costly change orders, and substantial project disruption directly undermining interim payment performance. Advanced analytical methods, including text-mining, fuzzy MCDM, and machine-learning, provide improved diagnostic capability to classify dispute triggers and predict escalation. Legal and adjudication research underscores the importance of statutory reform, clearer evidentiary standards, and enhanced claims management. The synthesis indicates that reducing payment-related disputes requires clearer contract drafting, transparent valuation processes, and strengthened adjudicative mechanisms supported by data-driven insights.

Theme 4: Risk Factors Affecting Payment & Project Delivery

The examined studies reveal recurring clusters of risk that directly drive schedule slippage and cost escalation in construction projects. Managerial and organisational shortcomings have been identified as factors that weaken project control and increase the likelihood of delay and budget overruns (Abate et al., 2024). Research on megaconstruction projects further identifies interacting technical, contractual, and resource deficiencies that compound into larger time and cost overruns (Daoud et al., 2023). Contextual drivers such as unclear scope definition, weak planning processes, and gaps in contractor capability have also been emphasised as frequent contributors to adverse project outcomes (Farid et al., 2020). In addition, probability-weighted risk ranking methods demonstrate that certain risk factors exert disproportionately strong influence on project performance (Genc, 2023). Collectively, these findings suggest that interim payment disruption often emerges from the same structural vulnerabilities that generate schedule delays and cost overruns.

Country and region-specific studies reveal variations in dominant risk profiles while maintaining some universal patterns. Building projects in Saudi Arabia, for example, experience both technical design weaknesses and administrative lapses that contribute to time and cost overruns (Alshihri et al., 2022). In Pakistan, construction projects exhibit context-sensitive risk combinations in which labour availability, material supply, and regulatory uncertainties play significant roles (Farid et al., 2020). Municipal projects in Gondar, Ethiopia, similarly face institutional and logistical constraints that hinder timely project execution (Tessema et al., 2022). Evidence from Ethiopian road projects further corroborates the presence of contractor performance risks in domestic infrastructure delivery (Wubet et al., 2023). These comparisons suggest that although risk types vary across national contexts, weaknesses in planning, procurement processes, and contract administration remain common factors affecting interim payment reliability.

Disruption events and systemic shocks can significantly alter risk dynamics and intensify vulnerabilities in payment processes. The COVID-19 pandemic, for example, changed risk profiles in residential construction by restricting labour availability and disrupting supply chains, which delayed milestones associated with interim

payments (Badawy et al., 2023). Studies of recent disruptions in Sri Lanka also indicate that extraordinary events require flexible risk management and contingency strategies to maintain payment flows (Rajapakshe, 2025). Research in Ghana further demonstrates that proactive risk absorption strategies and improved stakeholder coordination can reduce the likelihood that disruption events translate into prolonged payment delays (Wepari et al., 2024). Collectively, these findings highlight how external shocks magnify pre-existing procedural weaknesses and accelerate cash-flow stress among project participants.

Insurance arrangements, contractor perspectives, and risk management practices also shape the manner in which payment and performance risks are absorbed or transferred among project stakeholders. Distinctions between insurable and non-insurable risks in complex construction contracts have important implications for risk allocation and payment security (Owusu-Manu et al., 2020). Contractor perspectives from Palestine emphasise the importance of practical risk management measures to protect both cash-flow stability and contractual obligations (Mahamid, 2024). Studies of civil engineering projects further recommend targeted risk-control mechanisms that enhance the predictability of project progress and thereby support timely certification and payment (Idris et al., 2022). Overall, the evidence suggests that clearer risk allocation frameworks, robust contingency planning, and appropriate insurance mechanisms can mitigate the chain of events that leads from project disruption to interim payment failure.

A synthesis of the reviewed abstracts points to strong linkages between identified risk factors and interim payment challenges, with consistent findings across multiple studies. Poor planning practices, resource constraints, and disruption events elevate the likelihood of claims, disputed valuations, and delayed certification, which are proximate causes of payment arrears (Abate et al., 2024; Badawy et al., 2023; Daoud et al., 2023). Additional studies suggest that prioritising high-probability risks and implementing context-sensitive mitigation strategies can reduce payment delays (Farid et al., 2020; Genc, 2023; Tessema et al., 2022). Other research emphasises the need for resilience-oriented and adaptive control mechanisms to maintain interim payment triggers during disruptive events (Rajapakshe, 2025; Wepari et al., 2024). Overall, the literature suggests that integrated risk governance, clearer contractual mechanisms, and strengthened project execution capacity are necessary to reduce interim payment breakdowns across diverse construction contexts.

Findings across contexts confirm that risk factors managerial, technical, contractual, and resource-based directly influence interim payment reliability. Poor planning, capability gaps, and procurement weaknesses drive schedule and cost deviations that trigger certification disputes and delayed payments. Contextual variation exists, but universal patterns show that institutional fragility and administrative bottlenecks undermine both project performance and financial flows. External shocks such as pandemics intensify these risks, demonstrating the need for adaptive risk governance. Research on mitigation highlights the value of clear risk allocation, contingency planning, and insurance mechanisms to maintain progress and payment certainty. The overall implication is that payment reliability cannot be achieved without parallel improvements in risk governance, capacity building, and context-sensitive management practices.

