Master Thesis Report

CRAFTING A COMPREHENSIVE SOLUTION TO PERSISTENT PAYMENT ISSUES IN THE CONSTRUCTION INDUSTRY: STRENGTHENING RELATIONAL RESILIENCE

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Crafting a Comprehensive Solution to Persistent Payment Issues in the Construction Industry: Strengthening Relational Resilience

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in fulfilment of the requirements for the degree of

Master of Science
in Construction Management and Engineering

at Delft University of Technology.

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Acknowledgement

I would like to express my deepest gratitude to those who supported and guided me throughout this thesis journey.

First and foremost, I extend my sincere thanks to my committee. Dr. Daniel Hall, my chair, whose feedback was always concise, focused, and impactful. Dr. Erik-Jan Houwing, my first supervisor, who was always approachable, no matter how small the query, and took as much interest in the topic as I did. And Ir. Magchiel van Os, who not only offered valuable academic advice but also contributed to my personal growth. I am grateful to all three for continuously seeing potential in me, even at times when I did not, and for guiding me with care and wisdom.

This research was deeply inspired by my experience working on a mega-project, where I witnessed many of the issues explored in this thesis firsthand. That foundation gave meaning and purpose to the work I undertook here.

I am also grateful to my friends and colleagues, who always had my back, offering advice, encouragement, and a sense of community throughout this journey. Finally, I thank my family, whose unwavering belief in me provided strength and motivation at every step.

I hope you enjoy reading this thesis as much as I did working on it!

V. G. Pai Vernekar (Rishabh)

Delft, June 2025

Executive Summary

Persistent payment issues such as late payments, partial payments and non-payments continue to disrupt the construction industry, eroding trust between stakeholders and straining contractor cash flows. Despite numerous procedural fixes, technological tools, and legal mechanisms developed over the years, these problems continue to exist, pointing to a complex and multi-dimensional nature. This research sought to uncover the underlying dynamics behind these issues.

Adopting the Double Diamond Framework (DDF) as the guiding methodology, the study followed an iterative research design consisting of four phases: Discover, Define, Develop, and Deliver. It began with an extensive literature review to explore the underlying causes contributing to payment breakdowns, revealing a wide spectrum of issues such as administrative failures, contractual ambiguities, cultural norms, and interpersonal issues. While this review confirmed the multi-dimensional nature of the problem, it failed to explain how these issues interact or escalate in practice.

To build on this, exploratory interviews with construction professionals were conducted, revealing early relational themes such as trust, power imbalance, and administrative inefficiencies. These themes helped form an initial hypothesis, which assumed that payment problems followed linear, cause-effect relationships. However, as data collection progressed, a grounded theory-inspired analysis was applied to better capture the complexity of these issues. This revealed that payment disruptions are not the result of fixed sequences but are instead shaped by how underlying relational conditions such as trust, empathy, and power dynamics interact with and influence immediate disruptions.

The analysis introduced a new distinction: Triggering Factors (such as documentation errors or miscommunication) initiate disruptions in the payment process, while Influencing Factors (such as trust deficits or power asymmetry) determine whether these disruptions escalate or are resolved collaboratively. This insight set the foundation for a behaviourally grounded framework designed to enhance relational resilience of project teams. The framework consists of six strategic interventions:

1. Working Together
2. Transparency & Communication
3. Shared Goals & Incentives
4. Understanding Each Other's Needs
5. Monitoring & Progress Tracking
6. Contracts

Each intervention is tied to a set of behavioural mechanisms, such as procedural fairness, shared ownership, perspective taking, etc. that collectively strengthen the relational fabric of project participants. These mechanisms were later explained to show how they help interventions improve relationships and prevent small issues from turning into bigger payment problems. The framework was further refined through expert validation, ensuring it is both practical and adaptable to real-world contexts.

Ultimately, this research offers a conceptual and practical contribution by reframing payment problems as outcomes of relational dynamics rather than just procedural shortcomings. It provides the industry with a structured, behaviour-focused, and flexible approach to enhance the reliability of payment processes.

Table of Contents

Acknowledgement 1
Executive Summary 2
List of Tables 7
List of Figures 7
1 Introduction 8
1.1 Background and Context 8
1.2 Payment Challenges in the Construction Industry 8
1.3 Problem Statement 9
1.3.1 Common Causes of Payment Problems 9
1.3.2 Effects of Payment Problems 10
1.3.3 Existing Solutions to Payment Problems 10
1.4 Research Gap 10
1.5 Research Objective 11
1.6 Research Questions 11
1.7 Thesis Outline 12
2 Research Methodology 14
2.1 Introduction to the Double Diamond Framework (DDF) 14
2.2 Research Design 15
2.3 Methods of Data Collection 16
2.3.1 Exploratory Interviews 16
2.3.2 Semi Structured Interviews 17
2.3.3 Expert Validation Interviews 17
2.4 Data Analysis 17
2.4.1 Analytical Process 18
2.4.2 Application to Research 18
2.4.3 Thematic Analysis and Validation 19
2.4.4 Software and Tools Used 19
2.4.5 Research Validity & Reliability 20
2.5 Ethical Considerations 20
3 Literature Review 22
3.1 Causes of Payment Problems 22
3.1.1 Administrative Issues 23
3.1.2 Financial Constraints 24
3.1.3 Interpersonal Conflicts 25

3.1.4 Cultural and Ethical Issues 26
3.1.5 Intentional Delays and Mismanagement 27
3.2 Effects of Payment Problems 28
3.2.1 Impact on Contractors' Financial Stability 28
3.2.2 Operational Disruptions 28
3.2.3 Strained Relationships and Social Impacts 29
3.3 Solutions to Payment Problems 29
3.3.1 Prompt Payment Legislations 29
3.3.2 Challenges and Limitations of Implemented Prompt Payment Legislation 31
3.3.3 Suggested Remedies and Best Practices 33
3.3.4 Barriers to Implementing Suggested Remedies 37
3.4 Summary 38
4 Findings and Analysis 40
4.1 Interviewee Overview 40
4.2 Coding Process and Structure 41
4.3 Findings From Axial Coding 41
4.3.1 Client-centric Behaviour and Relationship Barriers 41
4.3.2 Administrative and Process-Related Inefficiencies 43
4.3.3 Financial Constraints and Mismanagement 44
4.3.4 Situational Constraints and Nature of the Industry 45
4.4 Preliminary Model and Its Limitations 47
4.5 Refined Conceptual Model 49
4.5.1 Components of the Model 49
4.6 Summary 51
5 Problem Definition and Strategic Focus 53
5.1 Strategic Focus for Intervention 53
5.2 Problem Focus 54
5.3 Revisiting Literature on Key Influencing Factors 55
5.3.1 Trust 55
5.3.2 Power Imbalance 55
5.3.3 Empathy 56
5.4 Requirements of the Solution 56
5.5 Summary 57
6 The Framework 59
6.1 Framework and Overview 60
6.1.1 Working Together 60
6.1.2 Transparency & Communication 62

6.1.3 Shared Goals & Incentives 64
6.1.4 Understanding Each Other's Needs 65
6.1.5 Monitoring and Progress 66
6.1.6 Contracts 66
6.2 Expert Validation and Framework Refinement 67
6.3 Mechanisms of Change 68
6.4 From Intervention to Outcome 70
6.5 Link to Conceptual Model 72
6.6 Practical Application and Adaptability 74
6.7 Summary 75
7 Discussion 76
7.1 Interpretation of the Framework 76
7.2 Behavioral vs Procedural Intervention 76
7.3 Positioning in Existing Literature 77
7.4 Broader Implications of Research Findings 78
7.5 Practical Contributions and Recommendations for the Industry 78
7.6 Summary 79
8 Conclusion 80
8.1 Research Questions 80
8.1.1 Research Question 1 80
8.1.2 Research Question 2 80
8.1.3 Research Question 3 81
8.1.4 Research Question 4 81
8.2 Research limitations 82
8.3 Recommendations for Future Research 82
9 References 84
Appendix A – Glossary of Terms 88
Appendix B – Intervention-Mechanism Mapping 89
Appendix C – Data Management 90
C.1 – Data Management Plan 90
C.2 – Informed Consent Form 97
C.3 – HREC Approval 101

List of Tables

Table 1: Categorisation of Causes of Payment Problems 22
Table 2: List of Remedies for Payment Problems 36
Table 3: Interviewee Details 40
Table 4: Clusters of Behavioural Mechanisms Used 69
Table 5: Mapping Each Intervention to the Conceptual Model Through Mechanisms 71
Table 6: Mapping Mechanisms to Influencing Factors 73
Table 7: Mapping of Interventions to Behavioral Mechanisms 89

List of Figures

Fig 1: The Double Diamond Framework (DDF) (Ahmed, 2023) 15
Fig 2: Early Conceptualization of Payment Problem Dynamics (By Author) 48
Fig 3: Refined Conceptual Model (By Author) 51
Fig 4: The Five Dysfunctions of a Team (Lencioni, 2002) 54
Fig 5: Overview of the Framework (By Author) 60
Fig 6: Pathway from Intervention to Payment Reliability (By Author) 70

1 Introduction

1.1 Background and Context

The construction industry is the backbone of economic growth and societal development worldwide. It plays a pivotal role in creating infrastructure that supports daily life, such as transportation networks, residential and commercial buildings, and utilities. Beyond infrastructure, the industry is a significant contributor to global economies. Construction accounts for approximately 10% of the European GDP and 13% of the global GDP (ECSO, 2020; McKinsey & Company, 2020). Needless to say, it provides millions of jobs, both directly and indirectly. For instance, in the European Union alone, the construction sector employs over 18 million people, demonstrating its crucial role in employment generation (EBC Construction, 2025).

Efficient administration of financial processes is vital for the construction industry's smooth functioning. Construction projects are inherently complex, involving multiple stakeholders such as clients, contractors, subcontractors, and suppliers. These projects operate on long timelines and their stakeholders on tight profit margins, thereby making smooth cash flow and timely payments imperative. Payment processes form the financial backbone of any project, ensuring that work progresses without interruptions, materials arrive on time, and labour is compensated fairly.

However, the industry’s heavy reliance on effective cash flow also makes it highly susceptible to financial inefficiencies. Payment issues, such as late payments, underpayments, or non-payments, can cascade through the entire supply chain, impacting stakeholders at all levels. Addressing these issues is crucial, given their increasing prevalence across countries and regions. For instance, in the United Kingdom, late payments have been linked to 28% of all insolvencies in the construction sector in 2023 (Simoes, 2024). Similarly, in Malaysia, over 53% of contractors identified financial hardship caused by late or non-payments as a big challenge (Hasmori et al., 2012).

The global nature of these issues emphasizes the urgent need for more resilient solutions. Establishing a stable financial environment is not only vital for the survival of individual companies but also for ensuring the timely delivery of critical infrastructure that supports broader economic and societal needs. This study delves into these payment challenges to identify practical, sustainable solutions that can enhance the resilience of the construction sector.

1.2 Payment Challenges in the Construction Industry

Payment challenges are a pervasive and severe issue in the construction industry that impact businesses and projects across the globe. The scale and frequency of these challenges have highlighted the industry's vulnerabilities, with far-reaching consequences for economic stability and project delivery.

In China, the construction industry has faced severe payment arrears. At one point, unpaid receivables reached an astonishing 367 billion RMB, accounting for nearly 58.6% of the industry’s expected revenue (Wu et al., 2008). The issue extends far beyond Asia. In Kenya, as much as 85% of small and medium contractors reported experiencing late payments from clients, as per a survey conducted by the National Economic and Social Council in 2014 (Kenyatta et al., 2016).

Even in regions with advanced economies, the challenges remain staggering. In the United Kingdom, a 2018 report highlighted that 65% of companies in the construction industry paid their suppliers late, leading to systemic inefficiencies in cash flow (CRIBIS D&B, 2019). These issues were starkly

exemplified by the collapse of Carillion in 2018, which disrupted 450 public-sector projects and sent shockwaves through its extensive supply chain, affecting approximately 75,000 jobs (Neate & Davies, 2020).

Across the Atlantic, the United States faces its own share of payment-related hardships. Payment delays in the construction industry resulted in a $273 billion inflation in bids, as general contractors and subcontractors hiked up their prices by 6% to 10% to account for late payments and maintain financial stability (PYMNTS, 2023). In New Zealand, over 50% of payment-related disputes involved claims exceeding NZD 100,000, posing significant financial risks for small to medium-scale contractors who constitute 98% of the industry (Ramachandra & Rotimi, 2015).

The ripple effects of these payment challenges are felt throughout the construction supply chain. These issues create financial bottlenecks that lead to severe cash flow disruptions, causing delays, project abandonment, and even forcing some firms toward bankruptcy. Additionally, they tarnish the reputation and strain relationships between stakeholders. Given that the construction industry employs over 200 million people globally and accounts for a significant portion of the GDP of many countries, the stakes are exceptionally high (McKinsey & Company, 2020).

Legislative efforts to address payment delays, from China's Prompt Payment Ordinance to Malaysia's adjudication frameworks, aim to curb these inefficiencies. However, the enforcement of such measures remains inconsistent, highlighting the need for a more systemic and integrated solution.

1.3 Problem Statement

While the existence of payment challenges is widely recognized, their complexity lies in the diverse causes, far-reaching effects, and limitations of existing solutions. Together, these dimensions point to the complex and multi-faceted nature of payment challenges in construction, which demands a closer examination to pave the way for effective solutions.

1.3.1 Common Causes of Payment Problems

Payment challenges in the construction industry arise from a variety of interrelated causes, reflecting the sector's inherent complexity. These causes span cultural, financial, administrative, and technical domains, each contributing to delays, disputes, or non-payment across the supply chain.

A common issue is the industry's culture of delayed payments, where some clients intentionally postpone payments to improve their own cash flow, often at the expense of smaller contractors who rely on timely payments (Abdul-Rahman et al., 2009). Financial constraints on the payer's end further amplify this problem, with some payers lacking sufficient funds or relying heavily on external financing (Judi & Mustaffa, 2023). Disputes over project deliverables, such as disagreements regarding work quality, scope, or documentation, frequently lead to withheld or partial payments (Ting et al., 2024). Administrative inefficiencies, such as multi-layered approval processes and errors in payment claims, create additional bottlenecks and disrupt cash flow (Mbachu, 2011).

Economic downturn adds another layer of vulnerability, as market fluctuations force clients to delay payments or prioritize certain projects over others (Azman et al., 2014). These diverse causes often interact and escalate one another, underlining the need for a comprehensive understanding of how payment issues develop and persist.

1.3.2 Effects of Payment Problems

The consequences of payment challenges are far-reaching, disrupting stakeholders at every level of the construction supply chain. These effects go beyond immediate financial instability, dealing big blows to project progress and industry relationships.

Delayed payments often lead to cash flow shortages, forcing contractors to compromise on project quality or halt work altogether (Ting et al., 2024). Insolvencies among smaller contractors are a frequent outcome, threatening the completion of critical infrastructure projects (Judi & Mustaffa, 2023). Payment issues also extend beyond project logistics, affecting workers directly (Peters et al., 2019). Contractors facing cash flow shortages may be unable to pay employee wages on time, leading to reduced morale and lower productivity on-site (Peters et al., 2019). Such outcomes have a cascading effect impacting all stakeholders through the supply chain thereby reducing the resilience of project delivery.

1.3.3 Existing Solutions to Payment Problems

To address payment delays in the construction sector, a variety of legislative, administrative, and contractual measures have been implemented.

Legislative measures, such as prompt payment laws, aim to establish enforceable standards and timelines (Dorrah & McCabe, 2022). Administrative interventions focus on streamlining processes, improving financial transparency, and introducing dispute resolution mechanisms (Ting et al., 2024). Contractual measures, such as clauses defining payment terms and schedules, seek to create clearer expectations among stakeholders (Judi & Mustaffa, 2023).

Despite their contributions, these solutions often fail to address the interconnected and systemic nature of payment challenges. By focusing on isolated factors, these solutions fail to address the broader dynamics that lead to payment challenges, thus, emphasizing the need for a more comprehensive and adaptive approach.

1.4 Research Gap

Despite numerous efforts to address payment issues in the construction industry, several critical gaps remain in both the understanding and approach. The foremost gap lies in the systemic nature of the problem. Payment challenges stem from diverse causes, encompassing administrative inefficiencies, financial constraints, cultural practices, and technical disputes which result in a wide range of effects, including project delays, insolvencies, and strained stakeholder relationships. Understanding these interdependencies is essential for developing effective interventions.

Existing solutions, while valuable, primarily focus on isolated aspects of the problem. Legislative measures establish enforceable payment standards, administrative interventions improve transparency, and contractual clauses define payment terms. However, these measures overlook how issues escalate across the project lifecycle and interact with one another. This leaves the broader dynamics of payment challenges largely unresolved.

Furthermore, there is a lack of empirical research evaluating the long-term success of these measures. While some solutions may offer short-term relief, their effectiveness across different contexts and over extended periods remains largely untested. This gap raises critical questions about the adaptability and scalability of existing measures.

Another significant gap is the scarcity of research that examines this issue through a relational and behavioural lens. Current studies often focus narrowly on specific causes or effects, without adequately considering how these factors interact within the broader ecosystem of the construction industry. This limits the ability to design interventions that respond to the real-world dynamics of construction projects.

Ultimately, the most crucial gap lies in the absence of an integrated, cohesive framework to address payment challenges comprehensively. The construction industry lacks a solution that unites the various dimensions of the problem into a single, adaptable approach. Developing such a framework is essential to provide actionable, sustainable solutions that strengthen financial stability, improve project outcomes, and foster collaboration among stakeholders.

1.5 Research Objective

This research aims to provide insights into the interconnected nature of recurring payment problems in the construction industry. This involves analyzing the diverse causes, interdependencies, and impacts of these issues across various project contexts. By examining the limitations of existing measures, the study will identify essential components required for a robust solution that addresses these complex issues comprehensively.

Ultimately, the objective is to create a practical framework that brings together different approaches to effectively address the complex and interrelated issues surrounding payment in the construction industry. This framework looks to not only address the shortcomings of the existing solutions but also propose new strategies tailored to the diverse and evolving needs of the industry. By including actionable steps, the framework will provide clear, practical guidelines for stakeholders across the construction industry.

Eventually, this research seeks to contribute with a viable approach that improves payment processes, strengthens stakeholder relationships and enhances project outcomes, thereby restoring confidence in both clients and the construction industry as a whole.

1.6 Research Questions

To achieve the objectives outlined in this study, we will explore the challenges and opportunities associated with payment issues in the construction industry. This exploration is guided by the following main research question:

“How can a comprehensive solution be developed to improve payment reliability in construction projects?”

The research question will be answered through four sub-questions. The sub-questions are as follows:

1. *What are the core factors behind payment issues in construction, and how do their interactions escalate these issues?*

This sub-question aims to provide a thorough understanding of the interconnected nature of payment issues by identifying the core causes that contribute to these challenges. It will also analyze how these causes affect project parameters, providing insights into the far-reaching consequences of payment delays and disputes. By highlighting the root causes and their impacts, this sub-question sets the foundation for addressing the complexity of the problem.

2. *What type of solutions have been proposed to address payment issues, and what constraints limit their impact?*

This sub-question seeks to evaluate the existing measures and approaches that have been implemented to address payment issues in the construction industry. It will assess how effectively these measures tackle the root causes of payment challenges and identify their limitations, including gaps in empirical evaluation, lack of integration, and context-specific barriers. This evaluation provides critical insights into why current solutions fall short and highlights areas for improvement.

3. *What constitutes a cohesive approach to effectively mitigate payment challenges in construction?*

This sub-question aims to define the essential components required for an integrated, systemic approach to payment challenges. By establishing the criteria for a cohesive solution, it seeks to lay the foundation for developing a framework that can address the diverse and complex causes of payment issues effectively. This exploration focuses on generating insights to inform the design of an adaptable and comprehensive approach.

4. *What practical steps and guidelines can be adopted to address payment issues in construction?*

This sub-question aims to outline practical steps and guidelines to facilitate the adoption of an integrated approach for resolving payment issues in the construction industry. By focusing on actionable recommendations, this question seeks to translate the criteria of an effective, relationship-centered framework into clear, implementable steps that stakeholders can follow. It bridges the gap between theory and practice, enabling the adoption of an effective and sustainable solution.

1.7 Thesis Outline

This thesis is organized into eight chapters, each building upon the previous one to investigate the persistent issue of payment problems in construction and to develop a comprehensive solution for industry adoption:

- Chapter 1 – Introduction: Establishes the background, context and relevance of the study. It outlines the research problem, objectives, research questions and scope, and sets the tone for the rest of the report.
- Chapter 2 – Research Methodology: Describes the research approach, including the qualitative strategy used for data collection and analysis. It explains the methodological tools and reasoning behind the study design.
- Chapter 3 – Literature Review: Reviews existing knowledge on the causes and consequences of payment issues, as well as previously proposed solutions. It highlights the limitations of conventional measures and serves the foundation for identifying the multi-dimensional nature of payment problems.
- Chapter 4 – Findings and Analysis: Presents insights from the interview data using a structured coding process. It develops a conceptual model that aims to explain payment dynamics in the industry and lay the groundwork for an integrated solution.

- Chapter 5 – Problem Definition and Strategic Focus: Refines the problem framing based on behavioural patterns identified in the interview data and revisits key literature to deepen the conceptual understanding. Finally, it articulates the requirements for an effective solution.
- Chapter 6 – Introduction to the Framework: Proposes a behaviourally grounded framework consisting of six strategic interventions, along with the behavioural mechanisms associated with each. It also links the framework back to the conceptual model.
- Chapter 7 – Discussion: Interprets and reflects on the developed framework and positions it within the existing literature. It discusses the practical implications of the findings and provides practical recommendations for the construction industry.
- Chapter 8 – Conclusion: Recaps the study and summarizes key findings, discusses limitations, and offers recommendations for future research.

2 Research Methodology

This chapter will outline the research methodology adopted to investigate and address payment problems in the construction industry. The methodology provides a structured approach to explore the root causes of payment delays, synthesize insights from literature and field data, and develop a comprehensive solution for addressing these issues.

2.1 Introduction to the Double Diamond Framework (DDF)

The Double Diamond Framework (DDF) has been selected as the guiding methodology for this research. The DDF, originally developed by the UK Design Council, is an iterative design process divided into four key phases: Discover, Define, Develop, and Deliver (Design Council, 2004). This framework is particularly suitable for research contexts that require both an in-depth exploration and understanding of complex problems, and the generation of practical, innovative solutions (Design Council, 2019).

The iterative nature of the DDF allows for continuous refinement of new insights, making it ideal for addressing multifaceted issues such as payment delays, characterised by diverse interconnected factors. With the help of the DDF, this research systematically navigates through problem exploration and solution development, ensuring that both theoretical and practical dimensions are effectively integrated.

Suitability of DDF to this research

The selection of the Double Diamond Framework over other methodologies, such as the Design Science Research (DSR) approach, is driven by the need to properly explore the problem space before transitioning to solution development. Given the multidimensional nature of payment issues in the construction industry, this research requires a flexible framework that is built on a thorough problem exploration.

The DDF's Discover phase enables a broad and open-ended investigation into the root causes of payment problems. This phase facilitates gathering diverse perspectives from literature, industry reports, and stakeholder interviews, not only allowing the identification of both surface-level symptoms and their underlying root causes but also the relations between the two. Following this, the Define phase helps synthesize the insights collected, leading to a clear, well-structured problem statement that accurately reflects the complexity of the issues.

In contrast to other approaches, which are solution-focused, the DDF provides equal attention to both problem exploration and solution development. This dual emphasis is crucial in this research, as it ensures that the solutions proposed are based on a well-defined understanding of the problem context. The flexibility and iterative nature of the DDF also allow for adjustments and refinements as new data emerges during the research process.

By adopting the DDF, this research benefits from a methodology that promotes critical reflection, stakeholder engagement, and iterative learning.

