

THE ARCHITECTURE OF CROSS-BORDER PAYMENTS: BLOCKCHAIN,  
GOVERNANCE FRICTIONS, AND HYBRID PAYMENT INTERMEDIATION

by

Paulo D. Manna, MSc

DISSERTATION

Presented to the Swiss School of Business and Management Geneva

In Partial Fulfillment

Of the Requirements

For the Degree

DOCTOR OF BUSINESS ADMINISTRATION

SWISS SCHOOL OF BUSINESS AND MANAGEMENT GENEVA

May, 2026

THE ARCHITECTURE OF CROSS-BORDER PAYMENTS: BLOCKCHAIN,  
GOVERNANCE FRICTIONS, AND HYBRID PAYMENT INTERMEDIATION

by

Paulo Daniel Manna

APPROVED BY



---

Dissertation chair

RECEIVED/APPROVED BY:



---

Admissions Director

### **Dedication**

In memory of my father, and to my mother, who always encouraged my love of learning. To my beloved wife and daughter, who so generously shared me with this research journey, almost always without complaint.

### **Acknowledgements**

I would like to express my sincere appreciation to all those who supported me throughout this doctoral journey.

My thanks go to my supervisor and to the academic team at SSBM for their time, guidance, and support during the development of this research.

I am also grateful to the professionals and experts who generously shared their time, experience, and insights through interviews and other research contributions. Their input was invaluable in helping to shape this dissertation and strengthen its practical relevance.

I would also like to acknowledge colleagues, peers, and all those who, directly or indirectly, offered encouragement, understanding, and constructive perspectives throughout this process.

Most importantly, I wish to express my deepest gratitude to my family: to my mother, who always encouraged me to learn and continue growing; to the memory of my father, whose influence remains part of who I am; and above all, to my beloved wife and daughter, for their patience, generosity, and loving support throughout this journey. Their understanding and sacrifice made this achievement possible.

### **Declaration on the Use of Generative AI Tools**

Generative AI tools were used in a limited and supportive capacity during the preparation of this dissertation, including language refinement, structural review, transcription support, and assistance in organising notes. All substantive analysis, interpretation, argument development, and final wording were reviewed and approved by the author, who remains fully responsible for the content of this work.

## **ABSTRACT**

### **THE ARCHITECTURE OF CROSS-BORDER PAYMENTS: BLOCKCHAIN, GOVERNANCE FRICTIONS, AND HYBRID PAYMENT INTERMEDIATION**

Paulo Daniel Manna  
2026

Dissertation Chair: Dr. Apostolos Dasilas  
DBA committee (Co-Chair): Dr. Milica Popovic Stijacic and Dr. Luka Lesko

Cross-border payments remain essential to global trade, remittances, and international business activity, yet they continue to exhibit persistent frictions in cost, speed, transparency, and operational predictability. While recent innovation has expanded the range of possible cross-border payment architectures, the central issue is no longer whether blockchain or other digital technologies can be applied to payments, but whether alternative architectures materially improve outcomes under real-world institutional, regulatory, and operational constraints.

This dissertation examines three architecture families: correspondent banking and incumbent upgrades, interlinked instant payment systems, and tokenised settlement arrangements. It adopts a pragmatic convergent mixed-methods design. The quantitative strand provides a descriptive public benchmark of architecture-relevant indicators using mixed-level public evidence—including corridor-level, scheme-level, network-level, and jurisdiction-level sources—across the core dimensions of cost, speed, transparency, and access. The qualitative strand combines four purposively selected semi-structured expert interviews, documentary and thematic analysis of a curated corpus of 45 public policy

and practitioner transcripts, and a single-round Delphi-informed structured expert elicitation exercise that produced 11 returned records overall, used to elicit and compare expert judgement rather than to generate consensus through multiple rounds.

The findings show that no single architecture provides a universal solution across all corridors and use cases. Architecture performance varies according to corridor conditions, infrastructure maturity, liquidity design, governance coordination, legal certainty, and institutional incentives. Interlinked instant payment models appear particularly strong in improving retail time-to-credit and local distribution in suitable contexts, while tokenised settlement arrangements show greater potential in use cases where reconciliation, programmability, and liquidity timing are more important. At the same time, the evidence does not support a simple disintermediation thesis. Rather, it suggests a re-specialisation of intermediary roles across liquidity provision, FX execution, compliance, orchestration, settlement access, and trust infrastructure.