Theme 5: Technological and Digital Solutions for Payment Automation

Digital solution has seen to improved workflow that is used to be in manual processes that consequently has resulted in project financial performance (Wen et al., 2026). Prior research suggests that blockchain-enabled smart contracts can substantially reduce friction in interim payment processes by automating condition verification and enforcing pre-coded disbursement rules. Encoded payment triggers linked to progress measurement have been shown to decrease manual intervention and reduce payment latency (Hamledari & Fischer, 2021). Smart contracts also enhance transparency in supply-chain payment systems, lowering disputes that arise from opaque transaction records (Nanayakkara et al., 2021). Integration of building information systems with blockchain technologies further enables automated contract management, which streamlines certification and payment cycles (Sigalov et al., 2021). Programmable mechanisms such as payment freezing and conditional release have additionally been proposed to protect stakeholders from premature or unfair disbursement of fundsb (Wu et al., 2022). Together, these studies indicate that smart contracts can transform

subjective certification procedures into verifiable and auditable events that support more timely interim payments.

Integration of blockchain with Building Information Modeling (BIM) and related digital workflows has emerged as a central strategy for automating progress recognition and payment processes. One proposed approach integrates Scan-to-BIM technologies with blockchain-based smart contracts to convert physical work outputs into validated digital records capable of triggering payment events (Elsharkawi et al., 2025). Frameworks linking BIM-derived progress states with blockchain-based contractual logic have also been developed, suggesting that such integration reduces disputes over measured work quantities (Kamel et al., 2023). Additional research proposes BIM-integrated smart contracts specifically designed for progress payment administration, demonstrating the potential to shorten the time interval between milestone completion and payment disbursement (Sonmez et al., 2022). Empirical assessments of integrated BIM–blockchain systems further indicate improvements in traceability and auditability within decentralized progress payment environments (Khalid et al., 2024). Collectively, these contributions demonstrate that combining spatial–temporal project data with immutable ledger systems can align technical measurement processes with financial settlement procedures.

Decentralised architectures and novel payment constructs have also been proposed to address power imbalances, dispute resolution challenges and conditional disbursement mechanisms that hinder timely interim payments. Studies examining programmable payment-freezing cycles propose smart-contract clauses that manage contested payment releases (Wu et al., 2022). Hybrid blockchain networks incorporating decentralized decision nodes and cryptographically secured records have likewise been suggested as mechanisms for reducing dispute duration and improving dispute resolution processes (Saygili et al., 2022). Additional research proposes decentralized Project Bank Account applications that isolate project funds for payment obligations and reduce the risk of diversion (D. Scott et al., 2024). Smart-contract systems that combine payment automation with conflict-reduction procedures have also been modelled to lower delay and claim incidence (Wahab et al., 2023). These studies suggest that decentralised fund-holding structures and coded dispute-management routines can preserve payment integrity while accelerating interim settlement processes.

Simulation, game-theory, and agent-based modelling approaches are increasingly applied to analyse strategic interactions and predict cash-flow stresses that may lead to payment failure. Agent-based simulations integrated with game-theory decision models have been used to examine how strategic behaviour among project owners, contractors, and subcontractors influences cash-flow timing and payment reliability (Dorrah & McCabe, 2023a). Complementary research proposes data-flow frameworks illustrating how advanced digital technologies can secure payment systems by formalising information exchange pathways (Chong & Diamantopoulos, 2020). Additional studies present BIM–IoT–blockchain monitoring models capable of automatically collecting evidence required for payment triggers, demonstrating that simulation of such systems can help predict operational bottlenecks (Sarkar et al., 2023). These modelling approaches provide diagnostic insights into systemic pressure points and assist decision-makers in prioritising interventions to prevent interim payment failure.

Despite these technological advances, adoption barriers and institutional constraints may limit the practical benefits of blockchain-based payment systems. Implementation challenges such as data interoperability limitations, governance uncertainty and shortages of specialised skills have been identified as key obstacles to blockchain adoption in construction (Mahmudnia et al., 2022). Institutional analyses further indicate that regulatory clarity, stakeholder alignment and demonstrable business value are necessary conditions for scaling smart-contract applications across the industry (Shang et al., 2023). Studies examining knowledge transfer between blockchain engineers and construction practitioners also highlight technical concerns regarding on-chain and off-chain system integration and long-term system maintenance (D. J. Scott & Broyd, 2025). Additional research raises practical issues concerning digital asset representation and interoperability with facility management platforms (Bongini et al., 2025). Overall, the literature suggests that technological feasibility alone is insufficient to achieve automated interim payment systems without concurrent progress in regulatory frameworks, technical standards, and industry capabilities.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue VI June 2026

A synthesis of the reported benefits and constraints suggests a hybrid pathway for improving interim payment performance through the combined use of automated BIM-linked smart contracts, decentralised fund-protection mechanisms, and predictive modelling tools, alongside institutional reforms and capability development. Studies demonstrate that digital technologies can eliminate manual administrative bottlenecks in payment processes (Elsharkawi et al., 2025; Hamledari & Fischer, 2021; Sigalov et al., 2021). Research on decentralised financial architectures further shows that blockchain-based fund protection and dispute-reduction mechanisms can safeguard project cash-flow (Saygili et al., 2022; D. Scott et al., 2024; Wu et al., 2023). Modelling studies also indicate that predictive simulation tools help anticipate payment-related stresses within project ecosystems (Dorrah & McCabe, 2023a; Sarkar et al., 2023).