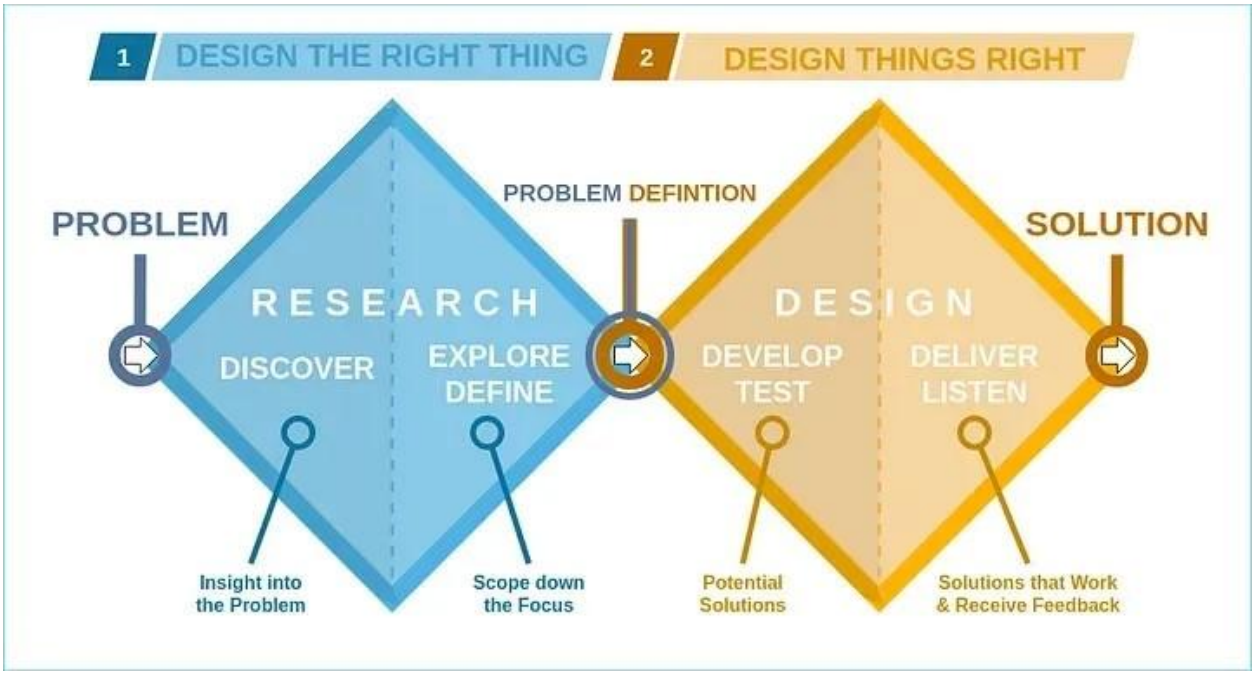

Fig 1: The Double Diamond Framework (DDF) (Ahmed, 2023)

2.2 Research Design

As shown above in Figure 2, the Double Diamond Framework (DDF) is structured around four key phases: Discover, Define, Develop, and Deliver, which guide the research process from problem identification to solution implementation. Each phase plays a distinct role in ensuring a comprehensive and iterative approach to addressing complex payment issues.

Discover: This phase focuses on exploring the problem space broadly to gather insights and understand the underlying issues. It involves activities such as literature reviews, stakeholder interviews, and data collection to uncover the root causes of the problem (Design Council, 2019).

In this research, the Discover phase consists of an extensive literature review to identify existing knowledge on payment problems, complemented by unstructured interviews with industry professionals. These interviews allow for an open-ended exploration of the issues, revealing perspectives and hidden patterns that may not be captured through rigid, pre-structured approaches.

Define: Building on the insights from the Discover phase, the Define phase aims to synthesize and analyse information and clearly articulate the problem. This includes identifying patterns and relations, refining the scope, and establishing a focused problem statement that guides the next stages (Brown, 2009).

For this research, the Define phase involves classifying the causes of payment issues, recognizing interdependencies, and structuring them into a logical framework. This is supported by semi-structured interviews conducted with industry professionals to validate and refine emerging themes. Additionally, this phase ensures that the problem statement is grounded in both theoretical findings and industry realities.

Develop: In this phase, potential solutions are generated and prototyped. It encourages creative thinking and experimentation to explore different approaches to address the defined problem effectively (Tschimmel, 2012).

In this research, the Develop phase involves formulating practical interventions based on structured problem insights. The solutions are designed considering best practices, expert feedback, and industry feasibility. Thematic analysis from prior phases ensures that the proposed interventions target the root causes and systemic inefficiencies.

Deliver: This phase involves validating and refining the developed solutions conceptually by gathering expert feedback, ensuring that the framework is practical, sustainable, and adaptable.

For this research, the Deliver phase consists of expert validation interviews with experienced industry professionals. Their feedback helps assess feasibility, adaptability, and effectiveness, ensuring that the final recommendations are both practical and impactful. This phase ensures that the framework is aligned with real-world industry practices and adjusted accordingly.

The iterative nature of the DDF allows for continuous feedback loops between these phases, promoting adaptability and ensuring that both the problem understanding and solutions evolve with new insights. This cyclical process is particularly valuable in complex environments like the construction industry, where dynamic factors and diverse stakeholder perspectives alter project outcomes.

2.3 Methods of Data Collection

The data collection process in this research is structured around the Discover, Define, and Deliver phases of the Double Diamond Framework. Since the study aims to understand the root causes of payment problems by exploring them thoroughly before formulating a solution, qualitative research methods have been employed. Interviews serve as the primary data collection tool due to their ability to capture detailed insights, experiences, and perspectives from industry professionals.

Given the exploratory nature of the research, three types of interviews are used at different stages:

- Exploratory (unstructured) Interviews (Discover Phase) – Conducted to gather diverse, unfiltered perspectives, allowing respondents to share their views freely and reveal hidden challenges without predefined constraints.
- Semi-Structured Interviews (Define Phase) – Designed to refine and validate the findings from the first phase, ensuring that the problem definition is well-articulated and that potential solutions are aligned with industry realities.
- Expert Validation Interviews (Deliver Phase) – Set up to gather feedback on the proposed solutions, the objective of these interviews is to validate them, ensuring they are feasible, applicable, and adaptable to real-world conditions.

These methods will allow for and ensure a more comprehensive problem definition and subsequently a more robust solution development.

2.3.1 Exploratory Interviews

In the Discover Phase, unstructured interviews are conducted to explore the various dimensions of payment problems in construction. This approach allows participants to discuss their experiences and perspectives in an open-ended manner, revealing nuances that might not emerge in a rigidly structured interview format.

The primary objective of this phase is to uncover the underlying factors influencing payment problems. By capturing the perspectives of various stakeholders such as project managers, contract managers, cost managers, quantity surveyors and financial controllers, the study aims to identify hidden patterns and industry-specific dynamics contributing to payment delays, partial payments, and non-payments.

Data is collected through one-on-one interviews conducted via Teams/Zoom or in-person, with each session lasting approximately 30–40 minutes. These conversations follow a free-flowing format, guided by discussions on broad themes such as payment approval processes, administrative inefficiencies and interpersonal factors.

2.3.2 Semi Structured Interviews

Once the problem space has been clearly understood based on exploratory interviews and literature insights, semi-structured interviews will be conducted to refine the findings and gather input for potential solutions. The objective of this phase is to validate the problem framing developed in Phase 1 and to identify preliminary intervention areas based on stakeholder experience.

Participants for this phase will be selected from the initial interview pool and additional experts with experience in financial management, contracts, and administrative affairs, particularly those with direct exposure to payment processes and contractual compliance. These one-on-one interviews will follow a structured format with a set of predefined open-ended questions, lasting approximately 40–50 minutes. The responses will be coded and analyzed thematically to identify key trends and patterns.

2.3.3 Expert Validation Interviews

In the Deliver Phase, expert interviews will be conducted to validate the proposed solutions before finalizing the framework. This phase ensures that the solutions are practical and aligned with industry needs. The objective is to test the feasibility of the proposed interventions and gather critical feedback to improve their effectiveness.

Experts for this phase will include senior industry professionals with experience in payment systems, financial management, and administrative affairs. Their feedback will help assess whether the solutions are robust enough to address real-world complexities. These interviews will follow a semi-structured format, allowing room for discussion while focusing on the practicality of the proposed interventions, identifying potential barriers, and refining based on key expert recommendations.

By employing this three-phase interview approach, the study ensures that problem exploration, solution development, and validation are systematically executed. The unstructured interviews offer deep exploratory insights, the semi-structured interviews refine these insights and align them with industry expectations, and the expert validation interviews confirm the practicality and adaptability of the proposed framework, each setting the foundation for the subsequent phases of the Double Diamond Framework.

2.4 Data Analysis

The data collected through interviews will be analyzed using qualitative coding techniques, ensuring that key themes, patterns, and relationships are identified. This structured approach helps in translating raw interview data into meaningful insights that guide the research findings towards the final framework development.

In line with the exploratory nature of this research, the analysis follows a grounded theory-inspired approach (Heath and Cowley, 2004), consisting of three levels of coding – open coding, axial coding, and selective coding (Corbin & Strauss, 1990). This approach facilitates an iterative, data-driven analysis, allowing insights to emerge organically rather than being constrained by predefined categories. Additionally, thematic analysis (Braun & Clarke, 2006) will be used to identify and categorize recurring themes across interviews, ensuring a structured synthesis of perspectives from industry professionals.

2.4.1 Analytical Process

As mentioned above, the research process involves a three-step coding process to systematically organize the data:

- Open Coding – In the initial stage, the interview transcripts are carefully reviewed, and descriptive codes are assigned to key concepts and patterns. The objective is to identify recurring themes, without forcing data into predefined categories. This phase allows for an open-ended exploration of the problem space. In the context of this research, the key concepts discussed will revolve around factors influencing and contributing to payment problems, and their underlying causes.
- Axial Coding – After initial themes are identified, related codes are grouped into broader categories that highlight interconnections and systemic patterns. These categories help to organize the various dimensions of payment challenges, distinguishing between underlying factors, process-related inefficiencies, and external influences that impact payment flows in construction projects.
- Selective Coding – The final step refines the themes and integrates them into a cohesive analytical model. At this stage, key findings are synthesized to establish connections between problem areas and potential intervention points, laying the foundation for the Develop and Deliver phases of the DDF.

2.4.2 Application to Research

The coding process plays a crucial role in structuring research findings within the DDF approach:

- Discover Phase – Open coding is applied to interviews to explore broad themes and hidden patterns related to payment delays, partial payments, and non-payments.
- Define Phase – Axial coding refines themes, linking them to systemic causes and classifying them into a structured analytical model that supports problem definition. This is followed by selective coding where connections between different factors are developed and synthesized into a conceptual model.
- Develop and Deliver Phase – While no new coding was conducted during the Develop or Deliver phases, the insights generated from selective coding directly informed the design and refinement of the proposed solutions, thereby playing a crucial role in formulating the final solution.

This approach would ensure that the entire research process is data-driven, allowing insights to automatically emerge as the study progresses.

2.4.3 Thematic Analysis and Validation

While the research is driven by an iterative coding process, it also employs thematic analysis (Braun & Clarke, 2006) to ensure that the key findings are systematically categorized into coherent themes. This approach involves:

- Identifying patterns across interviews to determine consistent themes and recurring viewpoints.
- Comparing findings across different stakeholder groups and functions to highlight variations in perspectives on payment challenges.
- Validating emerging themes by linking qualitative insights to existing literature and industry cases, ensuring robustness in the analysis.

By combining the coding process with thematic analysis, this study ensures that the findings are cross verified in multiple ways:

- Data Triangulation – Findings from different stakeholder groups are compared to obtain multiple perspectives on payment delays.
- Methodological Triangulation – Qualitative interview insights are cross-referenced with literature findings to ensure consistency and eliminate subjective biases.
- Expert Validation (Deliver Phase) – The proposed solutions will be evaluated by industry professionals, providing feedback to further refine recommendations.

This multi-layered validation process ensures that the research findings are robust, applicable, and reflective of real-world complexities.

2.4.4 Software and Tools Used

- Atlas.ti – A qualitative data analysis software used for coding, categorization, and theme identification in interview transcripts. It facilitates structured data organization, pattern recognition, and visualization of thematic relationships.
- Microsoft Excel – Used for organizing, filtering, and conducting comparative analysis between different interviews. Basic content analysis, frequency counting, and tabulation are performed using Excel.
- Miro (or other visualization tools) – Used for mapping thematic relationships and refining the research framework with interactive visual structuring.
- MS Word for Transcription and Manual Analysis – While software aids in structuring data, manual review of transcripts is essential for capturing context and nuanced interpretations that automated tools might overlook.

By integrating both automated tools and manual analysis, the study ensures a structured analysis and a credible research process.

Summary of Data Analysis Approach

The study employs grounded theory-inspired coding, thematic analysis, and triangulation to ensure that the research findings emerge naturally from the data while validating them against multiple

sources. The structured coding process aligns with the DDF methodology, ensuring a seamless integration of problem identification, definition, and solution development. The use of qualitative data analysis tools enhances the accuracy and efficiency of the process while allowing for in-depth manual validation.

2.4.5 Research Validity & Reliability

Ensuring the validity and reliability of research is essential to maintain the credibility and robustness of findings. This study employs multiple strategies to enhance research quality, ensuring credibility, dependability, confirmability, and transferability.

Credibility is ensured by using data triangulation, combining multiple sources such as literature reviews, exploratory and semi-structured interviews, and expert validation. By incorporating insights from diverse perspectives across different functions within the construction industry, this research captures a comprehensive understanding of payment issues.

Dependability is addressed by maintaining a transparent research process. A structured coding approach is applied to qualitative data, ensuring consistency in analysis. The research methodology and data collection approach have been documented in detail. Regular discussions with supervisors and experts help refine the research approach, and ensure it remains methodologically sound.

Confirmability is reinforced through a structured data analysis process that minimizes researcher bias. The study employs thematic coding using Atlas.ti, ensuring that insights emerge from the data rather than preconceived notions. Triangulation with literature and interview findings support the objectivity of interpretations. Maintaining an audit trail, including documented coding decisions, literature findings, and methodological adjustments, ensures transparency and allows for traceability of key research choices.

Transferability is considered by designing the study in a way that allows its findings to be applicable to various contexts within the construction industry. While the research primarily focuses on payment challenges in construction projects, the systemic nature of the identified issues suggests that similar patterns may exist in related industries. The study provides detailed descriptions of the research context, enabling other researchers or industry professionals to project the applicability of the findings to their specific situations.

Despite these efforts, certain limitations must be acknowledged. As a qualitative study, the research is inherently context-specific, meaning that all findings may not be generalizable across all construction sectors or regions. Additionally, reliance on self-reported data from interviews introduces the possibility of subjective bias. However, the use of triangulation and expert validation helps mitigate this risk and improves the credibility of the conclusions drawn.

By adopting these measures, this research ensures that its findings are rigorous, reliable, and reflective of real-world industry complexities, thereby contributing to a deeper understanding of payment challenges in the construction sector.

2.5 Ethical Considerations

This research adheres to ethical principles to ensure the integrity of the study and the protection of participants. The ethical considerations in this study include informed consent, confidentiality, voluntary participation, and data protection.

Informed Consent

All participants were provided with clear information about the research objectives, their role in the study, and how their insights would contribute to the findings. Before the interview, participants received a brief overview of the study and were given the opportunity to ask questions. Only after their consent was obtained did the interview proceedings begin.

Confidentiality and Anonymity

To maintain participant privacy, all personal identifiers have been removed from the data. Interview responses and transcripts are anonymized, and any references to specific companies, projects, or individuals have been generalized to prevent identification. The findings will be presented in aggregate form, ensuring that no single response can be traced back to an individual.

Voluntary Participation

Participation in the study was entirely voluntary. Interviewees had the right to decline participation or withdraw from the study at any point without providing a reason. No incentives were offered to ensure that the responses were given freely and without external influence.

Data Protection and Storage

All collected data, including interview recordings, transcripts, and coding records, will be securely stored on TU Delft's OneDrive, with restricted access. The data will be used strictly for academic purposes and will not be shared beyond the scope of this study. In compliance with ethical research standards, data will be securely retained for the required period and subsequently disposed of in accordance with institutional guidelines.

Researcher Bias and Ethical Integrity

To ensure objectivity, the researcher has taken measures to minimize bias in data collection and interpretation. The coding and analysis process follows a structured, systematic approach, and findings are cross validated through triangulation with literature and expert insights. Ethical integrity has been maintained throughout the study to ensure accuracy, fairness, and transparency in reporting the results.

By adhering to these ethical principles, this research ensures the protection of participant rights, the credibility of findings, and compliance with ethical research standards.

3 Literature Review

The construction industry is a vital driver of global economic growth, yet it remains tormented by recurring payment challenges that hinder project success and disrupt stakeholder relationships. Addressing these issues requires a comprehensive understanding of their underlying causes, effects, and the shortcomings of existing solutions. This chapter reviews the body of literature on payment problems in the construction industry, with a focus on identifying gaps and building the foundation for an integrated and systemic framework.

The review begins by exploring the root causes of payment issues, examining how different factors such as financial, administrative, cultural, and relational, contribute to the problem. It then considers the complex interplay between these factors while analysing the effects of these payment problems on project outcomes, including delays, insolvencies, and strained stakeholder relationships. Current solutions, such as legislative and administrative measures, are evaluated to identify their limitations in addressing the problem effectively.

This chapter also delves into the interconnected nature of payment issues and highlights the interconnected and complex relationships between their diverse causes and effects. Building on this, it discusses the critical need for a cohesive and integrated approach to resolve these challenges effectively. By synthesizing key findings from existing literature, this chapter aims to underline the gaps in current research and serves as a basis for designing and conducting interviews. The findings of the literature study paired with insights from the interviews will provide a deeper understanding of the payment problems and clarify the structural and behavioural criteria for developing the solution.

3.1 Causes of Payment Problems

Payment problems in the construction industry stem from a variety of causes that reflect the complexity and diversity of the sector. Understanding these causes is essential for addressing the problems that constantly disrupt project success and ruin relationships between stakeholders. To explore the underlying causes of payment problems in the construction industry, an extensive review of existing literature was undertaken, and various studies were analysed in the process. By comparing findings across the literature, similar causes were grouped into broader categories to provide a structured and cohesive understanding of the issue. These categories represent the most significant dimensions of the problem as discussed in this chapter. Table 1 shows an overview of the key categories and their corresponding causes.

Table 1: Categorisation of Causes of Payment Problems

Category	**Grouped Causes**
Administrative Issues	➢ Bureaucratic procedures ➢ Slow process of approving variations ➢ Lack of proper process implementation ➢ Delay in certification by client/consultant ➢ Errors in documentation/Improper payment claims

	➢ Heavy workload of consultant/QS to do evaluation of claim ➢ Involvement of too many parties in the process ➢ Changes in project personnel
Financial Constraints	➢ Scarcity of capital to finance the project ➢ Paymaster's poor financial management ➢ Cash-flow problems in other projects ➢ Contractor's unstable financial background ➢ Poor cashflow management by the contractor ➢ Ripple effects of an economic downturn ➢ Work done exceeds allocated budget
Cultural/Ethical Issues	➢ Perception in the industry that late payment for a few days is acceptable ➢ Contractors believe they are at the mercy of the clients ➢ 'Work first, get paid' later culture ➢ Inclusion of 'pay when paid' clauses ➢ Poor ethical culture of a company ➢ Use of adhesion contracts
Interpersonal Conflicts	➢ Disagreement of the valuation of work done ➢ Disputed works ➢ Conflicts among parties ➢ Lack of trust in certification of a contractor's progress claim ➢ Non-participation of contractor in joint valuation of payment
Intentional Delays and Mismanagement	➢ Client willfully withholding payment for personal reasons/ financial advantage ➢ Late release of retention amounts

These diverse categories, such as administrative inefficiencies, financial constraints, and cultural or ethical factors, reflect the multi-dimensional nature of payment problems in the sector. The subsequent sections discuss each category in detail, focusing on the significant causes under each one and their implications for the industry.

3.1.1 Administrative Issues

Administrative inefficiencies are among the most significant contributors to payment problems in the construction industry. These issues stem from bureaucratic delays, incorrect payment claims,

and inefficient processes that disrupt the smooth flow of payments. This section examines the key administrative causes of payment issues and their implications.

Errors in documentation and improper payment claims are some of the most frequently cited administrative issues. Incorrect invoicing or incomplete paperwork often arises due to inadequate training and reliance on manual methods (Mbachu, 2011). These errors lead to payment delays and create mistrust among stakeholders. Manual documentation methods, particularly in regions reliant on paper-based processes, do not make things easier (Yunianto & Rarasati, 2020).

Delays in certification by clients or consultants represent another significant roadblock. This step, forming a crucial part of the payment process, is often prolonged by limited resources and overly stringent verification requirements (Ting et al., 2024). Such delays are particularly burdensome for smaller contractors, especially when they lack means of tracking the status of their payment applications or the reasons for the hold-ups, leaving them unable to follow up effectively.

Bureaucratic procedures remain another persistent cause of payment problems. Excessive layers of approvals and extensive paperwork elongate approval processes, leading to significant delays (Ramachandra & Rotimi, 2015). In the case of approvals pertaining to variation orders, the process is even slower, as indicated by (Peters et al., 2019). Variation approvals often require detailed documentation and multiple levels of authorization, leading to delays in payment processing.

The fragmented nature of the construction process, involving numerous parties, adds to administrative inefficiencies. This multiplicity increases the likelihood of miscommunication and delays, as each step in the approval chain is susceptible to bottlenecks (Abdul-Rahman et al., 2009). Simplifying these interactions and establishing clearer communication channels can mitigate such issues.

Heavy workloads among consultants and quantity surveyors (QS) also contribute significantly to delays in claim evaluations. Abdul-Rahman et al. (2009) observe that QS teams often face capacity issues when managing multiple projects, resulting in delays in processing payment claims. Finally, inconsistent implementation of processes also hinders payment timelines.

In summary, administrative inefficiencies such as documentation errors, bureaucratic delays, certification bottlenecks, heavy consultant workloads, and fragmented processes significantly contribute to payment problems in the construction industry. Addressing these challenges requires streamlining workflows, improving resource allocation, and fostering better communication among stakeholders.

3.1.2 Financial Constraints

Another commonly cited cause is the scarcity of capital to finance the project, which creates systemic cash flow bottlenecks. Failure to secure adequate funding often leaves clients unable to meet payment obligations, cascading delays throughout the supply chain. Kenyatta et al. (2016) highlight that in many instances, clients initiate projects without securing sufficient capital, relying heavily on external financing, which may not materialize as expected.

Paymaster's poor financial management is another significant factor leading to cash flow problems. Ineffective allocation of funds or investing in too many projects at one time frequently leads to payment delays and disputes. Abdul-Rahman et al. (2009) emphasize that mismanagement at

paymaster's level often results in resources being diverted away from construction activities, adding to the woes of contractors and subcontractors.

Similarly, cash flow problems in other projects compound payment delays. When clients or contractors divert resources to meet obligations on other projects, it creates a financial shortfall for ongoing work. Ramachandra & Rotimi (2015) noted that such practices often occur in highly competitive markets where stakeholders operate on tight margins and shuffle capital between multiple commitments simultaneously.

The unstable financial background of contractors gives rise to payment issues. Contractors without sufficient financial reserves struggle to manage unexpected costs or project delays, leading to payment defaults towards their subcontractors. Research suggests that contractors with poor credit histories often fail to secure necessary funding, aggravating their financial instability further (Abdul-Rahman et al., 2009).

If the financial stability of contractors is not a matter of concern, their capacity to effectively manage cash flow often is. Inefficiencies in tracking and allocating funds result in missed payments and strained relationships with suppliers and subcontractors (Wang et al., 2023). Contractors' inability to manage their cash flows effectively disrupts project schedules and amplifies financial risks (Ansah, 2011).

Sometimes circumstances beyond the control of stakeholders, such as an economic downturn compound payment issues. Economic instability often results in reduced project funding, liquidity crises, and increased payment defaults across the industry (Abdul-Rahman et al., 2009; Peters et al., 2019). During recessions, clients and contractors alike face liquidity crises, delaying payments and jeopardizing project timelines. These ripple effects of economic shifts highlight the vulnerability of the industry to external financial shocks.

Lastly, work exceeding allocated budgets poses more financial risks. When projects exceed the budget due to scope changes or unforeseen expenses, clients may struggle to make additional payments, resulting in delays (Judi & Mustaffa, 2023).