The dissertation concludes that the most plausible future of cross-border payments is hybrid, layered, and functionally specialised rather than defined by the wholesale replacement of incumbent systems. It also develops the Hybrid-Complementary Multi-Layer Stack, an author-developed conceptual synthesis model showing how user-interface, distribution, tokenised-settlement, and governance layers are likely to coexist across corridors and use cases. Its main contribution is therefore to provide both a defensible, time-stamped comparative framework for evaluating cross-border payment architectures across performance, governance, and risk dimensions and a practitioner-oriented synthesis model of their likely coexistence.

## TABLE OF CONTENTS

|                                                                                        |    |
|----------------------------------------------------------------------------------------|----|
| CHAPTER I: INTRODUCTION.....                                                           | 1  |
| 1.1 Background and Persistent Frictions of Cross-Border Payments .....                 | 1  |
| 1.2 Academic and Practical Research Gap .....                                          | 2  |
| 1.3 Problem Statement .....                                                            | 3  |
| 1.4 Research Questions .....                                                           | 4  |
| 1.5 Scope and Delimitations .....                                                      | 4  |
| 1.6 Methodological Overview .....                                                      | 5  |
| 1.7 Contribution to Knowledge and Practice .....                                       | 6  |
| 1.8 Structure of the Dissertation .....                                                | 7  |
| CHAPTER II: REVIEW OF LITERATURE .....                                                 | 8  |
| 2.1 Introduction .....                                                                 | 8  |
| 2.2 Conceptual Definitions and Terminological Boundaries .....                         | 9  |
| 2.3 Economic Structure of Cross-Border Payment Architectures .....                     | 11 |
| 2.4 Governance, Standards, and Regulatory Coordination .....                           | 16 |
| 2.5 Risk, Resilience, and Systemic Implications .....                                  | 19 |
| 2.6 Comparative Synthesis of Architecture Families .....                               | 22 |
| 2.7 Research Gaps and Chapter Conclusion .....                                         | 24 |
| CHAPTER III: METHODOLOGY .....                                                         | 26 |
| 3.1 Introduction .....                                                                 | 26 |
| 3.2 Research Questions and Analytical Mapping .....                                    | 27 |
| 3.3 Research Design, Philosophical Positioning, and Justification .....                | 28 |
| 3.4 Quantitative Data Sources and Source Selection Logic .....                         | 30 |
| 3.5 Variable Operationalisation and Decision Rules .....                               | 32 |
| 3.6 Corridor Selection Strategy and Analytical Archetypes .....                        | 34 |
| 3.7 Quantitative Analytical Approach .....                                             | 35 |
| 3.8 Qualitative Evidence Base and Sampling Logic .....                                 | 36 |
| 3.9 Semi-Structured Expert Interviews .....                                            | 38 |
| 3.10 Single-Round Delphi-Informed Structured Expert Elicitation .....                  | 40 |
| 3.11 Documentary and Thematic Analysis .....                                           | 41 |
| 3.12 Integration Strategy and Meta-Inference .....                                     | 43 |
| 3.13 Quality Criteria: Validity, Reliability, Trustworthiness and<br>Integration ..... | 44 |
| 3.14 Limitations .....                                                                 | 46 |
| 3.15 Ethical Considerations .....                                                      | 47 |