However, several studies caution that widespread adoption requires the development of technical standards, legal clarity, and enhanced human capabilities (Mahmudnia et al., 2022; D. J. Scott & Broyd, 2025; Shang et al., 2023) Consequently, policymakers and industry stakeholders are encouraged to pilot integrated proof-of-concept implementations while simultaneously investing in interoperability standards, governance frameworks, and adjudicative mechanisms to realise secure and automated interim payment systems.

The reviewed technological literature shows that digital and blockchain-based systems hold considerable promise for reducing payment friction by automating progress verification, enforcing coded payment rules, and strengthening transparency. Integrating BIM, IoT, and scan-to-BIM techniques with blockchain enables verifiable, real-time evidence streams that support automated disbursement.

Decentralized financial constructs such as PBAs and coded dispute-handling routines further protect cash flows and reduce conflicts. Simulation and modelling techniques enhance the ability to predict bottlenecks and support strategic decision-making. However, successful implementation is constrained by interoperability challenges, skills gaps, regulatory ambiguity, and uneven institutional readiness. The synthesis suggests that a hybrid strategy combining digital automation with governance reform, capacity building, and standard-setting is essential to achieve secure and scalable payment automation.

CONCLUSION

The review of interim payment challenges in the construction industry demonstrates that payment-related issues continue to hinder timely project delivery, financial stability, and overall industry performance. The introduction highlighted persistent problems such as delayed certification, inconsistent contractual compliance, cash-flow disruptions, and limited transparency in payment administration. These challenges remain widespread across various regions, indicating that existing mechanisms for managing interim payments have not achieved the intended level of efficiency or reliability.

The literature review identified several interconnected themes, including financial constraints, valuation complexities, contractual disputes, and stakeholder-related behavioral factors. The findings and discussion reinforced these observations by showing that late payments, underpayments, and subjective assessments during valuation are common triggers for disputes and cash-flow instability. The analysis also revealed that subcontractors face heightened vulnerability due to dependence on timely payments from main contractors. The inclusion of advanced technologies such as smart contracts and blockchain offers a potential pathway for improving transparency, automating compliance checks, and reducing opportunities for manipulation and delay.

This study contributes by synthesizing evidence from multiple perspectives to provide a comprehensive view of interim payment issues, integrating financial, contractual, behavioral, and technological dimensions. The review emphasizes that payment challenges cannot be addressed in isolation and require multi-layered reforms involving clearer contractual conditions, improved valuation standards, and greater adoption of reliable digital tools.

Nevertheless, the review is limited by its dependence on secondary data and abstract-level information, which restricts deeper insight into context-specific practices. Future research should incorporate empirical studies

involving contractors, consultants, subcontractors, and clients to validate the conceptual findings. Further investigation into digitalization readiness, regulatory impacts, and pilot testing of blockchain-based payment automation would offer clearer guidance for developing effective, transparent, and standardized interim payment frameworks.

REFERENCES

1. Abate, H. H., Mengistu, D. G., & Abera, T. A. (2024). Failure Factors of Building Construction Projects in Ethiopia. African Journal of Science, Technology, Innovation and Development, 16(6), 860–880. https://doi.org/10.1080/20421338.2024.2377365
2. Abdallah, A., Doloi, H., & Holzer, D. (2025). Exploring Contextual Issues Impacting Delivery and Performance of Public Sector Construction Projects in Tanzania. Built Environment Project and Asset Management, 15(2), 228–246. https://doi.org/10.1108/BEPAM-03-2024-0068
3. Agyekum, K., Kukah, A. S., & Amudjie, J. (2022). The Impact of COVID-19 on the Construction Industry in Ghana: The Case of Some Selected Firms. Journal of Engineering, Design and Technology, 20(1), 222–244. https://doi.org/10.1108/JEDT-11-2020-0476
4. Al Alawi, M. (2021). Delay in Payment Effects on Productivity of Small and Medium Construction Companies in Oman: Exploration and Ranking. Asian Journal of Civil Engineering, 22(7), 1347–1359. https://doi.org/10.1007/s42107-021-00387-8
5. Al Malki, Y. M., & Alam, M. S. (2021). Construction Claims, Their Types and Causes in the Private Construction Industry in the Kingdom of Bahrain. Asian Journal of Civil Engineering, 22(3), 477–484. https://doi.org/10.1007/s42107-020-00326-z
6. Alajmani, H., Ahmed, S., & El-Sayegh, S. M. (2024). Factors Causing Delays in the UAE Construction Industry Amid the Covid-19 Pandemic. Journal of Financial Management of Property and Construction, 29(1), 135–151. https://doi.org/10.1108/JFMPC-02-2023-0006
7. Alrasheed, K. A., Soliman, E., & Almesbah, F. E. (2023). Dispute Classification in Construction Projects Based on Litigation Cases. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 15(3). https://doi.org/10.1061/JLADAH.LADR-910
8. Alrasheed, K., Bahman, M., Soliman, E., & Albader, H. (2025). Enhancing Claims Management in the Construction Industry Using Analytic Hierarchy Process. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 17(3). https://doi.org/10.1061/JLADAH.LADR-1268
9. Alshihri, S., Al-Gahtani, K., & Almohsen, A. (2022). Risk Factors That Lead to Time and Cost Overruns of Building Projects in Saudi Arabia. Buildings, 12(7), 902. https://doi.org/10.3390/buildings12070902
10. Arewa, A. O., Olubodun, F., & Peter Swai, L. (2024). Exploring Nuanced Approach to Criminalization of Late Payers in the Construction Sector. International Journal of Construction Management, 24(10), 1136–1144. https://doi.org/10.1080/15623599.2022.2163107
11. B., H. S. K., S, A., & Nachiar, S. (2024). Categorization and Assessment of Combination Causes in Construction Disputes Using Analytical Hierarchy Process (AHP). Engineered Science. https://doi.org/10.30919/es1109
12. Badawy, M., Alqahtani, F. K., & Sherif, M. A. (2023). Impact of the COVID-19 Pandemic on Risk Factors in Residential Projects. Journal of Asian Architecture and Building Engineering, 22(3), 1637–1647. https://doi.org/10.1080/13467581.2022.2097239
13. Benecke, D., Simpeh, E., & Smallwood, J. (2023). The Use of Smart Contracts to Assist in Mitigating Payment Inefficiencies. International Conference on Construction in the 21st Century, 2023-May.
14. Bitamba, B. F., & An, S. H. (2020). Study on Factors Affecting the Performance of Construction Projects in the Democratic Republic of the Congo. South African Journal of Industrial Engineering, 31(1), 12–25. https://doi.org/10.7166/31-1-2193
15. Bolton, S., Wedawatta, G., Wanigarathna, N., & Malalgoda, C. (2022). Late Payment to Subcontractors in the Construction Industry. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 14(4). https://doi.org/10.1061/(ASCE)LA.1943-4170.0000552