In conclusion, financial constraints, from inadequate capital to poor cash flow management, are deeply intertwined with payment problems in the construction industry. Addressing these constraints requires proper financial planning, transparent resource allocation, and effective risk management strategies to minimize disruptions and foster trust among parties.

3.1.3 Interpersonal Conflicts

Interpersonal conflicts are a common source of payment issues in the construction industry. With multiple stakeholders involved, disputes and conflicts are only natural. These conflicts often arise from disagreements, mistrust, and miscommunication among project stakeholders, disrupting payment flows and jeopardizing project timelines in the process.

Disagreements regarding the valuation of completed work is the most common source of delays in payment under this category, according to literature (Mbachu, 2011). Such disputes typically arise when the parties involved fail to reach a consensus on the quality, scope, or quantity of the work completed. Ting et al. (2024) highlight that differing interpretations of contractual terms and inconsistent evaluation standards frequently lead to protracted negotiations, delaying payments. This is a particularly sensitive issue, as payment is only due upon the verification of work done.

Conflicts between project stakeholders, whether between contractors and subcontractors or between clients and contractors, are another major contributor to payment delays (Azman et al., 2014). These conflicts often stem from unclear communication or competing interests. Such conflicts not only affect cash flow but could also jeopardize long-term working relationships, ultimately affecting project performance.

Another critical issue is the client's lack of trust in the contractor's payment claim (Judi & Mustaffa, 2023). Clients often have doubts regarding the authenticity of claims submitted by contractors, particularly in cases of additional work or variation orders. As highlighted by Judi & Mustaffa (2023), *"Clients frequently assume that contractors will take advantage by claiming more than the actual value of the work undertaken on-site"* (p.6). This skepticism leads to delays in processing claims. The respondents in their study further stated, *"even though we are sure the work done by the contractor is valid, we [the client] will not pay 100% of the claim for the value of the work done made by the contractor due to safety reasons"*. Such remarks reveal how underlying distrust can lead to defensive payment behaviour.

This trust deficit is further exacerbated when contractors fail to participate in the joint valuation of claims. According to Judi & Mustaffa (2023), non-participation by contractors during the assessment of claims generates suspicion and miscommunication. This lack of collaboration not only widens the mistrust but also prolongs the resolution process, creating additional barriers to timely payments.

In conclusion, interpersonal conflicts, including disputes, disagreements and mistrust, play a pivotal role in stalling contractor payments. Addressing these challenges requires structured collaboration, co-decision-making, and greater transparency in valuation processes to rebuild stakeholder trust and enable smoother cash flow.

3.1.4 Cultural and Ethical Issues

Cultural and ethical norms play a huge role in shaping payment practices in the construction industry. Unfortunately, several commonly accepted behaviors and unethical practices contribute significantly to the recurring payment issues in the sector. This section highlights the key cultural and ethical causes and their implications.

The most notorious issue is the perception in the industry that late payment for a few days is acceptable. As noted by Ramachandra & Rotimi (2015), this tolerance for minor delays often sets a precedent for longer and more disruptive delays, creating a culture of complacency. Azman et al. (2014) similarly observe that this leniency normalizes delayed payments, undermining professionalism in the industry. Contractors often accept such delays for the sake of maintaining business relationships and in fear of losing future business with clients (Bolton et al., 2022).

The inclusion of "pay when paid" clauses presents a significant ethical concern in the construction industry, particularly for subcontractors (Azman et al., 2014). These clauses offset payment to subcontractors until the main contractor has been paid by the client, placing an undue financial burden on the subcontractors. While certain legislative measures, such as the Construction Contracts Act in the UK and similar laws in Malaysia, have banned or restricted the use of these clauses, they remain prevalent in practice. Subcontractors frequently report difficulties enforcing their rights under these acts, highlighting the gap between regulation and implementation (Abdul-Rahman et al., 2009).

Additionally, the industry is inherently credit-based, where the services are rendered first, and the service providers are compensated later. According to Swai et al. (2020), this norm forces these parties to absorb significant financial risks, as they often complete large portions of work without any guarantee of timely compensation.

Poor ethical principles within companies are an often-overlooked aspect which also contributes to the payment problems of the industry (Salamon et al., 2017). The ethical culture of an organization plays a pivotal role in influencing its payment practices. Companies with poor ethical standards often exhibit behaviors such as making late payments to service providers, prioritizing financial gains over fairness, and exploiting contractual ambiguities. For instance, a lack of sanctionability – the failure to punish unethical behaviour – creates an environment where delayed payments are normalised (Salamon et al., 2017). Moreover, limited transparency within companies allows employees to slip away with unethical conduct. Without a robust ethical framework emphasizing accountability and fairness, payment challenges in the construction industry are likely to remain entrenched.

The use of adhesion contracts is another notorious practice grounded in unethical behavior. These contracts, as noted by Swai et al. (2020), leave subcontractors with little bargaining power, forcing them to accept unfavorable payment terms. This imbalance not only perpetuates financial instability but also deepens mistrust between stakeholders.

What's worse than clients dictating unfair terms over the weaker parties is that the contractors themselves believe that they are at the mercy of their clients (Wang et al., 2023). This belief discourages contractors from asserting their rights or enforcing any legal measures available to them.

In summary, cultural and ethical issues, from normalizing late payments to exploiting power imbalances, play a critical role in the emergence of payment problems. Addressing these challenges requires a shift in industry norms and the promotion of ethical practices to foster trust and equity among stakeholders.

3.1.5 Intentional Delays and Mismanagement

Another severe issue contributing to the contractors' payment worries is intentional delays and mismanagement. Unlike other issues that may arise from inefficiencies or misunderstandings, these challenges stem directly from selfish actions motivated by personal or financial gain.

A primary example is clients willfully withholding payments to improve their own economic standpoint. As noted by Ramachandra & Rotimi (2015), such behavior often stems from the client's desire to preserve cash flow or delay financial outflows for as long as possible. While this approach may temporarily benefit the client, it creates cascading financial distress down the supply chain (Ansah, 2011). Smaller contractors and subcontractors, who rely heavily on timely payments to sustain operations, are particularly vulnerable to such practices. This deliberate withholding reflects not just a financial strategy, but a relational breakdown marked by opportunism and mistrust.

Another intentional practice is the late release of retention amounts, where clients deliberately withhold retained funds well past agreed-upon timelines. Bolton et al. (2022) point out that this is the biggest contributor to insolvencies in the UK construction industry. This is alarming, given that the retention amount is usually greater than subcontractor profit (Bolton et al., 2022).

Such deliberate practices intensify the adversarial dynamics between stakeholders, to work collaboratively. Addressing these issues would require not only robust contractual provisions but also increased accountability mechanisms to discourage such opportunistic behaviours.

To conclude, there are a lot of different sources of payment problems in the construction industry. In this section, we have explored the most significant and frequently cited causes of payment problems, as identified through an extensive review of the literature. These causes span a wide spectrum, including but not limited to, administrative inefficiencies, financial inabilities, contractual ambiguities, and systemic market dynamics.

A compelling systems-based interpretation of these issues is offered by Wang et al. (2023), who present an analogy in which payment problems are compared to a disease: cultural and market factors serve as the pathogens, financial capability is the body's immune system, and operational processes act as catalysts that materialize the disease. Their study ultimately develops a predictive model to anticipate payment defaults based on these interacting variables. This analogy provides a helpful lens for understanding how different contributors to payment issues interact within a broader system.

While these categories helped capture the breadth of challenges, they did not provide insight into how these factors interact or escalate in practice. For that, qualitative interviews were necessary.

3.2 Effects of Payment Problems

The construction industry faces numerous challenges arising from payment problems, which extend beyond financial instability to affect operational processes, stakeholder relationships, and overall project outcomes. This section examines the significant effects of payment delays, partial payments, and non-payments based on insights from the analyzed literature.

3.2.1 Impact on Contractors' Financial Stability

Payment delays severely disrupt contractors' financial health. Contractors often struggle to cover direct and indirect costs, such as procuring materials, paying subcontractors, and meeting payroll obligations (Aljohani, 2017). Danuri et al. (2006) noted that late payments frequently force contractors to resort to high-interest loans to maintain cash flow, which ultimately reduces profitability. These financial strains can also limit contractors' ability to invest in new technologies or bid for future projects, further impacting their long-term competitiveness. Partial payments exert a similar financial strain, with contractors receiving only a fraction of the payment due, leading to cash flow shortages and financial stress. For example, Judi & Mustaffa (2017) reported that over 50% of Malaysian contractors faced significant operational inefficiencies due to partial payments.

Non-payments represent the most severe financial challenge. When clients fail to honor payments for completed work, contractors suffer direct financial losses, often leading to insolvency or bankruptcy. Hasmori et al. (2012) emphasized that non-payments leave contractors with unrecoverable costs, affecting both current operations and future financial planning. Such financial instability not only affects the contractors but also ripples through their entire supply chain, intensifying the overall economic burden (Azman et al., 2014).

3.2.2 Operational Disruptions

Payment problems disrupt project timelines and operational efficiency. Delays in payment hinder contractors' ability to procure essential materials and hire skilled labor, resulting in stalled

construction activities (Kikwasi, 2012). These disruptions frequently lead to time and cost overruns, with projects failing to meet deadlines. (Ishak et al., 2019) observed that payment delays often result in site suspensions due to material and labor shortages, causing cascading delays across the project lifecycle.

Reduced productivity is another significant consequence. Financial constraints arising from payment issues prevent contractors from investing in necessary resources, such as skilled labor and modern equipment, leading to slower work progress (Voigt et al., 2023). Judi & Mustaffa (2017) further emphasized that reduced productivity due to financial instability significantly impacts project timelines and costs.

3.2.3 Strained Relationships and Social Impacts

Payment delays create adversarial relationships between clients, contractors, subcontractors, and suppliers. These tensions often turn into disputes and litigation, damaging trust and cooperation (Ansah, 2011). Additionally, the cascading effect of payment problems often leaves subcontractors unable to sustain operations, with many discontinuing works altogether. This fans the flames of disruptions which reinforces transactional distrust and undermines collaborative intent across the supply chain.

The social impacts of payment problems are also significant. Delayed wages for construction workers contribute to economic instability within communities dependent on the industry. The inability to sustain employment in these regions disrupts livelihoods and fosters economic disparities (Ting et al., 2024). Beyond the site, payment uncertainty generates stress, reduces morale, and creates the perception of an exploitative work culture.

3.3 Solutions to Payment Problems

Addressing payment problems in the construction industry requires a combination of practical measures and innovative approaches due to its complex nature. Over the years, several legislative, contractual, and technological interventions have been implemented to mitigate payment challenges. Additionally, various solutions proposed in the literature aim to complement or refine these efforts.

This section explores the range of solutions, including measures that have been implemented in practice and those proposed by scholars. While implemented measures such as prompt payment legislation and project bank accounts have demonstrated partial success, their limitations underline the need for further improvements. At the same time, emerging solutions such as Blockchain-Based Smart Contracts (BBSC) and Alternative Payment Methods (APM) hold promise but remain underexplored.

By examining these remedies, the section aims to gain an understanding of the strategies employed to address payment issues while identifying gaps that need to be bridged for sustainable progress.

3.3.1 Prompt Payment Legislations

Prompt payment legislation has been introduced in numerous jurisdictions to address delays and non-payments, in order to improve cash flow and reduce disputes in the construction industry. These measures were introduced in response to systemic challenges such as widespread late payments, cash flow bottlenecks, and frequent disputes among stakeholders, which have been largely prevalent in the industry. The laws are designed to streamline payment processes, enforce strict timelines, and

penalize non-compliance to enhance fairness and efficiency. This section provides a brief overview of some prominent prompt payment acts implemented across the globe.

United States: Federal Prompt Payment Act

The Federal Prompt Payment Act (1982), amended in 1988, is one of the earliest examples of such legislation. It mandates payment to contractors within 14 days of receipt of invoice for progress payments and 30 days for final payments. Subcontractors must be paid within seven days of the contractor receiving payment. The act also requires that disputes over invoices be addressed within seven days, ensuring transparency and reducing payment delays at multiple levels (Dorrah & McCabe, 2022).

United Kingdom: Housing Grants, Construction and Regeneration Act

The UK introduced the Housing Grants, Construction and Regeneration Act in 1996, later amended in 2009. Also known as just the Construction Act, this legislation requires payers to issue a notice specifying the payment amount within five days of the due date and provide a notice of intent to withhold payment, if applicable, within seven days of the final payment date. This act effectively introduced adjudication as a speedy dispute resolution mechanism, allowing parties to resolve payment disputes quickly without resorting to lengthy litigation (Bolton et al., 2022).

Malaysia: Construction Industry Payment and Adjudication Act (CIPAA)

The Malaysian CIPAA, enacted in 2012 and effective from 2014, has significantly improved the payment landscape in Malaysia. It requires monthly progress payments to be made within 30 days of invoice receipt. The act also includes provisions for adjudication to address disputes and allows contractors to suspend work in the event of non-payment. These mechanisms have been instrumental in reducing payment delays and fostering accountability within the Malaysian construction industry (Azman et al., 2014).

Singapore: Building and Construction Industry Security of Payment Act (SOPA)

Singapore's SOPA, introduced in 2005 and amended in 2019, mandates that payments become due within 14 to 35 days of a valid claim, depending on the contractual terms. It also includes robust adjudication provisions, enabling swift resolution of payment conflicts. The act has been hailed for its clarity in defining payment timelines and its ability to balance the rights of both contractors and clients (Dorrah & McCabe, 2022).

European Union: Late Payment Directive

The EU Late Payment Directive, adopted in 2011, addresses payment delays across its member states. It mandates that payments in business transactions be made within 30 days (or 60 days for exceptional cases), with interest penalties imposed on late payments. The directive has been effective in standardizing payment practices in the EU, reducing payment delays, and promoting prompt payment cultures among public authorities and private entities (ECSO, 2020).

China: Construction Law, Contract Law, and Tender and Bidding Law

China's 1997 Construction Law, 1999 Contract Law, and 1999 Tender and Bidding Law collectively aimed to tackle payment delays and improve the industry's payment culture. The Construction Law emphasized the need for fair and transparent payment terms, requiring parties to define payment schedules and terms clearly in contracts. The Contract Law further mandated that payments for

completed work must be made promptly, with penalties for unjustified delays. Importantly, the law also prohibited the withholding of payments without a reasonable cause (Wu et al., 2008).

Additionally, the Contract Law granted contractors the right to auction completed work or materials in cases of prolonged non-payment. This empowered contractors to recoup their money through legal means and acted as a powerful deterrent against late payments. Furthermore, the law restricted excessive subcontracting by ensuring that subcontractors could only be hired with the client's approval and if they met specific technical and financial qualifications (Wu et al., 2008).

The 1999 Tender and Bidding Law introduced further safeguards for subcontractors and aimed to minimize disputes arising from poor subcontractor selection. Collectively, these laws highlighted the importance of robust enforcement mechanisms to reduce systemic payment delays and foster a culture of accountability within the construction industry (Wu et al., 2008).

3.3.2 Challenges and Limitations of Implemented Prompt Payment Legislation

While prompt payment legislation has significant potential in addressing payment issues, its implementation has seen a lot of challenges. These limitations stem from cultural, regulatory, and operational factors that undermine the effectiveness of such measures.

Weak Enforcement Mechanisms

The absence of stringent enforcement has rendered many prompt payment laws less effective than intended. Ting et al. (2024) note that even in jurisdictions with comprehensive legal frameworks, the lack of enforcement tools allows clients to bypass payment obligations without facing meaningful penalties. This undermines the impact of the legislation, leaving contractors vulnerable to financial distress.

Cultural Resistance

Cultural norms and industry practices play a significant role in shaping the adoption of prompt payment legislation. In China, as Wang et al. (2023) observe, the construction industry operates under an implicit "work first, get paid later" culture, which normalizes delayed payments and discourages contractors from taking legal recourse. Similar trends are seen in other regions, where contractors hesitate to assert their rights out of fear of damaging relationships with clients or endangering future business opportunities.

Limited Awareness and Accessibility

Another common challenge in many jurisdictions is the lack of awareness among contractors about their legal rights. Ting et al. (2024) emphasize that small and medium-sized contractors often remain unaware of the legal remedies available to them, leaving them unable to leverage protective measures. Furthermore, the cost and complexity of legal processes deter many stakeholders from pursuing claims, perpetuating payment issues.

Dependence on Timely Exchange of Documentation and Invoices

Prompt payment legislation often links payment timelines to the submission of claims or supporting documents. For example, in jurisdictions like the UK and Singapore, deadlines for payments are triggered by events such as the submission of invoices or progress claims (Bolton et al., 2022; Dorrah & McCabe, 2022). Without the proper and documented exchange of invoices or supporting documents, the payment clock doesn't start, and the legislation's intent is undermined. This

dependence highlights the necessity of standardised documentation and effective administrative processes to support legal compliance.

Resistance to Change

Adoption of laws requiring prompt payment is hampered in many areas by the construction industry's traditional mindset. Stakeholders accustomed to prolonged payment cycles resist adjusting to stricter timelines and transparency measures. ECSO (2020) notes that in the European Union, despite the Late Payment Directive's success in improving payment practices, enforcement challenges persist, particularly in sectors resistant to regulatory intervention.

Power Asymmetry

Power imbalances between clients and contractors heighten payment issues. Wang et al. (2023) identify that in China, dominant clients often impose unfavorable payment terms, exploiting weaker contractors. Such asymmetry upholds unfair business practices and erodes the spirit of prompt payment legislation.

Legal and Operational Bottlenecks

Many jurisdictions encounter obstacles in the legal and operational aspects of implementing prompt payment laws. These include lengthy adjudication processes, high litigation costs, and delays in resolving disputes. ECSO (2020) and Ting et al. (2024) argue that while adjudication mechanisms aim to expedite payment disputes, their effectiveness is often limited by administrative inefficiencies.

Lack of Formal Documentation for Certain Work

In many cases, work that is not explicitly included in the Bill of Quantities (BOQ) but is reflected in the project drawings becomes a source of non-payment disputes (Ting et al., 2024). Contractors often carry out such work based on assumptions or verbal agreements without issuing proper variation orders (Judi & Mustaffa, 2023). In the absence of any binding documents like variation orders or formal approvals, these claims lack the necessary contractual grounds to initiate litigation.

Impractical and Inefficient Legislative Measures

In some cases, legislative measures are circumvented due to their misalignment with industry practices. For instance, China's Construction Law (1997), Contract Law (1999), and Tender and Bidding Law (1999) were criticized for being overly idealistic and disconnected from the realities of the construction industry. Provisions such as requiring upfront funding arrangements and restricting multi-layer subcontracting were deemed impractical, as they failed to account for the complexities of project financing and subcontracting practices prevalent in the industry. Their ability to effectively address payment issues was hampered by this misalignment with industry dynamics (Wu et al., 2008).

In summary, while prompt payment legislation represents an important regulatory tool, its limitations reveal deeper systemic and relational challenges in achieving fair and timely payments. Overcoming these barriers would require more than legal compliance, it demands administrative enhancement, cultural transformation, and increased stakeholder trust.

3.3.3 Suggested Remedies and Best Practices

Numerous solutions have been proposed in the literature in response to payment issues in the construction industry. While many of these measures are not new, examining them helps identify both their contributions and limitations, which later inform the framework proposed in this thesis. These aim to address the complex, interdependent causes of payment delays, disputes, and non-payments. While some solutions focus on improving financial and cash flow management, others emphasize procedural, contractual, or regulatory reforms. Additionally, cultural and ethical interventions have been proposed to shift industry norms and practices.

This section discusses some of the most frequently cited and impactful remedies suggested in the literature. These include actions aimed at addressing important issues like budgetary limitations, ineffective administrative procedures, and ethical dilemmas. By focusing on significant solutions, this section aims to provide actionable insights, while serving as a foundation for understanding how payment issues can be effectively mitigated.

Financial Remedies

Financial remedies are among the most frequently discussed solutions for addressing payment problems in the construction industry. These measures include improving cash flow, ensuring financial accountability, enhancing financial capabilities, and providing safeguards for contractors and subcontractors. Some of the most important financial solutions recommended in the literature are listed below.

- Cash-Flow and Financial Management Training – Proper training in financial management can help contractors maintain healthier cash flows and mitigate the effects of delayed payments. Peters et al. (2019) emphasize the need for contractors, particularly smaller firms, to understand the importance of cash flow forecasting, budgeting, and financial risk management to avoid insolvency during payment delays.
- Payment Bonds – Payment bonds, which ensure that subcontractors and suppliers are paid even if the contractor defaults, have been highlighted as a key financial safeguard. Wu et al. (2008) suggests that these bonds not only protect stakeholders but also encourage better financial practices among contractors.
- Project Bank Accounts (PBAs) – PBAs are dedicated bank accounts designed to hold and promptly distribute project funds to all parties. Bolton et al. (2022) note that PBAs significantly reduce the risk of delayed payments and disputes by establishing transparency and reducing dependence on the client's cash flow.
- Mandatory Trust Accounts – Several studies, including those by Peters et al. (2019), advocate for mandatory trust accounts or retention sums that secure funds for payments to subcontractors and suppliers. These accounts help eliminate the risk of non-payment and provide financial security throughout the project lifecycle.
- Revised Retention Practices – To ease contractors' financial burdens while preserving client interests, few recommendations include lowering retention percentages or substituting them with retention bonds. Bolton et al. (2022) suggest these measures to strike a balance between ensuring quality and maintaining financial stability in the supply chain.

Administrative and Procedural Remedies

Administrative and procedural remedies aim to streamline operations, establish clear guidelines, and address inefficiencies in the process that leads to payment delays and disputes. These measures focus on improving transparency, defining responsibilities, and providing mechanisms for resolving conflicts promptly.

- Regular Audits to Identify Financial Shortcomings – Regular audits serve as a preventive measure, ensuring that financial irregularities are identified early, and corrective actions are taken. Peters et al. (2019) highlight the importance of audits in maintaining transparency and financial discipline among stakeholders, thereby reducing the likelihood of payment delays.
- Right to a Speedy Dispute Resolution Mechanism – The inclusion of expedited dispute resolution mechanisms, such as adjudication or arbitration, helps stakeholders resolve payment-related conflicts quickly. Ansah (2011) claims that timely resolution of disputes not only prevents further delays but also reduces legal costs.

Legislative and Regulatory Measures

Legislative and regulatory measures provide a formal framework for addressing payment issues, ensuring legal enforcement and accountability. These measures are critical for creating an equitable environment where stakeholders can operate with confidence and clarity.

- Right to Suspend or Slow Down Work – The right to suspend work or reduce the pace of work is a powerful tool for contractors facing persistent non-payment. Ansah (2011) highlights that these rights enable contractors to reduce their losses and compel clients to prioritize timely payments.
- Right to Lien – Lien rights allow contractors and subcontractors to place claims on property until payment is made. Peters et al. (2019) and Wu et al. (2008) argue how effective lien rights are in offering a legitimate means of recovering unpaid debts, particularly in areas where they are rigorously enforced.
- Charging Orders and Liquidation Notices – Remedies like placing charging orders on properties or serving bankruptcy notices to debtors are legal options for recovering unpaid amounts. Ramachandra & Rotimi, (2015) point out that these measures can also act as a deterrent to unethical practices and ensure compliance with payment obligations.

Contractual and Procurement Solutions

The goal of contractual and procurement remedies is to improve the construction industry's contractual frameworks and procurement procedures in order to address payment issues. These measures aim to ensure clarity, fairness, and efficiency in contracts, while fostering collaboration and accountability among stakeholders.

- Collaborative Procurement Models – Collaborative procurement models, such as partnering or integrated project delivery (IPD), emphasize shared goals, trust, and open communication among stakeholders. Kenyatta et al. (2016) argues that these models reduce disputes and promote timely payments by fostering a cooperative rather than adversarial project environment. This relational foundation is essential for ensuring smoother payment practices.

- Pre-Qualification Requirements for Clients – Having a pre-qualification requirement guarantees that clients have the financial capability and reliability to meet payment obligations before awarding projects. Ramachandra & Rotimi (2015) estimate that this practice shall lower the risk of non-payment and develop a more financially stable project environment.