16. Bongini, A., Sparacino, M., Marzi, L., & Biagini, C. (2025). Enhancing Facility Management with Emerging Technologies: A Study on the Application of Blockchain and NFTs. Buildings, 15(11), 1911. https://doi.org/10.3390/buildings15111911
17. Cakmak, P. I. (2022). The Stakeholders' Perspective on the Factors Contributing to Construction Disputes. International Journal of Building Pathology and Adaptation, 40(5), 712–727. https://doi.org/10.1108/IJBPA-06-2020-0050
18. Chadee, A., Ali, H., Gallage, S., & Rathnayake, U. (2023). Modelling the Implications of Delayed Payments on Contractors' Cashflows on Infrastructure Projects. Civil Engineering Journal, 9(1), 52–71. https://doi.org/10.28991/CEJ-2023-09-01-05
19. Chaturvedi, S., Bhatt, N., Rajasekar, E., & Patel, H. (2021). Assessment of Critical Causes of Conflicts for Building Construction Projects in India Using Fuzzy Analytical Network Process. Journal of The Institution of Engineers (India): Series A, 102(4), 919–941. https://doi.org/10.1007/s40030-021-00551-y
20. Chong, H.-Y., & Diamantopoulos, A. (2020). Integrating Advanced Technologies to Uphold Security of Payment: Data Flow Diagram. Automation in Construction, 114, 103158. https://doi.org/10.1016/j.autcon.2020.103158
21. Daoud, A. O., El Hefnawy, M., & Wefki, H. (2023). Investigation of Critical Factors Affecting Cost Overruns and Delays in Egyptian Mega Construction Projects. Alexandria Engineering Journal, 83, 326–334. https://doi.org/10.1016/j.aej.2023.10.052
22. Das, M., Luo, H., & Cheng, J. C. P. (2020). Securing Interim Payments in Construction Projects Through a Blockchain-based Framework. Automation in Construction, 118, 103284. https://doi.org/10.1016/j.autcon.2020.103284
23. Demachkieh, F. S., & Abdul-Malak, M.-A. U. (2019). Administration of Construction Contract Interim Payments Based on Earned-Value Reduction Techniques. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 11(4). https://doi.org/10.1061/(ASCE)LA.1943-4170.0000309
24. Dick-Sagoe, C., Lee, K. Y., Odoom, D., & Boateng, P. O. (2023). Stakeholder Perceptions on Causes and Effects of Public Project Failures in Ghana. Humanities and Social Sciences Communications, 10(1), 14. https://doi.org/10.1057/s41599-022-01497-7
25. Dorrah, D. H., & McCabe, B. (2023a). Integrated Agent-Based Simulation and Game Theory Decision Support Framework for Cash Flow and Payment Management in Construction Projects. Sustainability, 16(1), 244. https://doi.org/10.3390/su16010244
26. Dorrah, D. H., & McCabe, B. Y. (2023b). Construction Payment Problems: A Critical Review of Payment Problems, Prompt Payment Legislation, and Challenges (pp. 333–345). https://doi.org/10.1007/978-3-031-34593-7_22
27. Elsharkawi, H., Elbeltagi, E., Eid, M. S., Alattyih, W., & Wefki, H. (2025). Construction Payment Automation Through Scan-to-BIM and Blockchain-Enabled Smart Contract. Buildings, 15(2). https://doi.org/10.3390/buildings15020213
28. Elsherbiny, S. A. M., Gad, S. A.-F., & Alim, A. M. A. (2024). Critical Delay Factors in Construction Projects and Their Proposed Solutions from the Perspective of Total Quality Management. International Journal of Engineering Trends and Technology, 72(2), 1–8. https://doi.org/10.14445/22315381/IJETT-V72I2P101
29. Erzaij, K. R., Burhan, A. M., Hatem, W. A., & Ali, R. H. (2021). Prediction of the Delay in the Portfolio Construction Using Naïve Bayesian Classification Algorithms. Civil and Environmental Engineering, 17(2), 673–680. https://doi.org/10.2478/cee-2021-0066
30. Farid, W., Kureshi, N. I., Babar, S., & Mahmood, S. (2020). Critical Risk Factors of Construction Industry of Pakistan for Improving Project Outcome. Mehran University Research Journal of Engineering and Technology, 39(1), 71–80. https://doi.org/10.22581/muet1982.2001.08
31. Fateh, M. A. M., Mat, N. A. A. N., & Rahman, R. A. (2024). Payment Predicaments: Exploring Factors And Remedies for Main Contractor-Subcontractor Dynamics in Malaysia. ASEAN Engineering Journal, 14(2), 91–101. https://doi.org/10.11113/aej.v14.20767
32. Francis, M., Ramachandra, T., & Perera, S. (2022). Disputes in Construction Projects: A Perspective of Project Characteristics. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 14(2). https://doi.org/10.1061/(ASCE)LA.1943-4170.0000535

33. Francis, M., Ramachandra, T., & Rotimi, J. O. B. (2016). Strategies to Minimise the Effects of Delayed Payments. Proceedings of the Institution of Civil Engineers - Management, Procurement and Law, 169(5), 199–207. https://doi.org/10.1680/jmapl.15.00038
34. Genc, O. (2023). Identifying Principal Risk Factors in Turkish Construction Sector According to Their Probability of Occurrences: A Relative Importance Index (RII) and Exploratory Factor Analysis (EFA) Approach. International Journal of Construction Management, 23(6), 979–987. https://doi.org/10.1080/15623599.2021.1946901
35. Ghanam, S. A., Khuder, S. S. M., Ibrahim, A. A., Alghabsha, A. T. S., & Zeki, I. M. (2025). Evaluation of Factors Delaying the Completion of Schools Projects by Using Neural Network Multi-Layer Perceptron Model. International Journal of Intelligent Engineering and Systems, 18(6), 683–699. https://doi.org/10.22266/ijies2025.0731.43
36. Gohunuwatta, R. R., Perera, H. A. H. P., Perera, A. K. S., & Disaratna, P. A. P. V. D. D. (2024). Effect of COVID-19 Pandemic on the Productivity of Construction Projects in Sri Lanka. ITU Press, Press of the Istanbul Technical University. https://doi.org/10.58278/0.2024.32
37. Habetemeherit, A. B., Mengistu, D. G., Sorsa, F. T., & Tesfaye, B. Z. (2025). Causes and Impacts of Public Construction Projects' Contract Terminations. Engineering, Construction and Architectural Management. https://doi.org/10.1108/ECAM-09-2024-1217
38. Hamdan, N. A. M., Sarkawi, A. A., Habib, S. N. H. A., & Othman, A. A. (2022). Doctrinal Analysis on Interest for Late Interim Payment for Malaysian Construction Works Contracts. Malaysian Construction Research Journal, 15(1), 258–272.
39. Hamledari, H., & Fischer, M. (2021). Role of Blockchain-Enabled Smart Contracts in Automating Construction Progress Payments. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 13(1). https://doi.org/10.1061/(ASCE)LA.1943-4170.0000442
40. Hao, E. G. C., Hao, Y. J., Isa, N. L. S. M., Hamid, F. N. A. A., Roslan, N. A. F., & Mohd, N. I. (2026). A Comparative Study of Manual Approach and Centralized Digital Database. International Journal of Research and Innovation in Social Science, 10(2), 2180–2192. https://doi.org/10.47772/IJRISS.2026.10200165
41. Haron, R. C., & Arazmi, A. L. (2020). Late Payment Issues of Subcontractors in Malaysian Construction Industry. Planning Malaysia, 18(11). https://doi.org/10.21837/pm.v18i11.711
42. Hojat, N., & Hosseinian, S. M. (2025). Assessing Owner Payment Reliability in Construction Using Combined Supervised and Unsupervised Machine Learning Algorithms. Engineering, Construction and Architectural Management, 1–33. https://doi.org/10.1108/ECAM-10-2024-1390
43. Idris, M. H., Adnan, H., Baharuddin, H. E. A., Mahat, N. A. A., & Bakhry, N. A. (2022). Assessing Risk Factors on Civil Engineering Projects. Malaysian Construction Research Journal, 38(3), 35–42. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85149015651&partnerID=40&md5=e13f9c6ffb6d4997ac0a2a4ec44e6717
44. Ikediashi, D. I., & Okolie, K. C. (2022). An Assessment of Risks Associated with Contractor's Cash Flow Projections in South-South, Nigeria. International Journal of Construction Management, 22(11), 2051–2058. https://doi.org/10.1080/15623599.2020.1764752
45. Ismail, W. N. W., Adnan, H., Azmi, W. F. W. M., Yusop, N., & Isa, S. S. M. (2023). Factors Contributing to Delay of Interim Payment in Civil Engineering Projects. International Journal of Technology, 14(4), 867. https://doi.org/10.14716/ijtech.v14i4.3370
46. Ismail, W. N. W., Adnan, H., & Ismail, N. A. A. (2021). Common Contractual Behaviour of Key Participants in Civil Engineering Projects. International Journal of Sustainable Construction Engineering and Technology, 12(3). https://doi.org/10.30880/ijscet.2021.12.03.022
47. Judi, S. S., & Abdul Rashid, R. (2010). Contractor's Right of Action for Late or Non-Payment by the Employer. Journal of Surveying, Construction & Property, 1(1), 1–31. https://doi.org/10.22452/jscp.vol1no1.4
48. Judi, S. S., & Mustaffa, N. E. (2021). Exploring and Improving Late Payment and Underpayment Issues in The Malaysian Construction Industry: An Exploratory Study. Malaysian Construction Research Journal, 35(3), 41–56.
49. Judi, S. S., & Mustaffa, N. E. (2023). Development of a Proactive Preventive Late Payment and Underpayment Solution Model for the Construction Industry. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 15(2). https://doi.org/10.1061/JLADAH.LADR-859