- Incorporating Non-Price and Best-Value Selection Criteria – Moving beyond cost-based selection criteria, Adaku et al. (2024) advocate for incorporating non-price criteria, such as financial stability and past payment performance, while awarding contracts. This approach ensures trust-based relationships are prioritized during selection.

- Benchmarking and Continuous Improvement – Judi & Mustaffa (2023) suggest that benchmarking payment practices from organizations with strong track records can lead to a continuous improvement in payment systems. This approach promotes innovation and the adoption of proven methods for minimizing payment delays.

Cultural and Ethical Interventions

Cultural and ethical remedies aim to tackle the underlying attitudes, behaviors, and practices that cause payment problems in the construction industry. These solutions aim to reshape attitudes, generate trust, and promote ethical behavior to address the deeply ingrained issues contributing to payment problems.

- Cultivating a strong ethical culture within organizations and the industry as a whole is crucial for mitigating payment issues. Salamon et al. (2017) suggest that the absence of such a culture leads to employees inclining towards financial gains over clean practices, resulting in behaviours such as willfully delaying payments or exploiting contractual loopholes.

- Shifting mindsets through education and policies – A paradigm shift in how stakeholders perceive payment obligations is necessary. Peters et al. (2019) advocate for policies that reward timely payments and penalize delays, alongside training programs that instill a culture of responsibility and ethical behavior.

Technological Innovations

Technological advancements are increasingly being proposed as solutions to payment problems in the construction industry. By leveraging automation, digital tools, and innovative technologies, these measures aim to streamline payment processes, enhance transparency and reduce delays.

- Blockchain-Based Smart Contracts (BBSC) – Nanayakkara et al. (2021) emphasize the potential of BBSC to automate payment processes by embedding payment terms directly into digital contracts. These smart contracts execute payments automatically when a certain pre-defined conditions are met, reducing human intervention and minimizing disputes over non-payment. Furthermore, BBSC provides a decentralized, immutable ledger of all transactions, ensuring transparency and traceability throughout the project lifecycle. By eliminating intermediaries and enhancing trust among stakeholders, BBSC has the potential to address long-standing inefficiencies in payment practices while fostering collaboration within the construction industry.

- Alternative Payment Method (APM) – APMs are a ring-fenced payment system designed to ensure that funds allocated for a project are successfully distributed to the intended parties.

Unlike Project Bank Accounts (PBAs), which are typically managed collaboratively by project stakeholders, APMs involve an independent regulator or third party overseeing the payment process (Swai et al., 2020). This ensures enhanced transparency and accountability, as payments are monitored and verified to align with agreed-upon terms.

- Building Information Modeling (BIM) Integration – Integrating payment schedules with BIM can streamline project management by linking progress tracking with financial data. According to Ting et al. (2024), this ensures payments are aligned with actual work progress, reducing disputes over unverified claims.

While the remedies discussed above represent some of the most promising solutions in the literature, they are not exhaustive. These measures reflect a variety of approaches, each targeting specific aspects of payment-related challenges in the construction industry. However, their practical impact remains limited unless the underlying root causes are also addressed — a point examined in the following section. For a comprehensive overview of all remedies suggested in the analyzed literature, please refer to Table 2.

Table 2: List of Remedies for Payment Problems

Sr. No.	Remedies
1	Cash-flow and financial management training
2	Apply charges to overdue payments
3	Right to suspend work or reduce the rate of work
4	Payment bond with bank and client
5	Establishing a credit evaluation system for stakeholders
6	Use of Project Bank Accounts
7	Use of collaborative procurement models
8	Right to a speedy dispute resolution mechanism
9	Right to regular periodic payment
10	Stiff sanctions for unethical behavior within the industry
11	Regular audits to identify any financial shortcomings
12	Clearly defined roles and responsibilities under the contract
13	Contracting with a reputable paymaster
14	Change the mindset toward timely payment through awareness programs
15	Mandatory creation of trust accounts or retention sums
16	Right to lien
17	Removal of contingent payment clauses

18	Developing cost-effective measures that contractors can enforce
19	Incorporation of non-price and best value selection criteria for awarding tenders
20	Pre-qualification requirements for clients before taking up a new project
21	Contractual measures to ensure timely payments
22	Follow-up with clients
23	Initiate arbitration or litigation
24	Revise retention percentages
25	Use retention bonds
26	Make sure variation costs are agreed in writing before beginning the works
27	Adding contingency reserves in tender price
28	Place charging orders/caveat registrations on properties
29	Serve bankruptcy/liquidation notices to the debtor
30	Use of Alternative Payment Method (APM)
31	Use of BBSC
32	Cultivate good ethical culture
33	Provide quality staff
34	Develop trust b/w parties
35	Use appropriate contract type
36	Benchmarking from other organisations

3.3.4 Barriers to Implementing Suggested Remedies

Despite the promise of various remedies for addressing payment problems, their implementation often encounters significant challenges. Beyond the evident limitations of proposed measures, there are deeper, less obvious behavioural, relational, cultural, and systemic constraints that can undermine their effectiveness. Below, we discuss some of these hidden barriers and their implications.

Economic Pressures and Buyer's Market Dynamics

The construction industry often operates in a buyer-dominated market, where contractors avoid asserting their legal rights, such as suspending work, to preserve relationships with clients. Wang et al. (2023) point out that this hesitancy is especially pronounced among smaller contractors, who fear losing future business opportunities.

Cultural Reliance on Trade Credit

Many tier-1 contractors view trade credit, a long-standing practice in the construction sector, as an essential business model for maintaining their working capital (Swai et al., 2020). Wu et al. (2008)highlight that these norms often resist formal interventions, leading to continued financial instability.

Fragmentation in Traditional Procurement Systems

Because of its inherent fragmentation, the traditional procurement model creates silos that make it difficult for stakeholders to collaborate and coordinate (Kenyatta et al., 2016). Traditional methods usually have separate phases (design, bid, build) and more bureaucratic processes, which lead to prolonged approval cycles.

Technology Adoption and Accessibility Gaps

While advanced technologies like BBSC offer significant potential, their adoption remains limited due to accessibility issues and resistance to change. Nanayakkara et al. (2021) point out that smaller firms frequently lack the capital to invest in these technologies. Wang et al. (2023) emphasize on the need for extensive training as additional hurdles to widespread adoption, while Swai et al. (2020) mention technological unfamiliarity as a key barrier.

Reluctance Toward Collaborative Models

Collaboration is crucial for most of the suggested remedies, yet mistrust among stakeholders often hinders their adoption. Adaku et al. (2024) observe that stakeholders are often unwilling to share financial details or fully participate in joint procurement models due to fears of exploitation. This lack of trust can undermine even the most robust frameworks.

Region-Specific Challenges

Geographical and contextual differences further complicate the implementation of remedies. Region-specific factors, such as legal systems, cultural norms, and economic circumstances, significantly influence the success of solutions like prompt payment legislation (Azman et al., 2014).

The challenges mentioned above highlight that solving payment problems require more than just new tools or policies. The success of many of these measures hinges on removing numerous structural and cultural obstacles, even though they have the potential to enhance payment practices. Addressing these challenges requires a nuanced approach that goes beyond introducing new remedies to include robust stakeholder engagement and tailored implementation strategies.

3.4 Summary

This chapter explored the intricate web of challenges surrounding payment problems in the construction industry by examining their causes, effects and the solutions proposed in practice and academic literature. The literature reveals that payment delays, non-payments, and disputes are not isolated phenomena but are deeply interconnected phenomena rooted in financial fragility, interpersonal mistrust, cultural norms, and intentional misconduct.

A key finding is the interconnected and multi-dimensional nature of payment problems. The causes are not only diverse but also interlinked, with one often amplifying another. For instance, legislative gaps may diminish the impact of financial remedies, while administrative inefficiencies can compound the effects of cultural resistance. This interconnectedness creates a cascading effect that amplifies the challenges faced by industry stakeholders.

While certain measures, such as prompt payment legislation and technological innovations, have shown promise, their success could be hindered by factors like weak enforcement, misalignment with industry realities, and resistance to change. These limitations highlight the importance of developing solutions that are adaptable, context-specific, and capable of addressing the complex nature of payment issues.

This interconnectedness and diversity of payment issues reinforce the need for a multi-faceted and integrated approach to addressing them. The findings in this chapter will set the stage for advancing the discussion in the subsequent chapters. The interviews conducted in the next chapter aim to validate and expand on these themes, with a focus on relational and situational factors. By recognizing the multi-dimensional and interconnected nature of the problem, the research can move towards developing solutions that can holistically address these interlinked factors.

4 Findings and Analysis

This chapter presents the core findings from the qualitative analysis and explains how these findings lead to the development of the conceptual model. Using a grounded theory-inspired approach, the data from interviews was first subjected to open coding, followed by axial and selective coding. The coding process helped identify key categories of factors that influence payment problems in construction projects and revealed the complex ways in which these factors interact.

While the literature review in the previous chapter highlighted the multi-dimensional nature of payment challenges, it could not explain how different causes interact or escalate in practice. To bridge this gap, qualitative interviews were conducted to examine real-life scenarios and systemic dynamics behind payment breakdowns. These field-based insights allowed the research to move beyond static categorization and uncover conditional patterns of escalation.

The chapter is structured to reflect a clear, linear progression: it begins by outlining the coding process, followed by a presentation of the key findings grouped under four axial categories. These findings then serve as the basis for developing the conceptual model, which captures how payment problems emerge through dynamic and conditional interactions between various factors. The chapter closes by introducing the model and explaining how it sheds light on the payment dynamics outlined in the earlier chapters.

4.1 Interviewee Overview

This study draws upon insights from a diverse group of construction professionals involved in various aspects of the payment process. These individuals represent a range of roles including directors, project managers, contract managers, cost controllers, quantity surveyors, and financial professionals, and capture insights from the perspective of both client and contractor organizations.

A two-phase interview approach was followed: the initial phase consisted of unstructured exploratory interviews to broadly explore the problem space, while the second phase involved semi-structured interviews aimed at refining insights and validating emerging patterns.

The interviewees are based in three countries—India, Iran, and the Netherlands—and were selected to provide a broad range of professional perspectives on payment problems that are globally prevalent in the construction industry. While their geographic backgrounds may differ, the study does not aim to explore cultural variations in the interpretation of payment issues. Instead, this diversity is treated as a means of capturing varied experiential viewpoints on the same systemic problem. The table below provides a brief overview of the interview participants and their backgrounds:

Table 3: Interviewee Details

Sr. No.	Job Title	Years of Experience	Type of Organisation
1	Executive Director	40+	Client
2	Cost Manager	20+	Consultant
3	Cost Manager	15+	Consultant

4	Cost Manager	10+	Consultant
5	Project Controller	10+	Consultant
6	Dy. Contract Manager	4	Consultant
7	Project Manager & Owner	25+	Contractor

4.2 Coding Process and Structure

The qualitative data analysis followed a grounded theory-inspired coding process, conducted over three iterative phases: open coding, axial coding, and selective coding. This approach allowed insights to emerge naturally from the interview data while maintaining a structured path toward theory development.

In the open coding phase, each transcript was reviewed line by line to identify recurring issues, behaviors, and relational dynamics affecting the payment process. These codes were created inductively, based on the language used by interviewees and the patterns that emerged across conversations. Examples of open codes included "shortage of staff," "lack of urgency," "excessive gatekeeping," and "work done without POs". A total of 74 different open codes were created across all interviews.

In the axial coding phase, these open codes were grouped based on thematic similarity and underlying patterns of interaction. This resulted in four axial categories that reflected broader domains of influence: (1) Client-Centric Behaviors and Relationship Barriers, (2) Administrative and Process-Related Inefficiencies, (3) Financial Constraints and Mismanagement, and (4) Situational Constraints and Nature of the Industry. These categories captured the systemic and recurring nature of issues encountered across project roles and national contexts.

Finally, selective coding helped synthesize the broader patterns into a conceptual explanation of how payment problems evolve. This involved identifying a core category: payment problems, and helped clarify the roles that different types of issues play in shaping outcomes. This analysis eventually led to a distinction between different types of factors based on their roles in the system. These roles, explained later in Section 4.4, help clarify how certain issues act as immediate disruptions, while others determine whether those disruptions escalate into payment problems.

4.3 Findings From Axial Coding

The open codes derived from the interview data were grouped into four overarching axial categories based on thematic similarity and systemic relevance. These categories reflect the most recurring patterns and structural influences observed across the interviews. Each category represents a cluster of related behaviors, conditions, or constraints that explain payment dynamics in construction projects. This section presents each category accompanied by illustrative excerpts and brief interpretations.

4.3.1 Client-centric Behaviour and Relationship Barriers

This category captures a range of behaviors, attitudes, and power dynamics originating mostly from the client side of construction projects. Many interviewees described clients as exercising significant control over payment flows, often delaying, withholding, or deprioritizing payments based on internal preferences or risk aversion. These behaviors are often a result of lack of trust,

accountability, or empathy toward contractors. In some cases, payment-related decisions were influenced less by formal contract terms and more by informal considerations or perceived leverage in the relationship. Such dynamics reinforce asymmetrical relationships and erode collaborative potential.

Lack of Trust

"…if that trust isn't there, then we need to verify it. And that is the hard part."

This quote highlights how the absence of trust leads to procedural rigidity. The interviewee, speaking as a consultant (for the client), indicates that when trust is lacking, project actors are forced to double-check and validate every detail, especially when it comes to payment related matters. This causes inefficiency, delays, and increased scrutiny, indicating how trust acts as a lubricant in the payment process.

Power Imbalance

"So they'll make the rules up, they'll receive the document, and then they'll say, oh, you've not got the PO number on the invoice or this, that and the other."

This quote illustrates how power imbalance allows clients to exercise discretionary control over payments, even in cases involving minor procedural errors such as a missing purchase order number. Rather than working through the problem collaboratively, the client uses their dominant position to escalate the situation, underpinning the structural asymmetry in the payment process. It exemplifies how even small administrative lapses can result in significant consequences with regard to payment approvals.

Lack of Empathy

"For him, he is doing a favour that he is writing a check to somebody, not understanding that the check that he is writing, that guy has done completed his task two months back and is waiting outside his office"

This code highlights the emotional disconnect that can exist between parties in payment relationships. The speaker points out how payment authorities may disregard payment approval as a benevolent act rather than a professional obligation, thus showcasing lack of empathy towards the contractors' situation.

Clients Want to Withhold Payments for as Long as Possible

"I'm sure clients are like that, they know the value of the money. Yeah, it just costs them a bit more probably to pay on time."

This interviewee suggests that clients often strategically delay payments as a cost-saving measure, holding onto liquidity as long as possible. This behaviour reflects how one's financial interest often outweighs relational or ethical considerations, reinforcing the client's economic dominance over the contractor.

Matter of Pride to Change Policies

"That clashes with the company policy of the refinery that says payment is 60 days… Before the refinery then says, okay, we need to go down to that level and pay this vendor within 30 days… it's a—yeah. Is it a matter of pride?"

This quote reflects institutional rigidity of client organisations to deviate from standardized internal policies, even when they conflict with external, non-negotiable payment terms (such as those imposed by a government entity). The speaker raises the possibility that this rigidity may be rooted in pride or institutional ego, reflecting a deeper cultural resistance to change.

Lack of Responsibility/Accountability

"But the guy who is receiving it is not answerable for the progress to the boss. The guy who is measuring it is not answerable in the progress. The guy who is certifying it is not answerable in the progress and the guy who is finally releasing the payment, he is not at all bothered."

The speaker describes a discrete chain of responsibilities across departments involved in the payment approval process. Each actor is detached from the actual project outcomes and this diffusion of accountability leads to systemic inertia, where no one feels directly responsible for payment delays.

These excerpts reflect how client-side behaviors are not simply administrative choices, but expressions of power, emotion, and strategic control. They collectively reinforce the need to address relational and behavioral conditions, particularly trust, empathy, power disparity, and accountability when improving payment reliability.

4.3.2 Administrative and Process-Related Inefficiencies

This category covers flaws in the way information, responsibilities, and documentation are handled across different teams and phases of a project. While these issues may appear procedural or mundane on the surface, they introduce significant friction into the payment process. Such inefficiencies include the absence of standardised workflows, fragmented team communication, and contractual ambiguities. Although these factors may not always lead to payment problems in isolation, they often become triggering factors, especially when combined with relational or contextual pressures.

Disconnected Teams / Working in Silos

"All these different teams working in silos and not responsible for the output of the project is the biggest reason why there is delay in payment."

This quote highlights how fragmented communication and poor coordination between project teams create breakdowns in the payment process. Rather than working collaboratively across functions, each team operates in isolation. The lack of cooperation creates additional interfaces between teams, increasing the chances of miscommunication, duplication or missed handovers.

Lack of Proper Processes

"Staffing would have solved a big chunk of the problem, but another problem was also that there was no proper way of working in place. There were no procedures on how to do it. Somebody just made something and they just started doing it that way, but nothing was written down."

This quote highlights how multiple operational weaknesses can reinforce one another. The speaker points out that not only was the team understaffed, but also that clear procedures were lacking. This combination of resource constraints and procedural flaws creates ambiguity, delays, and inconsistent decisions, especially when responsibilities are unclear. Rather than a single root cause,

the interviewee describes a compounding situation in which structural and process-related shortcomings work together to disrupt payment operations.

Not having Contracts Before Starting Work

"So the second you get that PO, you can give us the invoice. But until you've got that PO, you can't do the work. So it's kind of a lag on the paperwork side. Everything's agreed that we're supposed to be paying that part of it."

This quote once again highlights poor administrative practices such as delaying contract finalization, which is seemingly a very common occurrence. Such administrative inefficiencies can create major complications in the payment process, inviting unnecessary delays in payment. The speaker emphasizes that this approach shifts all the risk onto the contractor while allowing the client to withhold payments under the pretext of pending formalities.

Lack of Clarity in Contracts

"Probably if you read the contract and everything that was in the contract, you'd still say 5-10% of it, you're not clear about…contract doesn't say anything about it."

Even well-drafted contracts may leave ambiguity around specific scenarios or deliverables. This lack of clarity leaves space for disputes or hesitation when the time comes to certify work or release payments. It shows how subtle gaps in formal documentation can directly influence the payment process.

Some Payment Claims Are Rigorously Reviewed

"It's usually the contractor's claims [that] are really, really carefully studied… you literally trace out every little penny if it's a reimbursable contract."

This quote shows the intensity with which contractor claims are sometimes reviewed, particularly under certain contract types. While such scrutiny may be justified in certain project contexts, the interviewee acknowledges the extreme level of detail involved, which can create significant delays in processing and approval. This reflects how rigid review practices can become a bottleneck in the payment flow.

These examples show that many payment delays are rooted not in relational breakdowns but in weak or overly rigid administrative practices. However, such issues do not always result in disputes on their own. Across interviews, these process-related inefficiencies were more likely to escalate into payment problems when paired with relational breakdowns. This conditional interplay between administrative and relational issues would later emerge more clearly during selective coding, as presented in Section 4.4.

4.3.3 Financial Constraints and Mismanagement

This category focuses on financial limitations, dependencies, and inefficiencies that impact payment timelines. Unlike behavioral or process-based issues, these factors often stem from structural constraints, such as limited access to funds, cash flow management problems, or pressures from broader financial environments. While they may not be intentional, they often create pressure points that directly affect the ability to release payments on time

Clients Have to Arrange the Funding

“The money's coming from somewhere else… and there’s another gatekeeper to that money that we might never meet.”

This quote highlights a key structural challenge in many construction projects: the client is often not the final source of funds. Instead, they may depend on external financial institutions, investors, or internal corporate hierarchies, each with their own approval cycles and priorities. This additional layer introduces delays that are difficult for even the client to anticipate.

Misaligned Funding Related Processes

“Everything will delay payment. So in the end, there's no financial problem… there is enough money to make the payments, but to get the money to the right spot, that's a big issue.”

This quote illustrates how payment delays can occur even when financial resources are available. Sometimes, the core issue lies in the misalignment of internal funding channels and disbursement mechanisms, essentially pointing to a broader logistical shortfall.

Clients Can Have Cash Flow Problems in Other Projects

“They've obviously got huge amounts of money that they're pushing around the world, yeah, they're rotating, and if their cash flow is off, yeah, they haven't got enough money”

Here, the speaker points to how cash flow pressures in one project can have ripple effects on other ongoing projects. The rotation of funds across multiple portfolios creates such financial uncertainty, which can cause huge payment delays.

Bank Guarantees Cost Money to the Clients

“The contractor charges us money for [a bank guarantee]… so it costs us more money to be able to pay them early.”

This quote captures a less obvious financial disincentive for early payment. Financial safety measures such as bank guarantees can result in additional costs for clients. These costs can compound across multiple vendors and become a deterrent to proactive payment behavior.

These excerpts reflect how payment problems are often embedded in financial architecture, not just behavioral dynamics or procedural failures. The actors involved may not have malicious intent but are constrained by structural or economic systems that limit flexibility. This category reinforces the importance of designing payment interventions that account for financial interdependencies, systemic lag, and cash flow realities, especially in large, multi-project organizations.

4.3.4 Situational Constraints and Nature of the Industry

This category captures the broader contextual realities, project-level compulsions, and industry-wide norms that influence how payment issues develop. Unlike behavioral, process-related, or financial issues, these factors are typically not caused by any single actor or decision. Instead, they emerge from the complex, interdependent nature of construction projects. While they may not directly trigger payment disputes on their own, they often shape the environment in which other disruptions escalate or persist. This makes them an important layer in understanding the conditions that give rise to payment delays.

Contractors Settle for Less Due to Time Constraints

“There's an incentive for the contractor to take a lower payment… they're not getting enough money in the door to cover all of the expenses.”

This quote captures the desperation contractors can face while undergoing financial struggles. Rather than escalating conflicts or negotiating, contractors may accept underpayments simply to keep the project going or avoid further delays. This dynamic reflects how financial pressure can distort bargaining power and normalize compromised outcomes.

Work Done Without POs

“Another thing that happens is that sometimes a department within the refinery will tell a vendor to do something without a purchase order because it is a rush job.”

Interestingly, a similar issue, ‘Not having Contracts Before Starting Work’, raised earlier in the interviews was categorized under administrative shortcomings. However, in this case, the breakdown was not due to process negligence, but rather situational urgency due to which normal procedures had to be bypassed. This distinction reflects how similar problems can emerge from different underlying dynamics, reinforcing the complexity and contextuality of payment disruptions in construction projects.

Time Urgency to Get Back Returns

“The investments… they want to have the money as soon as possible.”

This quote reflects the financial urgency experienced by contractors who are under pressure to recover their initial investments as quickly as possible. In their effort to speed up cash inflow, contractors may rush through administrative steps, resulting in mistakes in documentation or failure to follow proper procedures for submitting payment applications. This urgency can increase the likelihood of disputes, rejections, or delays.

A Lot of External Situations Can Affect the Payment Situations

“Even if the project is going well, some other things can go wrong and payment can get delayed.”

This quote acknowledges that payment delays are not always tied to project performance. Broader issues such as market shocks, regulatory delays, or unrelated cash flow crises can interfere with the timing or availability of funds. This underscores the fragility of the system, even under good internal conditions.

Waiting for Other Contractors to Finish Their Work

“We built one side of the wall and then we wait for the contractors to install their piping or whatever… and then we close the wall.”

This quote illustrates how payment progress can be delayed due to dependencies between different contractors working on interconnected scopes. When one contractor’s deliverables are contingent on another’s prior work, it creates coordination bottlenecks that can ripple into delayed invoicing and approval.

Initial Project Setup Challenges

“So you've had all this long build up to getting the contracts and getting everything, the first valuation in place, and still somebody will send the invoice to the wrong place and everything like that.”

This quote illustrates how delays in the early stages of a project, despite considerable preparation, can still disrupt the payment process. Even after contracts are signed and valuations set, operational mishaps like sending invoices to the wrong address can create unexpected bottlenecks. These kinds of oversights are not necessarily driven by poor intent or weak systems, but by the sheer complexity of coordinating and arranging multiple moving parts in a high-stakes environment.

These findings reveal how systemic industry conditions shape the broader environment in which payment issues emerge. While these constraints are rarely controllable at the project level, they increase the likelihood that administrative or behavioral issues will escalate. This reiterates the importance of designing payment interventions that are adaptable to situational variability and capable of absorbing complexity, rather than relying solely on rigid procedural structures.