50. Kamel, M. A., Bakhoum, E. S., & Marzouk, M. M. (2023). A Framework for Smart Construction Contracts Using BIM and Blockchain. Scientific Reports, 13(1). https://doi.org/10.1038/s41598-023-37353-0
51. Kazar, G. (2025). A Data-Driven Approach for Predicting Cash Flow Performance of Public Owners in Building Projects: Insights from Turkish Cases. Engineering, Construction and Architectural Management, 32(11), 7507–7538. https://doi.org/10.1108/ECAM-06-2024-0706
52. Khalid, M. A., Hassan, M. U., Ullah, F., & Ahmed, K. (2024). Integrated Building Information Modeling and Blockchain System for Decentralized Progress Payments in Construction Projects. Journal of Engineering, Design and Technology. https://doi.org/10.1108/JEDT-04-2024-0252
53. Lee, C. K., Bujna, M., Abd Jamil, A. H., & Ee, P. T. (2023). A Cause and Effect of a Nonpayment Model Based on the DEMATEL Algorithm. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 15(1). https://doi.org/10.1061/(ASCE)LA.1943-4170.0000592
54. Loke, M. K., Lee, W. P., & Yap, J. B. H. (2025). Effective Practical Strategies for Statutory Adjudication in Construction Disputes: Perspectives from Adjudicators. International Journal of Construction Management, 25(12), 1488–1499. https://doi.org/10.1080/15623599.2024.2440190
55. Mahamid, I. (2021). The Influence of Delayed Payments on Time Overrun in Public Sector Projects. International Journal of Public Sector Performance Management, 7(3), 372. https://doi.org/10.1504/IJPSPM.2021.114592
56. Mahamid, I. (2024). Risk Management in Construction Projects in Palestine: Contractors' Perspective. Revista Ingeniería de Construcción, 39(2), 140–150. https://doi.org/10.7764/RIC.00109.21
57. Mahamid, I., & Abdelaal, A. (2025). Causes and Effects of Change Orders for Construction Projects in Palestine. Engineering, Technology & Applied Science Research, 15(1), 19052–19061. https://doi.org/10.48084/etasr.8717
58. Mahdi, S. F., Ali, R., & Abd, A. M. (2025). Analysis the Causes Delay from Contractors in Construction Projects Using Fuzzy AHP. Diyala Journal of Engineering Sciences, 109–129. https://doi.org/10.24237/djes.2024.18207
59. Mahmud, A. T., Ogunlana, S. O., & Hong, W. T. (2021). Key Driving Factors of Cost Overrun in Highway Infrastructure Projects in Nigeria: A Context-Based Perspective. Journal of Engineering, Design and Technology, 19(6), 1530–1555. https://doi.org/10.1108/JEDT-05-2020-0171
60. Mahmudnia, D., Arashpour, M., & Yang, R. (2022). Blockchain in Construction Management: Applications, Advantages and Limitations. Automation in Construction, 140, 104379. https://doi.org/10.1016/j.autcon.2022.104379
61. Masrom, M. A. N., Ying, C. B., Mohamed, S., Md Yassin, A., Wee, S. T., Haron, R. C., & Chan, M. (2021). Determining Critical Contributory Factors of Payment Default in Residential Construction Projects. International Journal of Integrated Engineering, 13(5). https://doi.org/10.30880/ijie.2021.13.05.021
62. Mastan, Z. P., Mohammad, S. I. S., Azuan, N. I. M., & Vasudevan, A. (2025). General Factors, Dispute, and Human Factors Shaping Late Payment Issues in the Malaysian Construction Sector: A Path to Sustainability. Architecture Image Studies, 6(3), 1–16. https://doi.org/10.62754/ais.v6i3.179
63. Mewomo, M. C. (2019). The Construction Industry Stakeholders Preliminary Views on The Proposed South African Prompt Payment and Statutory Adjudication Regulations. In C. Gorse, S. of the B. E. and E. Leeds Beckett University Leeds Sustainability Institute NT107 The Northern Terrace Leeds, & C. J. Neilson (Eds.), Association of Researchers in Construction Management, ARCOM 2019 - Proceedings of the 35th Annual Conference (pp. 375–384). Association of Researchers in Construction Management. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85077109807&partnerID=40&md5=61b8527fa73d89248fa881bccadd6db1
64. Mustaffa, N. E., Nayan, R., Aminuddin, F. A., & Judi, S. S. (2023). Issues Encountered in the Valuation of Interim Payment Process in Construction Projects. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 15(1). https://doi.org/10.1061/(ASCE)LA.1943-4170.0000596

65. Nanayakkara, S., Perera, S., Senaratne, S., Weerasuriya, G. T., & Bandara, H. M. N. D. (2021). Blockchain and Smart Contracts: A Solution for Payment Issues in Construction Supply Chains. Informatics, 8(2), 36. https://doi.org/10.3390/informatics8020036
66. Ogunnusi, M., Omotayo, T., Hamma-Adama, M., Awuzie, B. O., & Egbelakin, T. (2022). Lessons Learned from the Impact of COVID-19 on the Global Construction Industry. Journal of Engineering, Design and Technology, 20(1), 299–320. https://doi.org/10.1108/JEDT-05-2021-0286
67. Omotayo, T. S., Danvers-Watson, O., & Oyegoke, A. S. (2023). Subcontractor Trust Issues on Payment and Valuation Practices in UK Private Projects. Journal of Financial Management of Property and Construction, 28(1), 64–90. https://doi.org/10.1108/JFMPC-07-2021-0048
68. Owusu-Manu, D.-G., Ghansah, F. A., Darko, A., Asiedu, R. O., & Edwards, D. J. (2020). Insurable and Non-Insurable Risks in Complex Project Deals: Case of the Ghanaian Construction Industry. Journal of Engineering, Design and Technology, 18(6), 1971–1995. https://doi.org/10.1108/JEDT-10-2019-0265
69. Pham, V. H. S., Vo, T. T., & Dang, N. T. N. (2024). Applying Blockchain Technology in Smart Contracts for Construction Payment: A Comprehensive Solution for Lumpsum Contracts. Asian Journal of Civil Engineering. https://doi.org/10.1007/s42107-024-00995-0
70. Rajapakshe, W. (2025). Critical Risk Factors Influencing the Management of Disruptions in Construction Projects: Insights from Recent Challenges in Sri Lanka. Social Sciences & Humanities Open, 12, 101748. https://doi.org/10.1016/j.ssaho.2025.101748
71. Rostiyanti, S. F., Hansen, S., & Ponda, T. N. (2020). Cause and Effect of Conditional Payments Provision to Subcontractors. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 12(1). https://doi.org/10.1061/(ASCE)LA.1943-4170.0000352
72. Saad, A. M. (2023). Exploring the Contractual Arrangements Associated with the Adoption of the Modern Methods of Construction in the United Kingdom. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 15(4). https://doi.org/10.1061/JLADAH.LADR-986
73. Sahu, P., Bera, D. K., & Parhi, P. K. (2024). Analyzing the Impact of Construction Delays on Disputes in India: A Statistical and Machine Learning Approach. Journal of Mechanics of Continua and Mathematical Sciences, 19(9). https://doi.org/10.26782/jmcms.2024.09.00004
74. Sarkar, D., Dhaneshwar, D., & Raval, P. (2023). Automation in Monitoring of Construction Projects Through BIM-IoT-Blockchain Model. Journal of The Institution of Engineers (India): Series A, 104, 317–333. https://doi.org/10.1007/s40030-023-00727-8
75. Saygili, M., Mert, I. E., & Tokdemir, O. B. (2022). A Decentralized Structure to Reduce and Resolve Construction Disputes in a Hybrid Blockchain Network. Automation in Construction, 134, 104056. https://doi.org/10.1016/j.autcon.2021.104056
76. Scott, D. J., & Broyd, T. (2025). Knowledge Transfer from Blockchain Engineers to Construction: Exploring the Technical Concerns of Using Blockchain for Payments in the Construction Industry. Journal of Information Technology in Construction, 30(48), 1174–1207. https://doi.org/10.36680/j.itcon.2025.048
77. Scott, D., Ma, L., & Broyd, T. (2024). Project Bank Account (PBA) Decentralised Application for the Construction Industry. Construction Innovation. https://doi.org/10.1108/CI-04-2023-0067
78. Shaikh, H. H., Zainun, N. Y., & Khahro, S. H. (2020). Claims in Construction Projects: A Comprehensive Literature Review. IOP Conference Series: Earth and Environmental Science, 498(1), 012095. https://doi.org/10.1088/1755-1315/498/1/012095
79. Shang, G., Pheng, L. S., & Zhong Xia, R. L. (2023). Adoption of Smart Contracts in the Construction Industry: An Institutional Analysis of Drivers and Barriers. Construction Innovation. https://doi.org/10.1108/CI-03-2022-0066
80. Sigalov, K., Ye, X., König, M., Hagedorn, P., Blum, F., Severin, B., Hettmer, M., Hückinghaus, P., Wölkerling, J., & Groß, D. (2021). Automated Payment and Contract Management in the Construction Industry by Integrating Building Information Modeling and Blockchain-Based Smart Contracts. Applied Sciences, 11(16), 7653. https://doi.org/10.3390/app11167653
81. Son, P. V. H., Thien, V. T., & Dang, N. T. N. (2024). Applying Blockchain Technology in Smart Contracts for Construction Payment: A Proposed Solution. In R. J.N., W. C.M., L. V.H., & L. A.T.