4.4 Preliminary Model and Its Limitations

Before the formal coding process began, a preliminary conceptual model was developed based on insights drawn from the first few interviews. These early conversations revealed recurring themes related to trust, power imbalance, financial constraints, and administrative inefficiencies. These observations were used to sketch a working hypothesis to organize preliminary insights and guide the deeper analysis that followed.

The early model assumed that payment problems in the construction industry followed a sequential progression of events. This conceptualization is shown in Figure 2. At its foundation were deeper systemic issues such as lack of trust, power imbalance, and lack of empathy, which dominated early discussions and shaped the core structure of the draft model. For example, one interviewee explained, *"You can categorize that in the company processes, but I think the overall reason for that is just a lack of trust… the trust aspect is immense."* Another described the power dynamic by stating, *"It's a one-way street… the client keeps all of the power because they keep all of the money… the balance of power is probably too far with the client."* These perspectives suggested that relational conditions were central to understanding the formation of payment problems.

These were thought to give rise to intermediate causes, such as poor documentation, procedural inefficiencies, or contractual ambiguities. The model also included triggering factors—such as time urgency, market volatility, or external delays—that were believed to amplify the effects of these intermediate issues and eventually lead to payment disruption. These disruptions, in turn, resulted in broader consequences such as project delays or damaged relationships. A feedback loop suggested that unresolved payment issues could reinforce the root causes, creating a self-perpetuating cycle.

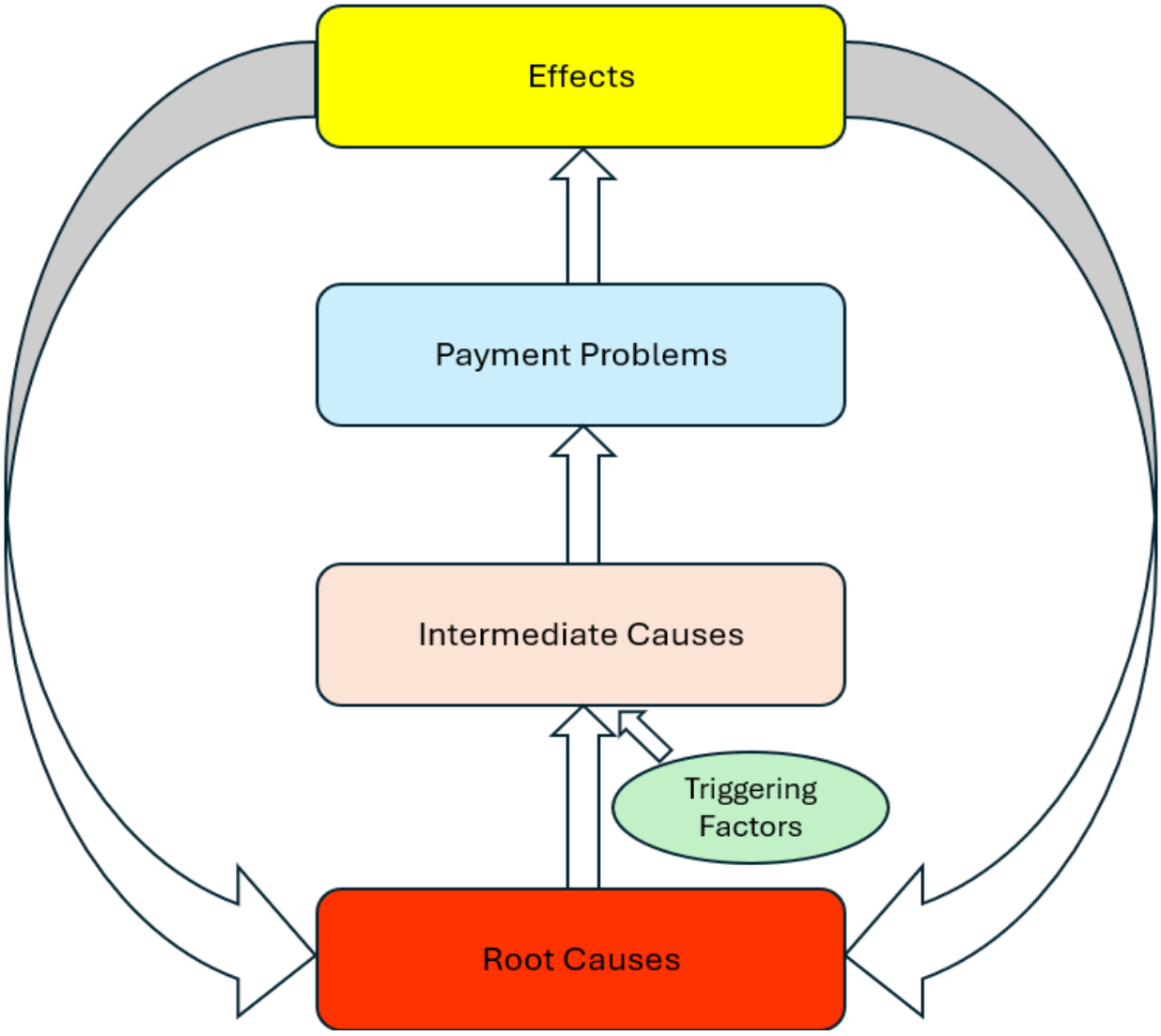

Fig 2: Early Conceptualization of Payment Problem Dynamics (By Author)

While the model offered a useful early structure, its limitations became increasingly evident as the interview dataset expanded. Not all disruptions followed the expected sequence. In some cases, payment issues were triggered directly by administrative lapses or individual oversights, independent of broader systemic issues. As one interviewee said,

"As a contract manager I will always make sure that I'm within my deadline but after me it's like the financial... Not everybody will ensure that".

Conversely, there were also instances where issues defined as root causes were present, but did not lead to payment disruptions. A different interviewee emphasized that strong procedural systems can override relational deficits:

"I don't think that the trust factor makes the difference in this case. I think the difference is… the progress I pay for will amount to a hundred percent and I know what hundred percent is. So there is no immediate need for me to scrutinize the monthly payments more."

These examples demonstrated that similar disruptions could produce different outcomes depending on context. In some cases, issues escalated; in others, they were resolved amicably. The assumption that payment problems unfold in a fixed sequence, from root cause to payment problems, did not consistently hold true.

This realization shifted the analytical focus. Rather than viewing payment problems as the outcome of a step-by-step chain, the research moved towards understanding the dynamic conditions under which disruptions either escalate or are mitigated. This led to the development of a more flexible conceptual model introduced in the next section.

4.5 Refined Conceptual Model

Building on the limitations of the earlier model and the patterns observed through axial coding, the analysis progressed to selective coding with the goal of integrating the previously defined categories into a cohesive explanatory framework. This involved identifying a core category; payment problems, and integrating the previously defined axial categories around it. Selective coding helped explain not only what types of issues occur, but how they interact, under what conditions they escalate, and which dynamics shape their outcomes.

Rather than emerging from a single dominant cause, payment problems were often found to arise from combinations of issues, playing out differently across project contexts, governance structures, and stakeholder relationships. This complexity required a model that moved beyond fixed categories or sequential logic and instead accounted for the conditional nature of how problems emerge.

The refined model developed through this process is presented in Figure 3. It depicts payment problems as the result of interactions between two types of factors.:

- Triggering Factors (TFs): Immediate disruptions that initiate friction in the payment process
- Influencing Factors (IFs): Underlying conditions that either amplify or absorb the impact of those disruptions

4.5.1 Components of the Model

During selective coding, it became clear that not all issues played the same functional role in the development of payment problems. Some, such as documentation errors, delayed certification, or poor coordination, acted as direct triggers and created conditions for payment problems to occur. These were labeled Triggering Factors (TFs) as they represent the observable disruptions that interfere with the flow of payments.

Other issues, such as power imbalance, lack of trust, or other behavioural aspects, consistently appeared as underlying enablers or buffers. These were labeled Influencing Factors (IFs); conditions that shape whether the triggering factors would escalate into real payment problems. In one project, for example, a documentation error might cause a major delay; in another, the same issue might be resolved informally due to strong collaboration or shared understanding.

The analysis also revealed that Triggering Factors often interact with each other, one disruption can lead to another in a chain-like pattern. This pattern was observed during axial coding. As shown in Section **4.3.2**, issues like lack of proper processes and staffing shortages are often built on each other, showing that there isn't always one distinct issue responsible for payment problems.

A similar pattern of escalation was seen across categories, particularly between sections **4.3.4** and **4.3.2**. In one case, a situational urgency, prompted by time pressure led a department to bypass formal procedures and a vendor to begin work without a purchase order. Interestingly, this issue of delayed contracts/documents was also identified earlier as an administrative problem in its own

right. Here, however, it is triggered by a process shortcoming. This reinforces the model's key insight; that Triggering Factors can activate or amplify each other, even across different categories, rather than remaining isolated within their own domain.

To illustrate this type of interaction, consider the following hypothetical scenario:

> *In one case, lack of clarity in contract terms led a subcontractor to submit insufficient supporting documents for a payment claim. The issue was not identified early in the process and went unnoticed until the final approver reviewed the file. At that point, the entire application was rejected, requiring the subcontractor to resubmit the claim through the full workflow with the correct documentation. This reprocessing caused a significant delay in payment, which in turn affected the subcontractor's ability to secure materials on time, further disrupting project progress.*
>
> *This example illustrates how interacting triggering factors like unclear contract terms, poor verification processes, and delayed feedback, can arise from one another and compound into major payment disruptions. It also reinforces the model's emphasis on understanding escalation not as a single event, but as a chain of interdependent triggers shaped by the surrounding conditions.*

Additionally, the analysis revealed that the Triggering Factors aligned with the themes in Categories 2, 3, and 4; namely administrative inefficiencies, financial constraints, and situational compulsions, while the Influencing Factors reflected the behavioral and relational dynamics captured in Category 1. Thus, the model also accommodates external situational triggers, such as market fluctuations, regulatory bottlenecks, or funding delays, that may originate outside the project but still activate or worsen existing TFs. As discussed in Section **4.3.4**, even well-aligned projects may face payment disruptions due to uncontrollable external pressures. This mapping helped give structure to the model by showing not just what types of issues occurred, but how they functioned in shaping payment outcomes.

Meanwhile, the IFs shown surrounding the network of TFs in the model serve as a relational buffer. As seen in Section **4.3.1**, in cases where power was disproportionate, even small triggers such as a missing PO number tended to escalate into payment delays. As one interviewee noted, *"If the client doesn't like you, he will give you a lot of problems"*, emphasizing how subjective dynamics could shape how payment-related issues were handled. Conversely, strong relational conditions were associated with smooth and timely transactions. Another participant summarized this clearly: *"When there is a lot of history and a lot of previous experience of working with each other, I think that trust factor is developed that then even if there is something up and down, you can say, okay, we will adjust it next time"*. These observations reinforce that Influencing Factors are not merely passive background conditions, but variables that can amplify or absorb the impact of disruptions, thus determining whether they escalate into payment problems or are resolved constructively.

Such a functional reinterpretation of the axial codes allowed the model to move beyond a linear cause-effect explanation and instead reflect the complex, conditional, and dynamic nature of real-world project environments. By placing emphasis on interactions rather than sequences, the model offers a more accurate and actionable lens for understanding and addressing construction payment problems.

4.6 Summary

This chapter presented the empirical findings of the research, developed through a grounded theory-informed coding process. The analysis began with open coding, where recurring issues and behavioral dynamics were identified directly from the interview data. These were then grouped through axial coding into four overarching categories: (1) Client-Centric Behaviors and Relationship Barriers, (2) Administrative and Process-Related Inefficiencies, (3) Financial Constraints and Mismanagement, and (4) Situational Constraints and Nature of the Industry. Each category was supported by illustrative excerpts to demonstrate its role in shaping payment dynamics.

A preliminary conceptual model, developed from early interviews, was then introduced. This model proposed a linear progression from deep-rooted issues to payment disruption. However, as the analysis expanded, the model's limitations became clear: not all problems followed a linear path, and the same issues could escalate or dissipate depending on contextual factors.

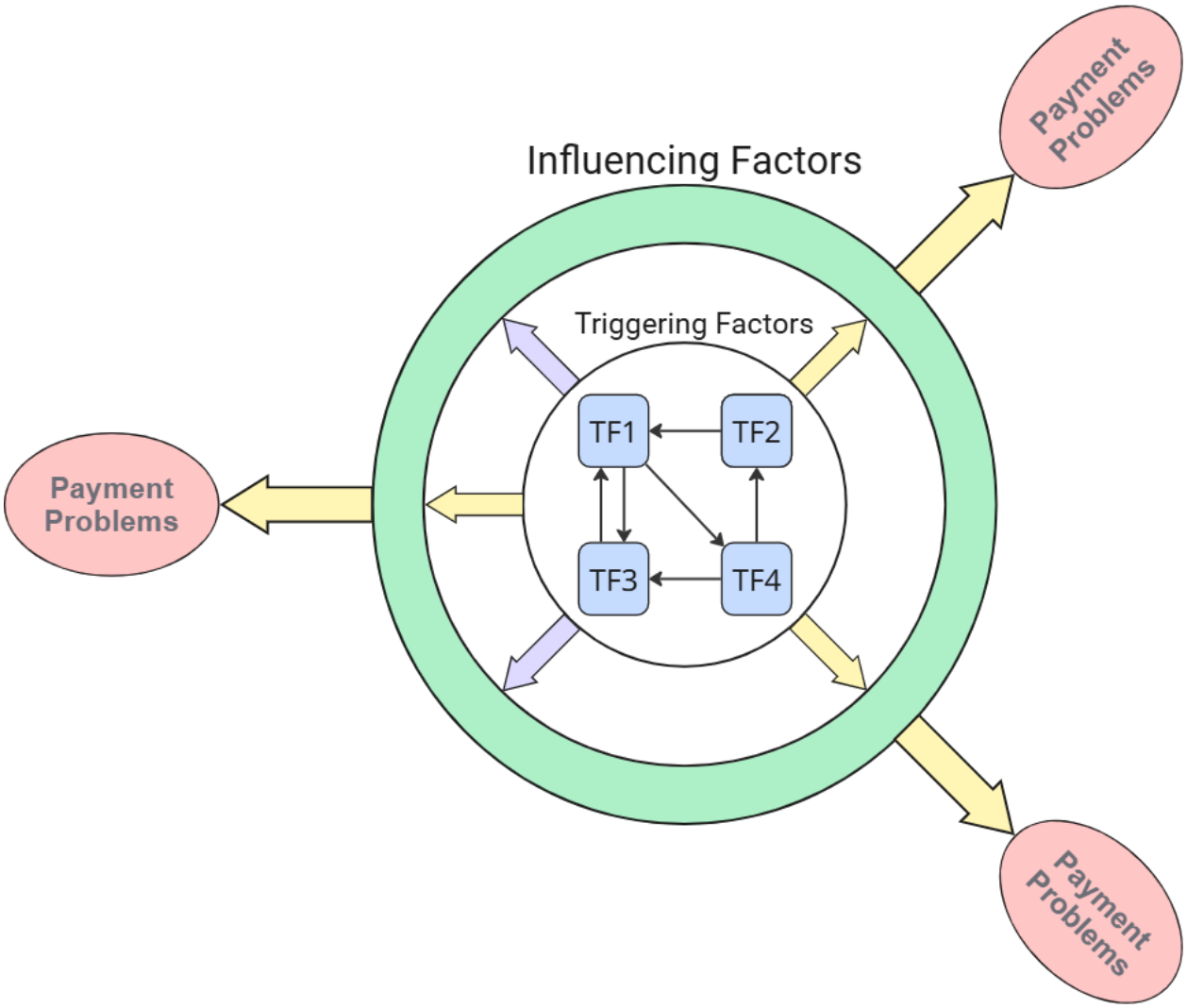

Fig 3: Refined Conceptual Model (By Author)

Selective coding addressed this gap by integrating the axial categories around a single core concern: payment problems. Through this process, the distinction between Triggering Factors (TFs) and Influencing Factors (IFs) emerged as a more flexible and explanatory framework.

The refined model developed through this process illustrates how payment problems do not stem from a linear cause-effect relationship but from a dynamic, conditional interaction between TFs and IFs. This model provides a grounded and adaptable framework for understanding payment issues across diverse project contexts and serves as the foundation for the next chapter, which interprets these findings and discusses their implications for the industry.

5 Problem Definition and Strategic Focus

The conceptual model developed in the previous chapter offers a thorough understanding of how payment problems emerge, not through isolated failures, but through the interaction of multiple categories of factors. By distinguishing between Triggering Factors (TFs) and Influencing Factors (IFs), the model highlights how disruptions in the payment process are often shaped, escalated, or absorbed based on the surrounding relational and organizational environment.

This chapter builds on that insight to define the strategic focus for intervention. It identifies which layer of the problem is most amenable to change, revisits relevant literature to understand the behavioral conditions that shape payment reliability and outlines a set of practical requirements for designing an effective solution.

5.1 Strategic Focus for Intervention

While the conceptual model developed in the previous chapter presents a wide array of conditions contributing to payment problems, not all of these factors are equally viable as points of intervention. Many of the Triggering Factors (TFs) represent external or contextual disruptions within payment processes, but their impact is often determined by broader relational dynamics. Thus, even when TFs were present, many interviews revealed that payment problems were not inevitable. On the contrary, Influencing Factors acted as either buffers or accelerators to these initial disruptions. Consequently, this study shifts its focus towards Influencing Factors, as they are more amenable to behavioral and organizational change.

This choice is further supported by insights from Lencioni's (2002) model on the "Five Dysfunctions of a Team," which places trust as the foundational condition for functional collaboration as seen in Figure 4 below. According to Lencioni (2002), unresolved foundational issues such as lack of trust, undermine communication, commitment, and accountability, regardless of how well those processes are designed. This aligns with the findings in this study, where several TFs, while significant, escalate into actual payment problems only in contexts marked by poor inter-personal dynamics or perceived power disparity.

Therefore, this research adopts a strategic focus on behavioral conditions, specifically trust, power imbalance, and empathy as the foundation for improving payment reliability in construction projects. The following sections define this problem more clearly, revisit literature to understand how these factors emerge, and translate those insights into practical requirements for solution development.

Fig 4: The Five Dysfunctions of a Team (Lencioni, 2002)

5.2 Problem Focus

While payment problems in construction projects are often attributed to contract ambiguities, delayed approvals, or poor documentation, this research suggests that such surface-level disruptions alone do not explain why payment breakdowns persist or escalate. Instead, the trajectory of these disruptions is often shaped by how teams respond to them, and whether they are absorbed through collaboration or amplified by mistrust and rigid structures.

Therefore, this research narrows its focus to the inter-personal and behavioral dimensions, specifically, lack of trust, power imbalance, and lack of empathy. Identified through coding and interviews, these Influencing Factors shaped whether administrative or process-related challenges triggered broader payment failures.

> To illustrate how relational dynamics can change the outcome of payment disruptions, we revisit the earlier scenario involving incorrect documents in a payment claim. In that case, the claim was sent back in the approval workflow, delaying the contractor's payment, which in turn disrupted material procurement and project progress.
>
> *However, in a more resilient relational environment, the situation could have been managed differently. For instance:*
>
> - *The approving authority could have sought verbal confirmation from the site team to verify whether the missing documents (e.g. test results or permits, etc.) indeed reflected completed work – an action enabled by trust both within the organization and in the contractor relationship.*

- *They could have engaged the contractor to clarify the omission, potentially revealing contractual ambiguity or misinterpretation – a conversation enabled by a relationship grounded in mutual respect and empathy.*
- *Recognizing the broader impact of delayed payments (on the contractor as well as the project), the approver could have issued a provisional approval or kept the claim on hold rather than rejecting it outright – a response more likely in an environment with balanced power and shared accountability.*

This example highlights why improving relational capacity is not just a soft skill, but a structural safeguard that determines whether disruptions escalate or are collaboratively resolved. The next section revisits literature to explore how these behavioral conditions develop in practice and what supports their emergence.

5.3 Revisiting Literature on Key Influencing Factors

With the decision to focus this study's intervention on three core Influencing Factors; trust, power imbalance, and empathy, this section revisits relevant literature to build a deeper understanding of how these factors arise in practice and what supports or inhibits their development. Unlike the general literature review presented earlier, this review is targeted and selective, aimed at informing the requirements for potential solutions and identify practical design considerations.

5.3.1 Trust

Trust emerged as one of the most emphasized Influencing Factors across both interviews and literature. In inter-organizational contexts like construction projects, trust is not incidental, it is shaped through specific, actionable conditions. Transparency and open communication are foundational to its development, as they reduce uncertainty and limit perceived opportunism (McDermott et al., 2005). When communication is coupled with consistency in actions, such as reliably meeting expectations or following through on commitments, stakeholders begin to develop confidence in one another's intentions (Karlsen et al., 2008).

This confidence is fortified through collaborative problem-solving, where parties engage constructively rather than defensively, fostering a relationship based on mutual respect (Tyler & Stanley, 2007). Literature also points out that trust is strengthened when project actors share clear goals, aligned values, and well-defined roles, as this reduces ambiguity and misalignment. Fair treatment, inclusion in decision-making, and fair representation also contribute by building legitimacy and reducing perceptions of hierarchy or exclusion (Khalfan et al., 2007).

Trust is also reinforced through reciprocal behavior, where both parties demonstrate willingness to accommodate each other, and through informal interactions that forge relationships beyond formal roles (Khalfan et al., 2007).

When these conditions are absent, trust erodes quickly. Inconsistent behavior, poor communication, rigid control mechanisms, and unilateral decisions all contribute to distrust. The literature makes it clear that trust is not simply an intangible value but a strategic condition; one that can be actively built through fluid communication processes, joint problem-solving, and equitable structures.

5.3.2 Power Imbalance

Power Imbalance was identified as another critical Influencing Factor, particularly in the context of timely payments. In construction projects, this often stems from the client's structurally dominant

position, reflected in their ability to dictate timelines, contract terms, and payment conditions. This dynamic was upheld in interviews, where contractors often described being unable to challenge decisions due to fear of delayed payments or future business repercussions.

According to Wu et al. (2023), such imbalances are frequently rooted in resource dependency and information asymmetry; where one party controls access to funding or expertise, while the other is operationally dependent.

West (2014) emphasizes that power disparities can discourage honest communication, leading to compliance rather than collaboration. Contractors may avoid raising concerns or pushing back on unfair terms due to fear of delayed approvals or retribution. Over time, this dynamic erodes mutual respect and builds the perception of a one-sided relationship.

Addressing power imbalance requires rethinking how decision-making authority, professional knowledge and influence are distributed across project stakeholders.

5.3.3 Empathy

Although empathy is less frequently studied in construction management literature, a few studies emphasize its practical relevance in collaborative environments. Saxe (2021) highlights that empathy can be developed through stakeholder-focused communication where parties actively consider others' needs, concerns, and expectations in decision-making. This form of engagement helps prevent misunderstandings and allows the development of mutual respect in high-stakes project interactions.

Lu et al. (2015) introduce the concept of professional empathy, referring to one's ability to adopt another's role or perspective within a shared task. By understanding the limitations and contributions of other stakeholders, project actors can better align their actions and improve coordination. This could be valuable in fragmented project structures, where misalignment often leads to friction or inefficiencies.

When empathy is present, teams are more likely to offer flexibility, negotiate fairly, and resolve disruptions without letting them escalate into payment disputes. These insights reinforce that empathy, though often overlooked, is a crucial factor that can be encouraged through open conversations, clear understanding of other stakeholders' roles, and greater awareness of what the other party is dealing with.

5.4 Requirements of the Solution

Based on the findings from interviews and targeted literature, this section outlines the core behavioral and relational requirements that any effective intervention must support. Each one reflects a practical condition that must be present to manage or de-escalate payment disruptions. By translating these relational dynamics into actionable criteria, this section provides a design foundation for the intervention proposed in the next chapter.

Requirements Derived from Trust:

- Seamless communication: Clear, open channels that allow teams to raise and address issues early and transparently.
- Collaborative engagement: Stakeholders must actively participate in shared decision-making and problem-solving.