(Eds.), Lecture Notes in Civil Engineering (Vol. 442, pp. 360–367). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/978-981-99-7434-4_38

82. Sonmez, R., Ahmadisheykhsarmast, S., & Güngör, A. A. (2022). BIM Integrated Smart Contract for Construction Project Progress Payment Administration. Automation in Construction, 139, 104294. https://doi.org/10.1016/j.autcon.2022.104294
83. Tessema, A. T., Alene, G. A., & Wolelaw, N. M. (2022). Assessment of Risk Factors on Construction Projects in Gondar City, Ethiopia. Heliyon, 8(11), e11726. https://doi.org/10.1016/j.heliyon.2022.e11726
84. Ting, S. N., Lee, Y. Y., & bin Haris, M. N.-F. (2025). Discerning the Disparity between Stipulated Contractual Payment Procedures and Payment Practices among Contractors. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 17(1). https://doi.org/10.1061/JLADAH.LADR-1151
85. Umar, G. M., Abidin, N. Z., & Kamal, E. M. (2024). The Impacts of Interim Payment Default in Public Projects: A Study in Kano State, Nigeria. In Advances in Civil Engineering Materials (pp. 1083–1092). Springer Nature Singapore. https://doi.org/10.1007/978-981-97-0751-5_89
86. Voigt, A., Khalaf, M., & Mattar, S. G. (2023). Impact of Cash Shortages on Project Performance. Journal of Legal Affairs and Dispute Resolution in Engineering and Construction, 15(4). https://doi.org/10.1061/JLADAH.LADR-898
87. Wahab, A., Wang, J., Shojaei, A., & Ma, J. (2023). A Model-Based Smart Contracts System Via Blockchain Technology to Reduce Delays and Conflicts in Construction Management Processes. Engineering, Construction and Architectural Management, 30(10), 5052–5072. https://doi.org/10.1108/ECAM-03-2022-0271
88. Wang, P., Wang, K., Huang, Y., Zhu, J., Fenn, P., & Zhang, Y. (2023). Payment Issues in China's Construction Industry: Nature, Causes, and a Predictive Model. Journal of Construction Engineering and Management, 149(1). https://doi.org/10.1061/(ASCE)CO.1943-7862.0002422
89. Wen, F. S. W., Ru, G. S., Quimson, K. J., Nazli, M. A. N. B. M., Fauzi, M. F. H. B. M., & Mohd, N. I. (2026). Digital Document Control System for Post-Contract Management. International Journal of Research and Innovation in Social Science, 10(2), 2137–2146. https://doi.org/10.47772/IJRISS.2026.10200161
90. Wepari, J. W., Donkor, M. B., & Kusi, E. (2024). Mitigating the Effects of Delay Risk in Building Construction Projects in Ghana. Cogent Engineering, 11(1). https://doi.org/10.1080/23311916.2024.2345522
91. Wu, L., Lu, W., & Chen, C. (2023). Resolving Power Imbalances in Construction Payment Using Blockchain Smart Contracts. Engineering, Construction and Architectural Management. https://doi.org/10.1108/ECAM-03-2023-0194
92. Wu, L., Lu, W., & Xu, J. (2022). Blockchain-Based Smart Contract for Smart Payment in Construction: A Focus on the Payment Freezing and Disbursement Cycle. Frontiers of Engineering Management, 9(2), 177–195. https://doi.org/10.1007/s42524-021-0184-y
93. Wubet, W. A., Burrow, M., & Ghataora, G. (2023). Risks Affecting the Performance of Ethiopian Domestic Road Construction Contractors. International Journal of Construction Management, 23(4), 639–647. https://doi.org/10.1080/15623599.2021.1902732
94. Ye, Y.-X., Shan, M., Gao, X., Li, Q., & Zhang, H. (2024). Examining Causes of Disputes in Subcontracting Litigation Cases Using Text Mining and Natural Language Processing Techniques. International Journal of Construction Management, 24(15), 1617–1629. https://doi.org/10.1080/15623599.2023.2286046
95. Youssef, M. A., Ibrahim, A. H., & El-Badawy Hafez, M. E.-S. (2023). Impact Factors on Subcontractor's Cash Flow Management. Civil Engineering Journal, 9, 94–104. https://doi.org/10.28991/CEJ-SP2023-09-08
96. Zemra, R. (2023). Measures to Mitigate the Main Causes of Social Hoising Delays in Algeria. Civil and Environmental Engineering Reports, 33(2), 13–33. https://doi.org/10.59440/ceer/172022
97. Zhu, L., & Xiong, H. (2023). Research on the Industry Acceptance and Promotion Path of Interim Payment in Civil Engineering Projects (pp. 1116–1132). https://doi.org/10.1007/978-981-19-7331-4_90

98. Zhu, L., Xiong, H., Ning, Y., & Lv, M. (2023). Addressing Individual Perception: Extending the Technology Acceptance Model to the Interim Payment Method in Construction Projects. Sustainability, 15(9), 7120. https://doi.org/10.3390/su15097120
99. Zulkhairi, F. H., Hussin, S. N., Saidin, M. T., Zain, F. M. Y., Hussein, E., & Khalil, N. (2022). CIPAA Implementation in the Malaysian Construction Industry: From Contractor's Perspectives. Malaysian Construction Research Journal, 16(2), 18–28. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85129731747&partnerID=40&md5=23f7cf282f5d4ea3143e9532da1714c7