- Informal interactions: Trust is strengthened not only through formal contracts and meetings, but through everyday interpersonal rapport.
- Shared goals, values, and tasks: Working towards shared goals and common objectives facilitates collaboration and mutual understanding
- Fair representation: All stakeholders should be included in conversations that affect payment outcomes.

Requirements Derived from Power Imbalance:

- Information transparency: Reducing knowledge asymmetry ensures all parties are equipped to contribute meaningfully.
- Joint decision-making: Clients and contractors must be equally involved in key decisions to rebalance control.

Requirements Derived from Empathy:

- Increased awareness and visibility of stakeholder needs: Project actors must be aware of each other's constraints, priorities, and dependencies to improve coordination and avoid misunderstanding.
- Speedy conflict resolution: The ability to understand the other's constraints enables faster, fairer dispute management.

Overarching Requirement

- Adaptability and flexibility: Beyond any single behavioral theme, the solution must be adaptable to varying project contexts, team structures, and risk environments.

The inclusion of adaptability reflects the broader research objective; to ensure that the framework is not only effective in one type of project, but applicable across diverse contractual, organizational, and cultural settings.

These requirements are not theoretical ideals but direct responses to recurring behavioral tensions identified during the research. For instance, the need for trust-based communication stems from observed patterns of misalignment and conflict escalation in interviews. Similarly, the emphasis on power balance and empathy reflects stakeholder frustrations with exclusion from decisions or lack of mutual awareness. Each requirement thus addresses a specific type of breakdown in payment reliability, helping ensure that the resulting interventions target not just symptoms, but the root conditions that allow these problems to escalate. In this way, the requirements bridge the problem space and the practical design of the solution.

These requirements will serve as the operational blueprint for the intervention proposed in Chapter 6. They also set the groundwork for identifying the mechanisms through which these conditions support or prevent payment breakdowns.

5.5 Summary

This chapter established the strategic focus of the research by narrowing the solution scope to three key Influencing Factors: trust, power imbalance, and empathy. While the conceptual model identified a wide array of issues contributing to payment problems, not all were equally viable for

intervention. Influencing Factors were selected as the most impactful and actionable intervention points, given their role in shaping whether or not triggering factors escalate.

Drawing from targeted literature and validated through interviews, each of these factors was explored in terms of its behavioral roots and conditions for development. From this, a set of relational requirements was formulated to define what a solution must comprise in order to improve payment reliability.

These requirements will serve as the foundation for the intervention proposed in the next chapter and form the basis for identifying the mechanisms through which each condition can lead to more resilient payment outcomes.

6 The Framework

This chapter introduces the proposed framework that emerged from the analytical process undertaken in this research. Developed in response to the conceptual model discussed in Chapter 4 (Figure 3) and the behavioral requirements identified in Chapter 5, the framework offers a set of guided interventions aimed at improving the relational and organizational conditions that shape payment-related outcomes in construction projects.

Rather than offering isolated or purely procedural solutions, the framework addresses the interconnected, multi-level nature of the problem. It is structured around six mutually reinforcing interventions: Working Together, Transparency & Communication, Shared Goals & Incentives, Understanding Each Other's Needs, Monitoring and Progress, and Contracts. Figure 5 below provides an integrated overview of the full framework, mapping the six strategic interventions along with their key components.

The Contracts intervention acts as an overarching enabler, embedding and sustaining several components from the other interventions. Each intervention includes actionable measures designed to improve payment reliability, while remaining adaptable to different project scales and contexts. In the sections that follow, each intervention is discussed in terms of its structure, rationale, and expected behavioral outcomes. Particular attention is paid to the mechanisms through which each intervention is expected to influence payment behavior, and how these mechanisms reflect the conditional dynamics observed in the conceptual model.

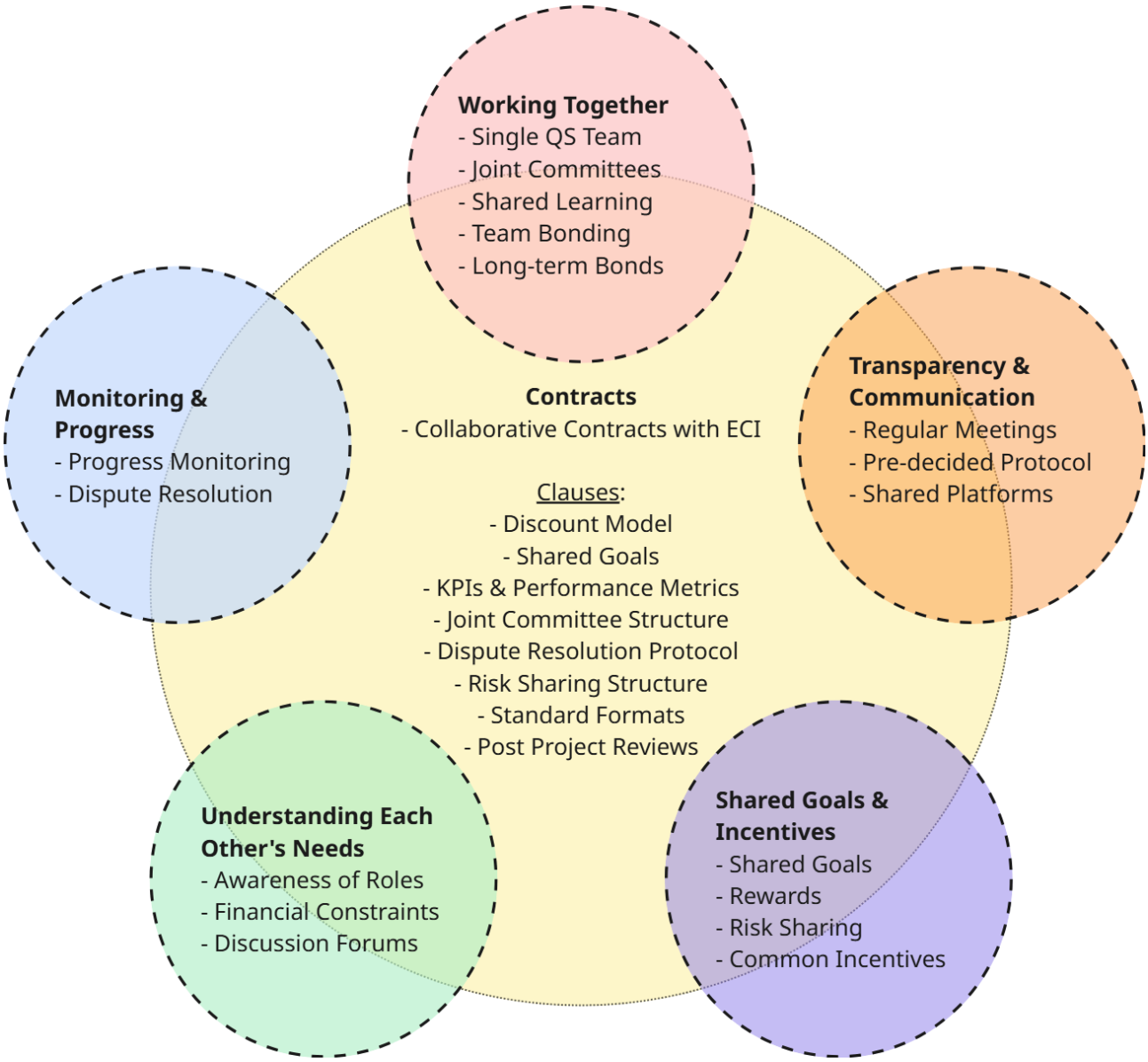

Fig 5: Overview of the Framework (By Author)

6.1 Framework and Overview

6.1.1 Working Together

This intervention proposes the formation of a single Quantity Surveying (QS) Team and the establishment of Joint Committees for commercial decision-making, both designed to enhance collaboration and reduce payment-related friction through alignment, transparency, and shared responsibility.

Single QS Team

In construction projects, QS (Quantity Surveying) teams are typically responsible for measuring and verifying work progress, especially the quantities of materials or tasks completed on site. These verified quantities form the basis for interim payments claimed by contractors and are a key input into how much is approved and paid at each billing cycle. Rather than operating in isolation, this intervention recommends a single QS team, composed of members from both parties, jointly responsible for progress measurement, verification, and reconciliation.

The primary task of this joint team is to measure and verify quantities, a process that directly influences the timing and accuracy of payment claims. Even if billing is monthly, weekly or bi-weekly quantity tracking is recommended to ensure real-time alignment and reduce end-of-cycle discrepancies. Working together as one team allows for an earlier alignment and ensures that when invoices are raised, there are no surprises or mismatches.

In addition, the team is tasked with forecasting monthly quantities based on progress, giving financial departments early visibility into expected invoice amounts. They also ensure that all measurements and billing processes remain in line with contractual conditions. If any deviations or ambiguities are detected, the QS team addresses them early, before they escalate. The team also keeps track of potential variations, initiating discussions in advance so that variation processes don't block or delay payment cycles once triggered.

Although these responsibilities appear procedural, they play a critical role in reducing ambiguity and building a shared understanding between project parties. Working side-by-side fosters regular engagement, encourages information symmetry, and cultivates a shared sense of responsibility. This collaborative dynamic enhances trust, reduces adversarial behavior, and ensures that minor quantity or documentation discrepancies do not escalate into payment disputes.

While a single team is ideal, this intervention is designed to be flexible. In contexts where fully integrating QS teams is not feasible, it is recommended that both teams meet regularly, ideally weekly, and spend time co-locating or working together on verification tasks. The goal is consistent: to maintain continuous alignment on all quantity and billing-related matters.

Joint Committees for Commercial Decision-Making

In parallel with the operational focus of the QS team, this intervention also recommends the creation of joint committees consisting of senior representatives from both the client and contractor sides. These committees are tasked with shared oversight of decisions that directly or indirectly affect payments, including budget approvals, expenditure tracking, and other commercial matters such as procurement, that may have financial implications.

Crucially, these committees also serve as a trust-building mechanism. When decisions are taken jointly, parties are more likely to perceive outcomes as fair and balanced. Decision-making becomes transparent, and both sides are more likely to adhere to the agreements reached. As with the QS team, the scope of this committee can be scaled based on project needs, ranging from narrow financial oversight to broader commercial governance.

Learning & Development

To support collaboration, this intervention includes a dedicated learning and development component. The purpose is to close knowledge gaps, particularly within the joint QS team, and to foster a culture of shared learning and growth across the project.

This includes joint workshops and group learning sessions, where team members build familiarity with shared tasks, tools, and expectations. Where knowledge asymmetries exist, either between organizations or between individuals, mentorship arrangements can help transfer expertise and establish mutual respect. For instance, experienced team members can offer support to those less familiar with the contract or key software systems.

Where digital tools are used to manage documentation and billing, software training sessions should also be included. This ensures that all team members are equipped to use common platforms for uploading, reviewing, and tracking payment-related documents efficiently.

Contract awareness sessions are also recommended, especially in the early stages of the project. A recurring issue that was seen in literature and even some interviews was that team members lacked clarity on what the contract actually stipulated, particularly around payment procedures and triggers. These sessions ensure that key personnel from both teams involved in payment processes understand the expectations, documentation, and compliance thresholds involved.

While the focus of this intervention is on payment-relevant knowledge, its deeper value lies in building mutual understanding, reducing role-based power gaps, and fostering respect between parties. The structure is flexible and can be extended to other teams and technical areas as needed.

Cultural and Team Bonding Activities

Beyond formal structures and learning modules, informal interactions play a vital role in enabling collaboration. This intervention encourages teams to invest in cultural awareness programs (especially in international or cross-cultural projects), as well as social events and casual meet-ups that allow team members to interact outside formal workflows.

In addition, teams are encouraged to celebrate key project milestones together. Marking collective achievements creates a sense of shared success and reinforces the idea that progress and delivery are joint responsibilities. These moments of recognition contribute to long-term relationship building and create positive shared memories across organizational boundaries.

Long-Term Relationships

Finally, this intervention encourages teams to strive for long-term relationships, even on short-term projects. Conducting post-project reviews and establishing a feedback loop to improve future collaboration sends a powerful signal: that relationships matter, and that project success is not measured solely in deliverables, but also in how well teams worked together to achieve them.

6.1.2 Transparency & Communication

This intervention aims to reduce payment-related misunderstandings and misalignments by establishing structured, consistent, and openly accessible communication channels between project stakeholders. It consists of three interlinked components: regular cross-party meetings, pre-agreed billing protocols, and the use of shared digital platforms for information management.

Regular Coordination Meetings

The first component involves weekly or bi-weekly meetings between project leads, typically the project managers or commercial leads from both client and contractor sides. These meetings provide a space to review project progress, discuss projected quantities, and identify potential variations. All of this information, sourced and updated by the joint QS team (as described in the previous intervention), helps both sides forecast upcoming payment claims and align expectations early in the billing cycle.

These meetings also create an opportunity for continuous feedback exchange, where either party can raise concerns or suggest improvements before small issues escalate. The consistency of these

meetings ensures that communication is not reactive or fragmented but embedded into the weekly rhythm of the project, thereby promoting trust, transparency, and collaborative problem-solving.

Pre-Decided Protocols

To avoid confusion and reduce the likelihood of disputes, this intervention recommends agreeing on certain payment-related procedures at the outset of the project. These include:

- Payment approval processes
- The process for measuring and validating quantities
- The formats and structure of invoices
- The steps and documents required for variations or amendments

Once established, these agreed-upon rules can be translated into a simple checklist that is submitted alongside every invoice or payment claim. While administratively lightweight, such a checklist ensures that approving parties can quickly verify that the submission meets all pre-agreed criteria.

By eliminating ambiguity and minimizing room for interpretation, this clarity builds mutual trust and reduces the likelihood of rejections or payment delays due to procedural errors. It also empowers both sides to hold each other accountable in a transparent and fair way.

Shared Digital Platforms

To support transparency in documentation and reduce the reliance on fragmented communication channels, this intervention recommends the mandatory use of a shared platform, such as MS SharePoint or a digital data room, for storing and accessing critical payment related documents. These may include:

- Contracts and contract amendments
- Approved drawings and revisions
- Quantity breakdowns, measurement sheets, or progress reports
- Any pre-agreed documentation or formats related to billing

The intent is not to create additional documentation, but to provide a single source of truth accessible to both parties, reducing information asymmetry and helping avoid disputes caused by outdated or missing references.

Additionally, for projects that have the capacity, a digital tracking system may be implemented to monitor the status of payment applications. Such a system can show where a claim stands in the approval chain, whether any queries have been raised, and who is responsible for each step. This not only increases accountability on the part of the approving authority but also reduces uncertainty for the claimant and ensures that issues are logged and resolved transparently.

As with all interventions in the framework, the tools and formats suggested here are flexible and can be scaled depending on the size and complexity of the project. The core principle remains the same: to create predictable, transparent communication around payment-related matters that allows both parties to engage constructively and with full visibility.

6.1.3 Shared Goals & Incentives

This intervention focuses on aligning stakeholders through shared project objectives, performance incentives, and the recognition of contributions across different teams. Rather than operating on a transactional basis, it encourages participants to pursue collective outcomes, rewarding collaboration and initiative that go beyond the minimum contractual obligations.

Performance-Based Goals and Incentives

The first component of this intervention is the formulation of shared performance goals that go beyond baseline contractual deliverables. These may include targets such as early project completion, cost savings, or exceeding quality benchmarks. Each goal is linked to specific Key Performance Indicators (KPIs) that allow for objective measurement throughout the project lifecycle.

Where these goals are achieved, the resulting bonuses, savings, or efficiencies are shared between stakeholders in accordance with pre-agreed terms. The intention is to create a mutual incentive structure that encourages proactive behavior, reinforces mutual accountability, and enhances continuous collaboration.

Value Added Outcomes

In addition to project delivery metrics, teams are encouraged to establish shared goals around value-added outcomes, such as sustainability, innovation, or user satisfaction. These goals help reinforce alignment around broader project values and can be paired with corresponding incentives based on measurable results. The flexibility of this component allows teams to tailor value-based goals to their specific project context or stakeholder priorities.

Team-Level and Individual Goals

This measure also includes smaller-scale targets for individual teams or cross-functional groups (such as the joint QS team). These may involve milestones related to process efficiency, collaboration, or knowledge-sharing. Where appropriate, recognition or rewards are provided for reaching these goals; through formal acknowledgment, professional development opportunities, or performance-linked bonuses.

By recognizing individual and team contributions, the project environment becomes more participatory and transparent. Teams are more likely to support one another when their efforts are seen, valued, and tied to collective success.

Risk Sharing

To complement shared rewards, the framework encourages equitable risk-sharing, particularly for unforeseen events or scope-related uncertainties. The exact configuration of risk-sharing arrangements is flexible and can be negotiated early on in the project. The goal is to prevent one-sided risk allocation and instead promote mutual support in the face of challenges.

Common Incentives

Finally, the intervention allows for optional payment-linked incentives, such as a discount structure for early payments. These can be introduced if mutually agreed upon, with specific terms (e.g., discount percentage, cut-off period) defined during contract negotiation. While optional, such arrangements can be a practical lever for motivating prompt approvals and reinforcing financial flow.

Together, these components create an environment where accountability, appreciation, and reciprocity are embedded in project routines. By reinforcing fairness and shared responsibility, they strengthen relational dynamics and help ensure that financial processes are managed with transparency, urgency, and mutual respect.

6.1.4 Understanding Each Other's Needs

This intervention focuses on improving mutual awareness between stakeholders, particularly around the roles, constraints, and financial realities of the parties involved in the payment process. While technical collaboration may be well-structured, projects often suffer from a lack of visibility into the challenges faced by the other side. Misunderstandings can escalate quickly when one party assumes unwillingness where the other is simply unable.

This intervention proposes a set of light, but intentional practices aimed at creating space for early clarification, empathy, and forward-looking dialogue on payment-sensitive issues.

Awareness of Roles and Constraints

One of the most consistent sources of tension in payment processes is the assumption that others are either obstructive or careless. This can often be avoided by improving basic awareness of what different teams actually do, and what pressures or limitations they face in fulfilling those roles.

This intervention encourages early discussions, formal or informal, where teams such as contractors, subcontractors, and client-side finance present their roles, workflows, and common challenges. This may include:

- How long certain internal approvals typically take
- How investor reporting cycles or capital constraints influence release of funds
- What documentation gaps tend to cause issues
- What common oversights slow down invoice processing

By making these known up front, teams can adjust expectations and reduce misinterpretation of delays or queries, and foster a more empathetic and cooperative working environment.

Discussing Financial Constraints

This intervention also provides a structure for open financial conversations in projects where one party may be facing short-term liquidity challenges. For example, if a contractor is managing several projects and facing staggered cash flow, having a channel to raise concerns early can help clients plan responses, whether that means fast-tracking a particular claim, extending flexibility on a variation, or simply maintaining open communication to prevent escalation.

While not all financial situations can be solved at the project level, the ability to discuss them without shame or fear of retribution can prevent a breakdown in trust and goodwill.

Client–Subcontractor Interactions

In many payment hierarchies, subcontractors have no channel to engage directly with the client, even when their work and pay is affected by client-side decisions. This intervention encourages occasional structured meetings where subcontractors can raise payment-related issues directly. These forums do not bypass contractual responsibility, but allow for limited and targeted visibility,

reducing blame games and enabling more coordinated problem-solving when cash flow bottlenecks appear.

As with other interventions, these practices are designed to be scalable. On large projects they may take the form of structured onboarding or mid-project sessions. On smaller projects, they may be implemented more informally through standing meetings or project reviews.

6.1.5 Monitoring and Progress

This intervention introduces mechanisms for ongoing review and adjustment, both in terms of physical work progress and the overall functioning of the framework itself. It also establishes a system for neutral dispute resolution, ensuring that conflicts, should they arise, do not derail collaboration or payment flows.

Progress and Performance Monitoring

To sustain momentum and accountability, this intervention recommends regular joint reviews of both project progress and collaborative performance. These reviews may be monthly or aligned with key project milestones, depending on project scale and complexity.

The reviews are not only technical but also relational: they provide an opportunity to jointly assess how well collaboration is functioning. For example, whether the joint QS team processes are being followed or regular coordination meetings are taking place.

Where shared goals have been set, such as early completion, cost savings, or innovation targets, key performance indicators (KPIs) can be reviewed jointly to ensure alignment and track outcomes.

This dual-layer monitoring ensures that both project delivery and relational infrastructure remain on track and can be adjusted early if needed.

Third-Party Dispute Resolution

Despite best efforts, disagreements or bottlenecks are likely to emerge during the course of a project. This intervention includes a mechanism for quick, neutral dispute resolution through a third-party mediator.

The parties are encouraged to jointly pre-select a mediator and define a basic dispute resolution protocol early in the project. This could be embedded within the contract or agreed through a side protocol. The goal is to avoid delays and escalation by providing a fast, fair resolution path when disputes arise, particularly with those that could impact payments.

The process can be designed with flexibility: for example, disputes below a certain value could be fast-tracked; or the mediator's decision could be binding in some cases and advisory in others. The key is to create procedural clarity in advance, reducing fear and friction when conflict does occur.

6.1.6 Contracts

This intervention focuses on shaping the contractual foundation of the project in a way that reinforces collaboration, transparency, and flexibility throughout the project lifecycle. Rather than relying solely on post-signature practices to foster alignment, this approach encourages project participants to incorporate key collaborative principles directly into the contract.

Collaborative Contract Types

Where project and legal contexts allow, the use of collaborative contract models is recommended, preferably with the arrangement of early contractor involvement (ECI). These could be partnering contracts, alliancing, Integrated Project Delivery (IPD), two-phase contracts, or Construction Manager at Risk (CMAR).

These models promote early alignment, distribute responsibilities more equitably, and create built-in opportunities for shared planning and decision-making. However, the framework remains flexible, parties may choose the contract type that suits their risk appetite, jurisdiction, and project scale, as long as the collaborative spirit is preserved.

Key Clauses to Support Collaboration

In addition to selecting a suitable contract model, this intervention proposes the inclusion of specific clauses that align with the framework's broader interventions. These may include:

- Payment terms and early payment incentives – discounts for payments made within a pre-agreed shorter timeframe
- Shared performance goals and incentive structures – setting goals and incentives
- Clear KPIs and performance metrics – specifying how performance will be measured
- Joint decision-making – which decisions can be made and through what structure
- Dispute resolution – protocol for third-party mediation, timeframes, and escalation steps
- Risk sharing – identifying which risks are shared and how
- Standardized processes and formats – for invoices, variation forms, and checklists
- Post project reviews and knowledge sharing – encouraging structured reflection and long-term learning

These clauses are not intended to add unnecessary complexity but to codify practices that, if left informal, may lose strength under stress or change in personnel. Their inclusion signals that collaboration is not just encouraged; it is contractually supported.

6.2 Expert Validation and Framework Refinement

Purpose of Validation

Following the development of the initial framework, a round of expert validation interviews was conducted to ensure that the proposed interventions were not only theoretically grounded but also practically applicable across a range of construction project contexts. The objective was to gather practitioner perspectives on the feasibility, relevance, and completeness of the framework, and to identify opportunities for refinement prior to finalizing the solution.

Validation Method and Participants

The validation phase involved semi-structured interviews with experienced professionals across client, contractor, and consultancy roles. Participants who were connected to the payment process within construction projects were included to ensure relevant practical insights. Interviews focused on reviewing the intervention set and reflecting on its applicability, clarity, and any critical gaps.

Key Feedback Themes

The feedback received was largely positive, with most experts affirming the framework's relational focus and modular structure. However, several suggestions were made to enhance its depth, usability, and inclusivity. In particular, experts recommended strengthening the learning and relationship-building dimensions and introducing more concrete mechanisms for performance evaluation.

In response to the expert input, five key adjustments were made:

- Inclusion of mentorship programs to close knowledge gaps across or within teams, particularly within the QS function.
- Addition of contract awareness sessions to ensure that team members are familiar with the terms, expectations, and procedures related to payments.
- Introduction of cultural awareness programs to support smoother collaboration in diverse or international project environments.
- Emphasis on long-term relationships, including post-project reviews and feedback loops to build continuity and trust across projects.
- Specification of KPIs to measure progress against shared goals, improving transparency and accountability in incentive structures.
- Addition of a risk-sharing component for more balanced allocation of unforeseen project risks and for reinforcing a sense of mutual support.

These refinements were incorporated into the final framework presented earlier in this chapter which helped strengthen its behavioral focus and real-world adaptability.

6.3 Mechanisms of Change

As outlined in section 6.1, the framework's interventions are not merely operational steps but are strategically designed to activate behavioural change. Their effectiveness lies in the underlying mechanisms they activate. These mechanisms explain how and why each intervention brings about the desired behavioural outcome. This section identifies a set of repeating behavioural patterns that underpin the framework. They emerged through a combination of grounded theory-inspired coding from interview data and targeted literature review. These are grouped into four core clusters: shared structures and expectations, perceived fairness and role legitimacy, motivation and reinforcement, and communication and responsiveness.

Each cluster reflects a different mode of systemic improvement and contributes to the conditions necessary for payment reliability.

1) Shared Structures and Expectations

A major source of payment delays is misalignment in how work is measured, documented, or approved. Several practices in the framework address this by embedding predictability and symmetry into the project's operating environment. Whether through joint verification, pre-agreed billing protocols or standardized formats, these practices create a common frame of reference that reduces misinterpretation and procedural conflict. Codified expectations, through contract clauses

and standard formats, strengthen these effects by creating a consistent, rule-based environment from the outset.

2) Perceived Fairness and Role Legitimacy

Relational conditions such as trust and power balance do not emerge automatically, but are often shaped by whether stakeholders feel respected, informed, and heard. Practices such as joint commercial decision-making, mentorship programs, and cultural or role awareness sessions activate mechanisms of perspective-taking, mutual legitimacy, and procedural fairness. Risk sharing agreements also contribute to this dynamic as they build the idea that responsibility is shared, not unilaterally imposed. These mechanisms improve the perceived quality of interactions and reduce relational escalation.

3) Motivation and Reinforcement

To shift entrenched behaviors, it is not enough to prescribe new procedures, stakeholders also need reasons to adopt them. Practices such as shared goals and performance-linked rewards introduce motivational levers that tie desirable behaviors to positive outcomes. Similarly, early payment discounts reframe timely payments as an opportunity rather than an obligation. These mechanisms create positive feedback loops that support ongoing cooperation and discourage opportunism.

4) Communication and Responsiveness

Finally, the framework addresses the rhythm of communication itself. Practices like weekly alignment meetings, shared digital platforms and open subcontractor forums embed routines that allow problems to surface early, before they escalate. Informal mechanisms, such as meet-ups or milestone celebrations, support this by reducing social distance and improving accessibility. Together, these mechanisms create a more responsive project environment, where dialogue is frequent, structured, and less adversarial.

The following table summarizes the core behavioral mechanisms activated by the framework, grouped into four clusters. A complete list of all behavioral mechanisms used in this framework along with concise definitions is provided in the glossary in Appendix A.

Table 4: Clusters of Behavioural Mechanisms Used

Shared Structures & Expectations	**Perceived Fairness and Role Legitimacy**	**Motivation & Reinforcement**	**Communication & Responsiveness**
Shared ownership Process predictability Codified expectations Information symmetry Structured progress reflection	Procedural fairness Co-decision-making Mutual legitimacy Risk buffering Perspective-taking Shared vulnerability Psychological safety Relational continuity	Incentive alignment Recognition and appreciation Positive feedback loops Behavioral prompting	Regular engagement Visibility of progress and issues Early issue detection Informal trust-building Reduced social distance Shared reflection

6.4 From Intervention to Outcome

While the previous sections described the components and mechanisms of the framework, this section explains the underlying logic of how the framework drives change in payment behavior. The framework does not aim to directly fix surface-level disruptions, but rather to strengthen the relational conditions that determine how such disruptions are handled. Each intervention is designed to activate behavioral mechanisms such as shared ownership, procedural fairness, and information symmetry, which in turn address key Influencing Factors like power imbalance, lack of trust, and empathy deficits. These mechanisms function as enablers: they allow teams to respond constructively to disruptions, contain escalation, and maintain the flow of payments even when challenges arise.

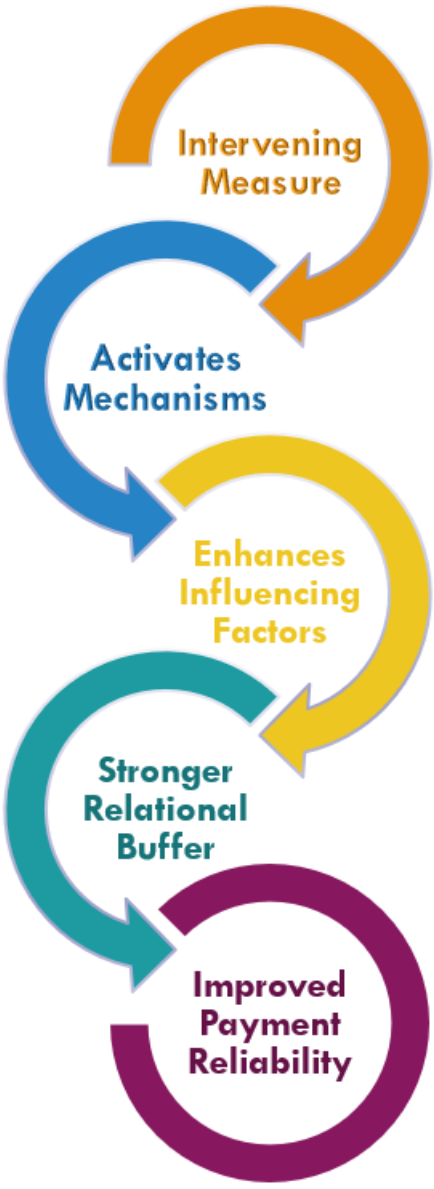

Fig 6: Pathway from Intervention to Payment Reliability (By Author)

The process unfolds in a series of interconnected steps. First, each intervention introduces a practical or structural change, such as a joint team, a shared platform, or a regular meeting. These changes create more opportunities for engagement, transparency, and shared responsibility. Next, these opportunities activate specific behavioral mechanisms such as informal trust-building, structured progress reflection, or process predictability. As these mechanisms take hold, they begin to reshape

the relational dynamics between stakeholders. Teams become more responsive, communicative, and aligned. Finally, this improved relational environment enables stakeholders to handle disruptions constructively, reducing the chances of escalation and improving payment reliability. This process is illustrated in Figure 6, which visually summarizes how each intervention activates behavioral mechanisms, strengthens influencing factors, and ultimately improves payment reliability.

To understand this better, consider two examples of how individual components in the framework operate in practice.

In the case of the client–subcontractor interactions, occasional structured meetings are introduced to give subcontractors limited visibility into client-side decisions. This simple procedural change creates opportunities for direct engagement across hierarchical layers. Through these conversations, clients begin to see the cash flow stress or uncertainty faced by subcontractors, and subcontractors gain insight into approval chains and reporting constraints on the client side. The open channel fosters mutual legitimacy and reduces perceived power asymmetry. As trust and empathy develop through repeated interactions, both sides become more responsive and less defensive in the face of delays or issues. Instead of attributing disruptions to incompetence or obstruction, teams are more likely to interpret them as shared challenges, helping reduce payment disputes from escalating.

As another example, contract awareness sessions and shared digital platforms ensure that both parties gain familiarity with common workflows, documentation requirements, and the intent behind specific contract clauses. While these practices seem procedural, they build shared ownership and procedural fairness by reinforcing that both parties are operating from a common understanding. When participants know what to expect and why, they are less likely to engage in gatekeeping behavior or reject claims on technicalities. Over time, such an alignment improves payment efficiency, especially in fast-moving or high-pressure project phases.

In this sense, the framework functions as a behavioural operating system. It doesn't prescribe rigid processes but instead creates an environment that supports collaborative efforts, constructive communication and more empathetic decision-making. These environments serve as buffers, absorbing shocks that would otherwise trigger payment disputes, delays, or breakdowns. To clarify how this sequence of logic plays out across the full framework, the table below provides an overview of selected interventions, the specific behavioral mechanisms they activate, and the types of Triggering Factors they prevent from escalating.

Note: While each intervention in the table is associated with its most prominent enabling mechanisms, these mechanisms are not exclusive to that intervention. In practice, most mechanisms support multiple interventions and may be activated across different project contexts. For a detailed overview of how each individual measure contributes to behavioral change, refer to the table in Appendix B, mapping each component to its corresponding mechanisms.

Table 5: Mapping Each Intervention to the Conceptual Model Through Mechanisms

Intervention	**Enabling Mechanisms**	**What It Prevents (Triggering Factors)**

Working Together	➢ Shared ownership ➢ Process predictability ➢ Structured progress reflection ➢ Relational continuity ➢ Procedural fairness ➢ Informal trust-building	➢ Disputes due to: o Measurement mismatches o Contractual ambiguities o Knowledge gaps
Transparency & Communication	➢ Information symmetry ➢ Codified expectations ➢ Visibility of progress and issues ➢ Regular engagement ➢ Early issue detection	➢ Escalation due to: o Unclear billing processes o Version mismatches o On-site discrepancies o Missed updates
Shared Goals & Incentives	➢ Incentive alignment ➢ Recognition and appreciation ➢ Positive feedback loops ➢ Behavioral prompting	➢ Demotivation ➢ Fragmented priorities ➢ Opportunistic behavior
Understanding Each Other's Needs	➢ Perspective-taking ➢ Mutual legitimacy ➢ Recognition and appreciation ➢ Reduced social distance ➢ Shared vulnerability	➢ Conflicts driven by: o Assumptions o Misunderstandings
Monitoring and Progress	➢ Visibility of progress and issues ➢ Shared reflection ➢ Regular engagement ➢ Structured progress reflection	➢ Delays due to: o Unresolved conflicts o Lack of progress visibility
Contracts	➢ Codified expectations ➢ Co-decision-making ➢ Risk buffering ➢ Psychological safety	➢ Conflicts due to: o Poorly defined scope o Errors in Design o Irregular formatting

The next section builds on this understanding by mapping how each intervention aligns with the conceptual model introduced in Chapter 4.

6.5 Link to Conceptual Model

The conceptual model developed in Chapter 4 identified Influencing Factors such as trust, empathy, and power balance as the critical components that determine whether disruptions escalate into payment problems or are absorbed constructively. These IFs cannot be resolved by procedural fixes alone but require deeper relational and behavioral shifts within project teams.

The framework introduced in this chapter intervenes at that level by activating behavioral mechanisms that directly strengthen these Influencing Factors. While Section 6.4 explained the

collective logic from intervention to outcome, this section takes a closer look at how each Influencing Factor is supported in practice.

The table below maps each IF to the key behavioral mechanisms that reinforce it and lists the relevant framework measures that activate these mechanisms. This illustrates how the framework translates abstract relational challenges into tangible, implementable actions, providing a direct bridge between the conceptual model and real-world application.

Table 6: Mapping Mechanisms to Influencing Factors

Influencing Factor	Enabling Mechanisms	Intervening Measures
Trust	➢ Procedural fairness ➢ Regular engagement ➢ Informal trust-building ➢ Relational continuity ➢ Shared reflection	➢ Joint committees ➢ Single QS team ➢ Weekly meetings ➢ Informal meet-ups ➢ Long-term relationship practices
Power Imbalance	➢ Co-decision-making ➢ Information symmetry ➢ Psychological safety ➢ Visibility of progress and issues ➢ Shared ownership	➢ Joint committees ➢ Risk-sharing ➢ Shared learning ➢ Shared platforms ➢ Third-party dispute resolution
Empathy	➢ Perspective taking ➢ Mutual legitimacy ➢ Recognition and appreciation ➢ Reduced social distance ➢ Regular engagement	➢ Cultural awareness ➢ Mentorship programs ➢ Subcontractor forums ➢ Awareness of roles and constraints

Note: This table presents a selection of the most directly relevant mechanisms associated with each influencing factor. However, many more behavioral mechanisms contribute to each Influencing Factor.

This logic can also be illustrated by building on the previously introduced example of a subcontractor's payment claim being rejected due to insufficient supporting documents. Here, we show how the alternative responses suggested in the previous chapter could be enabled by the behavioral mechanisms and intervention measures proposed in the framework.

- *The approving authority could have sought verbal confirmation from the site team – This reflects the mechanism of informal trust-building, activated by measures such as informal meet-ups, part of the **Working Together** intervention. These exchanges are only possible when there is an informal relationship with peers, built over time through repeated engagement and mutual visibility. By fostering such relationships, the framework strengthens trust, allowing actors to verify and resolve small issues quickly, without escalating them through formal channels.*

- *They could have engaged the contractor to clarify the omission – This reflects the mechanism of perspective-taking and mutual legitimacy, both of which are activated by measures such as raising awareness of roles and constraints under the **Understanding Each Other's Needs** intervention. Such measures allow stakeholders to recognise the pressures and limitations others face, prompting constructive interactions rather than punitive responses. This dynamic demonstrates how strengthening empathy through deliberate relational design can prevent unnecessary escalation.*
- *Recognizing the broader impact of delayed payments – This reflects the mechanism of shared ownership, activated by measures such as risk sharing arrangements, part of the **Shared Goals & Incentives** intervention. Risk-sharing creates a sense of mutual accountability for project outcomes, encouraging stakeholders to consider the wider consequences of their decisions. By embedding shared ownership into incentive structures, the framework helps balance power dynamics and promotes forward-looking decision-making, preventing unnecessary escalation of avoidable disruptions.*

These examples illustrate just a few of the mechanisms and measures at play. In practice, the framework works through a broader set of interconnected interventions that collectively strengthen relational resilience.

While the framework is primarily designed to intervene at the level of Influencing Factors, many of the interventions begin with procedural or structural changes, such as regular meetings or pre-decided protocols. Although these are intended to activate deeper relational mechanisms, they also help reduce process-related disruptions. As a result, the framework produces secondary benefits at the Triggering Factor level as well, reinforcing payment reliability through both relational and procedural improvements.

6.6 Practical Application and Adaptability

The strength of the proposed framework lies not only in its behavioral grounding, but also in its adaptability across diverse project contexts. While surface-level disruptions in construction projects may vary widely, the underlying relational dynamics that determine payment outcomes are consistent. For this reason, the framework has been deliberately designed to be modular, flexible, and context responsive.

Rather than presenting a fixed checklist, the six interventions serve as strategic building blocks that can be tailored to project needs. For example, for large infrastructure projects with fragmented governance structures, interventions like Transparency & Communication may be more appropriate, while for smaller projects, Working Together and Shared Goals & Incentives could prove more effective. Similarly, relationally mature teams may already perform many of these practices informally. What the framework offers is a structured logic for strengthening and formalizing them when needed.

While some interventions, such as pre-decided protocols, single QS team, shared digital platforms and contractual clauses shape payment flows and documentation processes directly, others, such as informal team bonding, cultural awareness, and subcontractor discussion forums are aimed at moulding relational conditions. These may not influence payment behaviour in visible ways, but they determine whether minor disruptions escalate into disputes or are resolved collaboratively.

These more relational or "generic" interventions play an equally critical role. Payment problems are not necessarily caused by procedural faults but by adversarial responses to them. In such cases, the strength of interpersonal dynamics, communication norms, and psychological safety can determine whether a small error turns into a major delay. These relational enablers foster a culture of responsiveness, patience, and shared problem-solving, making them indispensable to payment reliability.

Additionally, the framework's strength lies in its mechanism-driven logic. Because the interventions are grounded in a set of defined behavioral mechanisms such as informal trust-building, procedural fairness, or incentive alignment, they can be adjusted while preserving their core function. This means teams can substitute or adapt an individual measure without losing the intended behavioral effect, making the framework more resilient to local constraints and variations.

Importantly, the timing of implementation plays a critical role. Relational aspects are best introduced as early as possible in the project lifecycle, ideally during the project definition phase, when routines, expectations, and collaborative norms are still forming. Early adoption strengthens the foundation of trust, alignment, and role clarity, making teams more resilient to disruption. That said, some interventions – such as joint reflection sessions, structured dispute resolution or progress monitoring – can be introduced later to recalibrate team dynamics and reduce friction as challenges emerge.

Ultimately, the framework is not about prescribing a single path to payment reliability but about equipping teams with a coherent strategy to intervene at multiple levels: procedural, contractual, interpersonal, and informal. By doing so, it offers a practical and scalable toolset for addressing the relational causes of payment problems in a wide range of construction settings.

In this way, the framework maintains conceptual consistency while remaining adaptable in practice and bridging the gap between theoretical insights and real-world application.

6.7 Summary

This chapter presented the final framework developed to address persistent payment problems in construction projects. Building on the conceptual model outlined in Chapter 4, the framework targets the behavioral and relational conditions: trust, power imbalance, and empathy, that determine whether surface-level disruptions escalate into broader payment breakdowns.

Rather than offering a fixed checklist, the framework introduces six strategic interventions designed to activate behavioral mechanisms such as shared ownership, procedural fairness, and information symmetry. These mechanisms strengthen Influencing Factors and help build relational resilience within project teams.

The chapter also explained how the framework drives behavioral change through a stepwise logic. Finally, the framework's adaptability was emphasized. By preserving its mechanism-driven logic, the framework can be tailored to suit varying project sizes, stakeholder arrangements, and organizational cultures, making it both conceptually robust and practically scalable.

7 Discussion

This chapter reflects on the key insights derived from the research, interpreting the implications of the developed conceptual model and the proposed framework. It explains the logic behind the interventions, places the study within the wider literature, and discusses its broader contributions to the industry.

7.1 Interpretation of the Framework

The framework developed in this research does not attempt to eliminate surface-level disruptions within construction projects. Instead, it acknowledges that these are inevitable in complex project environments. What differentiates successful projects from those that suffer consistently from payment problems is not the absence of such disruptions, but the relational capacity of project teams to absorb and manage them without escalation.

The interventions proposed in the framework operate primarily by strengthening Influencing Factors, namely trust, power balance, and empathy. These are not passive contextual conditions, but outcomes that can be cultivated through deliberate behaviors and interactions. These relational conditions serve as the cushions that determine whether a triggering event escalates into a systemic payment breakdown or is collaboratively managed and contained.

While Table 5 presented in Chapter 6 maps each intervention to the type of disruption it helps prevent, it is important to clarify that the intervention point is not at the Triggering Factor itself. Instead, each intervention aims to fortify the behavioral environment surrounding the event, ensuring that relational resilience absorbs the shock of the disruption. In this sense, the framework operates one level deeper than traditional procedural fixes: it addresses the conditions that make projects either fragile or resilient in the face of inevitable operational frictions.

This highlights an important insight, payment problems are not just technical mistakes. They are relationship weaknesses, set off by surface disruptions but caused by breakdowns in trust, communication, and collaboration. Therefore, solving payment problems is not only about improving procedures, but it also requires strengthening the way people work together and trust each other within project teams.

7.2 Behavioral vs Procedural Intervention

Although the framework developed in this study is primarily behavioral in its focus, it also, by default, integrates procedural enablers to support and sustain relational improvements. The core objective of the interventions is to strengthen trust, balance power dynamics, and foster empathy within project teams. However, bringing about relational change cannot rely on behavioral efforts alone, especially in large, complex projects where administrative structures often shape everyday interactions.

Several measures within the framework such as the creation of shared digital platforms, standardized billing protocols, or the adoption of collaborative contract types serve as procedural supports that help create environments where positive behavioral dynamics can blossom. These procedural enablers do not replace the behavioral mechanisms; rather, they stabilize and reinforce them by reducing ambiguity, improving transparency, and providing clear reference points for collaboration.

This dual approach of anchoring the framework behaviorally but reinforcing it procedurally ensures that relational improvements are not left to chance or personal goodwill alone. It acknowledges the reality that trust, fairness, and cooperation must often be operationalized through structures that guide and sustain intended behaviors across project lifecycles. This way the framework offers both flexibility and resilience. It allows project teams to adapt behavioral practices to different contexts, while using supportive processes and structures to embed those practices in daily project operations.

7.3 Positioning in Existing Literature

The findings and framework uncovered in this research offer important extensions to the existing literature on payment problems in construction. Traditionally, payment issues have been framed largely as administrative, contractual or financial problems, solvable through clearer processes, stronger contracts, stricter enforcement mechanisms, better financial planning, or improved documentation practices.

Much of the existing literature tends to treat payment breakdowns as isolated, one-dimensional issues. Solutions are often designed to address singular administrative or contractual aspects without fully recognizing the complex interplay of technical, relational, and procedural factors that shape payment outcomes. In contrast, this research views payment problems as a multi-dimensional issue, with a complex interplay of different situational and behavioural factors. It highlights that payment reliability is heavily influenced by the underlying relational dynamics within project teams, specifically, the quality of trust, perceived fairness, empathy, and power balance.

The behavioral vulnerability of project relationships, rather than purely technical failures, was consistently found to explain why triggering events escalated into full payment disputes. Few studies in construction management literature have positioned payment resilience explicitly as a relational phenomenon. While relational contracting literature emphasizes trust and cooperation at the broader project alliance level, there has been limited focus on how day-to-day behavioral conditions influence financial flows at the operational level. This study thus makes a vital link between relational theory and payment-specific challenges, offering a behaviorally structured framework grounded in project realities.

A useful comparison can be made with the analogy introduced by Wang et al. (2023), previously discussed in Chapter 3, where payment problems are likened to a disease, shaped by systemic and contextual factors. Their study uses this analogy to build a predictive model to anticipate payment defaults. This study continues the analogy, albeit in a different direction. It views payment problems as a complex disease, with a wide variety of possible causes, like a condition caused by a multitude of pathogens. This thesis argues that instead of targeting each pathogen individually (e.g., fixing one cause at a time), the more viable solution is to strengthen the system's immunity. Here, relational mechanisms such as trust, procedural fairness, mutual legitimacy, and communication act as the immune system of the project, allowing it to resist and absorb shocks without escalating into payment breakdowns. In this way, the proposed framework shifts the focus from reactive fixes to proactive resilience-building.

In terms of categorization, this research also offers a complementary view to Wang et al.'s classification of causes. Their categorization of client management and implementation, documentation and communication, and cultural factors shares some conceptual overlap with the four axial coding clusters developed in this study. However, while Wang's model remains focused on

mapping causes to predictive probabilities, this study emphasizes how these causes escalate through behavioral dynamics.

Other studies have touched on individual relational elements. For instance, Karlsen (2008) explores the influence of trust in project alliances, while West (2014) and Wu et al. (2023) examine how power imbalances and asymmetrical dependencies distort collaboration. However, these works have often remained conceptual or context-specific. This research contributes by integrating these fragmented insights into a single operational framework and empirically grounding them in the specific context of payment issues.

Moreover, by introducing a mechanism-based approach, the framework provides specific behavioral levers, such as shared ownership, procedural fairness, and regular engagement, that can be activated and adapted depending on project context. This level of operationalization is often missing from broader relational theories, offering a practical contribution that strengthens the behavioral toolkit available to practitioners and researchers alike.

7.4 Broader Implications of Research Findings

The insights from this study highlight a critical but often overlooked reality: large construction projects, however complex, are ultimately executed by people. Systems, processes, and technologies are all mediated by human relationships. Therefore, the consistent neglect of behavioral dimensions in construction project management leaves a significant blind spot. This research points to the need for greater emphasis on relational dynamics, not just as secondary factors, but as structural components of project reliability.

A practical implication is the need to rethink how project environments are designed. Instead of treating trust, empathy, and collaboration as peripheral traits, systems could be structured around these as foundational enablers. This raises a broader question for both practitioners and researchers: what would it mean to design our systems with relational factors at the forefront?

7.5 Practical Contributions and Recommendations for the Industry

The framework developed in this research offers several important practical contributions for construction project teams, clients, contractors, and consultants looking to improve payment reliability. By reframing payment problems as relational challenges rather than purely procedural or financial ones, the framework equips industry actors with new tools to build relational resilience.

Based on the findings, the following key recommendations are made for industry practitioners:

- Treat project actors as partners – Project actors should be seen as partners, not just within contractual agreements, but through everyday practices and behaviors. The more teams treat each other as collaborators rather than adversaries, the fewer disputes and payment conflicts will arise.
- Build long-term relationships – Even in short-term projects, teams should strive to create the foundations for long-term relationships. This mindset builds trust that lasts across contracts and future collaborations.
- Leverage technology to support the adoption of the framework – Wherever possible, project teams should use digital and technological advancements to facilitate coordination and

information sharing. This not only simplifies the implementation of the framework, but also reduces individual workload, giving teams more time to focus on relationship-building.

- Solve all problems together – Teams should strive to approach all challenges, not just payment-related problems, jointly. Solving operational problems together reinforces trust, demonstrates shared ownership, and strengthens relationships across project functions.
- Communication is key - Open and frequent communication is critical for sustaining collaboration. Whether providing instructions, offering feedback, or raising concerns, structured communication routines create clarity, reduce misunderstandings, and accelerate issue resolution. Teams should create environments where communication is continuous, structured, and encouraged across all levels.
- Recognize and appreciate contributions – Recognition of individual and team contributions is a powerful but often an underrated tool for building trust. Acknowledging effort and showing appreciation, either formally or informally, strengthens relational bonds and encourages proactive collaboration.

By embedding these practices into their everyday project management routines, industry actors can move beyond reactive payment enforcement towards proactive payment resilience, enhancing collaboration, trust, and financial flow across construction projects.

7.6 Summary

This chapter reflected on the key findings, contributions, and implications of the research. It emphasized the critical role of relational conditions such as trust, power dynamics, and empathy in shaping payment reliability. The framework developed in this study was positioned within the existing literature, addressing gaps by offering a behavioral, mechanism-driven approach rather than relying solely on procedural or contractual reforms. The chapter also introduced a broader reflection on the potential value of designing project systems around relational principles, not as a recommendation, but as a question for future exploration. Practical recommendations were provided to guide industry practitioners in applying the framework, emphasizing partnership, long-term relationship building, technology leverage, collaborative problem-solving, and open communication practices. Together, these insights reinforce the need for a systemic, behaviorally grounded strategy to achieve payment resilience in construction projects.

8 Conclusion

This chapter presents the concluding insights of the study by directly addressing the main research question and its four sub-questions. It brings together the core findings developed through literature review, interview analysis, and framework development, and reflects on their broader significance. The chapter also outlines the study's limitations and identifies key areas for future research.

8.1 Research Questions

"How can a comprehensive solution be developed to improve payment reliability in construction projects?"

The main research question is answered by systematically addressing the four sub-questions, each of which explores a different dimension of the issue.

8.1.1 Research Question 1

What are the core factors behind payment issues in construction, and how do their interactions escalate these issues?

The research identified four main categories of causes: behavioral factors, administrative inefficiencies, financial constraints, and structural characteristics of the industry. In the conceptual model developed, these were explained with the help of a two-tier structure: Triggering Factors (TFs), which represent surface-level disruptions, and Influencing Factors (IFs), which shape how those disruptions unfold.

Causes from the last three categories typically act as Triggering Factors. These disruptions often interact and compound one another in project-specific ways. Ultimately, they create conditions for escalation and come into contact with causes from the first category, behavioural factors, which serve as Influencing Factors.

It is the behavioral environment shaped by these Influencing Factors that determines whether disruptions are absorbed or allowed to intensify. When trust is weak, power imbalances persist, or empathy is lacking, issues that could otherwise be resolved tend to escalate.

This distinction highlights that payment problems are not simply the result of what goes wrong, but of how the project environment is prepared to respond. Relational fragility, rather than isolated events, is what ultimately drives escalation.

8.1.2 Research Question 2

What type of solutions have been proposed to address payment issues, and what constraints limit their impact?

Existing solutions to payment problems in construction have typically focused on individual measures such as contractual reforms, legal enforcement mechanisms, financial controls, dispute resolution processes, and the adoption of digital tools. While each of these addresses a specific aspect of the problem, for example, cash-flow and financial training improves financial planning, and adjudication offers faster dispute resolution, they operate in isolation and target only individual causes.

This fragmented approach has several limitations. Many of these solutions are procedurally rigid, lack adaptability to project-specific dynamics, and often reinforce compliance rather than

collaboration. Most importantly, they fail to account for the behavioral and contextual realities of construction projects. Trust deficits, power imbalances, and poor communication remain unaddressed, limiting the long-term effectiveness of these measures.

As a result, while these solutions may resolve surface-level disruptions, they do not engage with the underlying conditions that cause payment problems to escalate. This gap underscores the need for a more integrated, behaviorally grounded approach.

8.1.3 Research Question 3

What constitutes a cohesive approach to effectively mitigate payment challenges in construction?

A cohesive approach to payment reliability must go beyond procedural fixes and address the underlying conditions that determine whether disruptions escalate. The research identified three core Influencing Factors, trust, power balance, and empathy, as central to shaping relational resilience within project environments.

Each of these factors requires specific behavioral conditions to function. Trust depends on transparency, consistent communication, shared ownership, etc. Power balance requires fair representation and joint decision-making to reduce control asymmetries. Empathy is supported by mutual awareness of stakeholder needs and role constraints, allowing for more constructive problem-solving. These conditions do not emerge organically; they must be intentionally fostered through structural and behavioral interventions.

A cohesive solution must therefore enable these relational dynamics in practical, context-sensitive ways. Rather than targeting individual causes of disruption, it should strengthen the project's overall capacity to absorb and respond to them. This insight formed the basis for the framework developed in this study, which focuses on activating behavioral mechanisms that address the root conditions behind payment escalation.

8.1.4 Research Question 4

What practical steps and guidelines can be adopted to address payment issues in construction?

To translate the study's insights into actionable measures, a set of six strategic interventions was developed, each consisting of different components. These interventions are designed to activate specific behavioral mechanisms that support trust, power balance, and empathy within project environments, thereby strengthening the conditions necessary for payment reliability.

The six interventions are:

- Working Together – promoting collaboration through shared quantity surveying teams and decision-making committees.
- Transparency & Communication – providing clarity through structured meetings, documentation protocols, and shared platforms.
- Collaboration & Shared Goals – aligning efforts around common project outcomes, with performance incentives and risk-sharing mechanisms.
- Understanding Each Other's Needs – creating awareness of stakeholder roles and constraints through open dialogue and proactive issue framing.
- Monitoring & Issue Resolution – ensuring work stays on track through progress monitoring systems and third-party support for dispute handling.

- Contractual Structures – enabling flexibility and cooperation through collaborative contract types while supporting the implementation of the other five interventions.

The interventions were validated through expert feedback to ensure that they are not only theoretically sound but also practical, flexible, and adaptable across different project types and contractual settings. Rather than offering a prescriptive solution, they represent a toolkit that can be tailored to specific project dynamics to reduce the risk of payment breakdowns.

8.2 Research limitations

While the research provides valuable insights into addressing payment issues in construction, certain limitations should be acknowledged to contextualize the findings and guide future research.

- Focus on project level dynamics: The study focused on day-to-day project level dynamics. Broader systemic or macroeconomic influences (policy changes, inflation) were not deeply examined.
- Qualitative and interpretive design: The study relies entirely on qualitative data. While rich in depth, it lacks quantitative validation of the framework's effectiveness or impact.
- Sample size and diversity: Although participants were selected to represent a range of functions, the sample size remained relatively small. Some key functions were underrepresented, possibly leaving out critical perspectives.
- Self-reporting and subjectivity: Interview data was based on participants' own recollection and perceptions, which are subjective and could be influenced by hindsight bias or selective memory.
- Absence of a demonstration phase: The framework was validated through expert interviews but not implemented in a live project. As a result, its real-world effectiveness and long-term viability remains untested.
- Unaccounted cultural variations: Although the study involved interviewees from multiple countries, it did not take into the cultural variations in their interpretation of payment processes, trust or collaboration.
- Temporal constraints: The research was conducted within a limited timeframe, which restricted the opportunity to observe long-term effects or changes over multiple project cycles.

8.3 Recommendations for Future Research

Building on the findings of this research, future studies can help deepen the understanding of the problem, expand the framework's applicability, and explore alternative approaches. This section outlines key opportunities for further investigation and development.

- Integration with behavioural science – Future research could explore how insights from psychology or behavioral economics can inform the design of interventions. Understanding how stakeholders perceive fairness, manage conflict, or build trust could strengthen the behavioral foundations of payment systems.

- Empirical testing of the framework: While the framework was developed through a grounded analysis and validated through expert interviews, future studies could apply and evaluate it in real-world settings. This would determine how the interventions perform in practical situations, offering insights into their suitability and any necessary adjustments.
- Broader stakeholder involvement: Future studies should consider diverse stakeholder groups beyond clients, contractors, and consultants, and widen the range of roles within these groups. Personnel from contracts, procurement, quality control, etc. should be included to get a complete picture of payment dynamics.
- Diverse contractual settings: Explore the suitability of the framework under different contractual arrangements, such as two-phase, Alliance, IPD, etc. This would provide insights into how adaptable the proposed solution is under varying governance structures.
- Integration with digital tools: Several proposed measures, such as standardized documentation and shared communication platforms, could benefit from digital support. Various tools such as Building Information Modelling (BIM), collaborative dashboards, or digital invoicing systems could be explored for enhancing the efficacy of the framework.
- Use of Blockchain-Based Smart Contracts (BBSC): This technology offers great potential for automating various aspects of the payment process while preserving relational integrity. Future studies should explore how this technology can be integrated into the framework to further enhance payment reliability.

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Appendix A – Glossary of Terms

1. Shared ownership – Joint responsibility over tasks, data, or outcomes across parties.
2. Process predictability – Clear and stable processes that reduce uncertainty and confusion.
3. Codified expectations – Explicitly agreed standards, protocols, or norms that structure behavior.
4. Information symmetry – Equal access to relevant project information by all key stakeholders.
5. Structured progress reflection – Formal review of project progress to enable course corrections.
6. Procedural fairness – Perception that decisions are made through fair and transparent processes.
7. Co-decision-making – Shared authority over key decisions between project parties.
8. Mutual legitimacy – Recognition that all parties and their contributions are valid and valuable.
9. Perspective-taking – Active effort to understand the constraints and viewpoints of others.
10. Risk buffering – Distribution of risks to avoid overburdening any single party.
11. Shared vulnerability – Openness about risks and weaknesses that encourages reciprocal trust.
12. Psychological safety – Confidence that raising issues, mistakes, or concerns will not result in retaliation or judgment.
13. Relational continuity – Building long-term trust and memory across multiple projects and engagements.
14. Incentive alignment – Structuring rewards so that all parties benefit from collaborative success.
15. Recognition and appreciation – Acknowledging and valuing the contributions and efforts of individuals and teams.
16. Positive feedback loops – Systems where cooperative behavior is reinforced and amplified over time.
17. Behavioral prompting – Using incentives or structured nudges to encourage desired behaviors.
18. Regular engagement – Consistent interactions that maintain relationship quality and project momentum.
19. Visibility of progress and issues – Ongoing transparency about project status, challenges, and achievements.
20. Early issue detection – Mechanisms that surface problems before they escalate.
21. Informal trust-building – Developing rapport and trust through non-contractual, everyday interactions.
22. Reduced social distance – Minimizing perceived hierarchies or barriers between different project actors.
23. Shared reflection – Informal discussions where team members reflect together on their collaboration and experiences, with a focus on learning and relational alignment.

Appendix B – Intervention-Mechanism Mapping

Table 7: Mapping of Interventions to Behavioral Mechanisms

Intervention	Measure	Key Mechanisms
Working Together	Single QS Team	Shared ownership, Information symmetry, Regular engagement, Structured progress reflection
	Joint Committees	Co-decision-making, Mutual legitimacy, Procedural fairness, Relational continuity
	Shared Learning	Shared vulnerability, Shared reflection, Reduced social distance, Recognition and appreciation
	Contract Awareness Sessions	Codified expectations, Process predictability, Risk buffering, Procedural fairness
	Cultural Awareness Sessions	Perspective-taking, Reduced social distance, Shared reflection, Shared vulnerability
	Team-Bonding	Informal trust-building, Relational continuity, Shared reflection, Psychological safety
	Long-Term Relationships	Relational continuity, Incentive alignment, Mutual legitimacy, Psychological safety
Transparency & Communication	Weekly/Bi-weekly Meetings	Positive feedback loops, Early issue detection, Visibility of progress and issues, Reduced social distance
	Pre-Decided Protocols	Codified expectations, Process predictability, Procedural fairness, Information symmetry
	Shared Platforms	Information symmetry, Process predictability, Visibility of progress and issues, Shared ownership
Shared Goals & Incentives	Shared Goals	Shared ownership, Incentive alignment, Structured progress reflection, Regular engagement
	Rewards	Recognition and appreciation, Positive feedback loops, Behavioural prompting, Incentive alignment
	Risk Sharing	Shared vulnerability, Psychological safety, Co-decision-making, Risk buffering
	Early Payment Discount	Incentive alignment, Behavioral prompting, Mutual legitimacy
Understanding Each Other's Needs	Awareness of Roles	Perspective-taking, Mutual understanding, Shared vulnerability, Reduced social distance
	Financial Constraints	Psychological safety, Perspective-taking, Mutual legitimacy, Shared vulnerability
	Client-Subcontractor Forums	Mutual legitimacy, Reduced social distance, Procedural fairness, Shared reflection
Monitoring & Progress	Progress Review	Structured progress reflection, Regular engagement, Shared ownership, Positive feedback loops
	Third-party Dispute Resolution	Procedural fairness, Psychological safety, Codified expectations, Risk buffering
Contracts	Collaborative Contracts	Co-decision-making, Codified expectations, Shared ownership, Process predictability

Note: The list of mechanisms associated with each measure is not exhaustive. In practice, multiple mechanisms may be activated depending on project dynamics, and some measures may activate mechanisms beyond those explicitly listed.

Appendix C – Data Management

C.1 – Data Management Plan

Plan Overview

A Data Management Plan created using DMPonline

Title: Crafting an integrated solution for addressing payment problems in the construction industry

Creator: Rishabh Pai Vernekar

Affiliation: Delft University of Technology

Template: TU Delft Data Management Plan template (2021)

Project abstract:

Payment issues in the construction industry are a persistent challenge, leading to financial instability, strained relationships, project delays, and even insolvencies. These issues arise from complex and interdependent financial, legal, administrative, and cultural factors, yet existing solutions often address these aspects in isolation, limiting their effectiveness.

This research aims to develop an integrated framework to address payment-related challenges by adopting the Design Science Research (DSR) methodology. The study will begin with a literature review, real-world case analysis, and exploratory interviews to identify the root causes and interdependencies of payment issues. Semi-structured interviews will then define objectives for an effective solution.

The framework will be designed, demonstrated using use-case scenarios and process diagrams, and iteratively validated through feedback sessions. By fostering transparency, enhancing payment processes, and improving trust among stakeholders, the framework aspires to contribute to a more resilient and efficient construction industry.

ID: 166104

Start date: 15-11-2024

End date: 15-05-2025

Last modified: 13-12-2024

Crafting an integrated solution for addressing payment problems in the construction industry

0. Administrative questions

1. Name of data management support staff consulted during the preparation of this plan.

My faculty data steward, Xinyan Fan, has reviewed this DMP on 13/12/2024.

2. Date of consultation with support staff.

2024-12-13

I. Data description and collection or re-use of existing data

3. Provide a general description of the type of data you will be working with, including any re-used data:

Type of data	File format(s)	How will data be collected (for re-used data: source and terms of use)?	Purpose of processing	Storage location	Who will have access to the data
Interview recordings	mp3, mp4	Recording on Microsoft Teams	To get to the bottom of payment issues in construction and develop an effective solution	One Drive (TU Delft)	Myself
Interview transcripts	doc, pdf	transcription of the recordings will be done on Microsoft Teams	To facilitate thematic analysis and to identify common factors contributing to payment problems in the construction industry	One Drive (TU Delft)	Me and my interviewees, so they can validate the transcription
De-identified interview transcripts	doc, pdf	Personal information will be manually excluded from the transcripts on a review process	To ensure privacy while allowing for a detailed exploration of the underlying issues surrounding payment problems	One Drive (TU Delft)	Me and my graduation committee members
Informed consent forms	doc, pdf	Forms shall be sent to the interviewees before the interviews for review. They shall fill them up, sign and send it back	To comply with GDPR	One Drive (TU Delft) during the project; transferred to my supervisor for long-term storage after end of research	Me and the interviewees
Contact information of interview participants	doc, pdf	I shall request it from the participants	To contact and recruit participants for the interview	One Drive (TU Delft)	Myself
Personally Identifiable Research Data (e.g., professional background, job titles, affiliation)	doc, pdf	To be collected during interviews	To contextualize interview responses in terms of the participants' expertise and to facilitate a thematic analysis	One Drive (TU Delft)	Me and my graduation committee members (if necessary for analysis or validation)

4. How much data storage will you require during the project lifetime?

- < 250 GB

I will not require a lot of data storage. I plan to conduct 12-14 interviews in total of 30-40 minutes each. The data storage required won't exceed 15 GB.

II. Documentation and data quality

5. What documentation will accompany data?

- Methodology of data collection

The methodology used for data collection shall be described in a chapter of my thesis report.

III. Storage and backup during research process

6. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- OneDrive

IV. Legal and ethical requirements, codes of conduct

7. Does your research involve human subjects or 3rd party datasets collected from human participants?

- Yes

8A. Will you work with personal data? (information about an identified or identifiable natural person)

If you are not sure which option to select, first ask your Faculty Data Steward for advice. You can also check with the privacy website . If you would like to contact the privacy team: privacy-tud@tudelft.nl, please bring your DMP.

- Yes

Participants will be interviewed and personal data will be collected after obtaining consent from the participants. All interviews will be recorded and transcribed. Once I finish writing the thesis report, all recordings and transcripts shall be destroyed.

8B. Will you work with any other types of confidential or classified data or code as listed below? (tick all that apply)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- No, I will not work with any confidential or classified data/code

9. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering this question. If this is not the case, you can use the example below.

I will be the owner of the data and it will be restricted to myself during the research process. Data will be anonymously shared in my report as findings, as well as with my supervisors.

10. Which personal data will you process? Tick all that apply

- Photographs, video materials, performance appraisals or student results
- Other types of personal data - please explain below
- Signed consent forms
- Data collected in Informed Consent form (names and email addresses)
- Email addresses and/or other addresses for digital communication
- Names and addresses

Expertise and experience in the field (company names will be included if authorized by the interviewee)

11. Please list the categories of data subjects

I shall mainly interview professionals linked to payment process and disputes in construction projects, which includes project managers, financial managers, contract managers and quantity surveyors.

12. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?

- No

15. What is the legal ground for personal data processing?

- Informed consent

16. Please describe the informed consent procedure you will follow:

The informed consent forms shall be sent to the participants before the interviews. They will be asked to sign the form and send it back digitally. I will go through the agreements again before each interview.

17. Where will you store the signed consent forms?

- Same storage solutions as explained in question 6

18. Does the processing of the personal data result in a high risk to the data subjects?

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).
If two or more of the options listed below apply, you will have to complete the DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to receive support with DPIA.
If only one of the options listed below applies, your project might need a DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to get advice as to whether DPIA is necessary.
If you have any additional comments, please add them in the box below.

- None of the above applies

22. What will happen with personal research data after the end of the research project?

- Personal research data will be destroyed after the end of the research project

V. Data sharing and long-term preservation

27. Apart from personal data mentioned in question 22, will any other data be publicly shared?

- No other data can be publicly shared - please explain below why data cannot be publicly shared

As a Master's student, I don't need to comply with data policy regarding data publishing.

29. How will you share research data (and code), including the one mentioned in question 22?

- No data can be publicly shared - please explain below

Same as above.

VI. Data management responsibilities and resources

33. Is TU Delft the lead institution for this project?

- Yes, the only institution involved

34. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

I am the only person responsible for my research. Personal data shall be destroyed when I finish my research or in the unlikely case of a force majeure, whichever comes first.

35. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

I will do the data management myself, therefore no other resources are necessary.

C.2 – Informed Consent Form

Delft University of Technology
Human Research Ethics
Informed Consent

Opening Statement:

This research, conducted as part of a Master's thesis at TU Delft, aims to explore and develop solutions to address payment issues in the construction industry, focusing on enhancing trust, collaboration, and transparency between clients and contractors. You are being invited to participate because of your professional experience in the industry, and your insights will be invaluable in shaping potential solutions. Participation is completely voluntary, and you are free to withdraw at any time without any consequences. While there are no direct benefits for you, your involvement will contribute significantly to both the improvement of industry practices and the advancement of academic research in the field.

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	☐	☐
3. I understand that taking part in the study involves: Video recorded interviews that will be automatically transcribed as text. Both the recording and the transcript will be destroyed right after the conclusion of this study;	☐	☐
4. I understand that I won't be compensated for my participation.	☐	☐
5. I understand that the study will end by May/2025. The exact date will be decided during the green light meeting		
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study involves collecting specific personally identifiable information (PII), such as name, e-mail address, designation, and location. It also involves the collection of personally identifiable research data (PIRD), with the potential risk of my identity being revealed public. I understand that I can ask for the interview to stop at any point if I feel the need to do so.	☐	☐
7. I understand that some of this PIRD is considered as sensitive data within GDPR legislation, specifically data related to my specific role and responsibilities.	☐	☐

8. I understand that the following steps will be taken to minimise the threat of a data breach, and protect my identity in the event of such a breach: all the data will be safely stored on TU Delft One Drive, and the access to this data will be limited. I am also aware that this data will be destroyed once the study is completed.	☐	☐
9. I understand that personal information collected about me that can identify me, such as e-mail address, name, job designation and location, will not be shared beyond the study team.	☐	☐
10. I understand that the (identifiable) personal data I provide will be destroyed right after the conclusion of this study.	☐	☐
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
11. I understand that after the research study the de-identified information I provide will be used for the Master's thesis report developed by the researcher and that it will be publicly available in TU Delft's repository.	☐	☐
12. I agree that my responses, views or other input can be quoted anonymously in research outputs	☐	☐
13. I agree that my real name can be used for quotes in research outputs.	☐	☐
PLEASE TICK THE APPROPRIATE BOXES	**Yes**	**No**
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
14. I give permission for the de-identified video recording that I provide to be archived in TU Delft repository so it can be used for future research and learning.	☐	☐
15. I understand that access to this repository is open, but it can be restricted on my request.	☐	☐

Signatures

_____	_____	_____
Name of participant [printed]	Signature	Date

I, as a researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Researcher name	Signature	Date

Study contact details for further information:

V.G. PAI VERNEKAR

+31 682243315

E-mail: v.g.paivernekar@student.tudelft.nl

C.3 – HREC Approval

Date 13-May-2025
Correspondence hrec@tudelft.nl

Human Research Ethics Committee TU Delft
(http://hrec.tudelft.nl)

Visiting address
Jaffalaan 5 (building 31)
2628 BX Delft

Postal address
P.O. Box 5015 2600 GA Delft
The Netherlands

Ethics Approval Application: Crafting a Holistic Solution for Addressing Long-standing Payment Issues in the Construction Industry: Towards an Integrated Approach
Applicant: Pai Vernekar, Rishabh

Dear Rishabh Pai Vernekar,

It is a pleasure to inform you that your application mentioned above has been approved.

Thank you very much for your submission to the HREC. Your submission has been approved.
In addition to any specific conditions or notes, the HREC provides the following standard advice to all applicants:
• In light of recent tax changes, we advise you to confirm any proposed remuneration of research subjects with your faculty contract manager before proceeding.
• Please make sure when you carry out your research that you confirm contemporary COVID protocols with your faculty HSE advisor and that ongoing COVID risks and precautions are flagged in the informed consent, with particular attention to this where there are physically vulnerable (e.g., elderly or with underlying conditions) participants involved.
• Our default advice is not to publish transcripts or transcript summaries but to retain these privately for specific purposes/checking, and if they are to be made public, then only if fully anonymised and the transcript/summary itself approved by participants for a specific purpose.
• Where there are collaborating (including funding) partners, appropriate formal agreements, including clarity on responsibilities, including data ownership, responsibilities and access, should be in place, and relevant aspects of such agreements (such as access to raw or other data) are clear in the Informed Consent. Please update the ICF to communicate to the participants that transcripts will be shared for review.

Good luck with your research!

Sincerely,

Dr. C. Shelley-Egan
Chair HREC
Faculty of Technology, Policy and Management