|                                                                                                                                                                                                                                                                                                                                              |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 3.16 Conclusion .....                                                                                                                                                                                                                                                                                                                        | 48  |
| CHAPTER IV: QUANTITATIVE FINDINGS.....                                                                                                                                                                                                                                                                                                       | 50  |
| 4.1 Introduction.....                                                                                                                                                                                                                                                                                                                        | 50  |
| 4.2 Cost Findings from Public Remittance Benchmarks .....                                                                                                                                                                                                                                                                                    | 52  |
| 4.3 Speed Findings from Public Retail, Remittance, and Network<br>Evidence.....                                                                                                                                                                                                                                                              | 56  |
| 4.4 Transparency and Access Findings from Aggregate Monitoring<br>Evidence.....                                                                                                                                                                                                                                                              | 58  |
| 4.5 Illustrative Innovation Cases: US–Brazil and Hong Kong–China .....                                                                                                                                                                                                                                                                       | 59  |
| 4.6 Cross-Dimension Trade-Offs and Emerging Patterns .....                                                                                                                                                                                                                                                                                   | 60  |
| 4.7 Supplementary Public Risk Indicators.....                                                                                                                                                                                                                                                                                                | 62  |
| 4.8 Summary of Quantitative Findings .....                                                                                                                                                                                                                                                                                                   | 64  |
| 4.9 Conclusion .....                                                                                                                                                                                                                                                                                                                         | 67  |
| CHAPTER V: QUALITATIVE FINDINGS AND INTEGRATED DISCUSSION .....                                                                                                                                                                                                                                                                              | 69  |
| 5.1 Introduction and Evidence Base .....                                                                                                                                                                                                                                                                                                     | 69  |
| 5.2 Architectural Pragmatism and the Case for Hybridisation .....                                                                                                                                                                                                                                                                            | 72  |
| 5.3 Interoperability, Governance Coordination, and “Spaghetti Risk” .....                                                                                                                                                                                                                                                                    | 75  |
| 5.4 Liquidity, Prefunding, and the Re-specialisation of Intermediaries .....                                                                                                                                                                                                                                                                 | 77  |
| 5.5 Legal Finality, Operational Resilience, and Smart-Contract Risk.....                                                                                                                                                                                                                                                                     | 80  |
| 5.6 Integrated Discussion by Research Question.....                                                                                                                                                                                                                                                                                          | 82  |
| 5.7 Author-Developed Conceptual Synthesis Model: The Hybrid-<br>Complementary Multi-Layer Stack .....                                                                                                                                                                                                                                        | 85  |
| 5.8 Conclusion .....                                                                                                                                                                                                                                                                                                                         | 89  |
| This chapter also prepares the ground for Chapter VI. The dissertation can<br>now conclude, on evidential rather than speculative grounds, that the<br>future of cross-border payments is less about absolute technological<br>replacement and more about the disciplined redesign of coordination,<br>liquidity, governance, and trust..... |     |
| CHAPTER VI: SUMMARY, IMPLICATIONS, AND CONCLUSION.....                                                                                                                                                                                                                                                                                       | 90  |
| 6.1 Summary of the Study and Answers to the Research Questions .....                                                                                                                                                                                                                                                                         | 90  |
| 6.2 Theoretical, Managerial, and Policy Implications .....                                                                                                                                                                                                                                                                                   | 94  |
| 6.3 Recommendations for Future Research .....                                                                                                                                                                                                                                                                                                | 97  |
| 6.4 Conclusion .....                                                                                                                                                                                                                                                                                                                         | 100 |
| APPENDIX A INFORMED CONSENT / PARTICIPANT INFORMATION .....                                                                                                                                                                                                                                                                                  | 102 |
| APPENDIX B SEMI-STRUCTURED INTERVIEW GUIDE .....                                                                                                                                                                                                                                                                                             | 104 |

|                                                                                       |     |
|---------------------------------------------------------------------------------------|-----|
| APPENDIX C SINGLE-ROUND DELPHI-INFORMED STRUCTURED EXPERT ELICITATION INSTRUMENT..... | 107 |
| APPENDIX D. DOCUMENTARY CORPUS OF 45 PUBLIC TRANSCRIPTS .....                         | 110 |
| APPENDIX E. QUANTITATIVE KPI SOURCE MAP AND VARIABLE DEFINITIONS.....                 | 115 |
| APPENDIX F. SUPPLEMENTARY DELPHI / QUANTITATIVE TABLES .....                          | 123 |
| REFERENCES .....                                                                      | 131 |

## LIST OF TABLES

|                                                                                                                                            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Table 2.1. Comparative synthesis of cross-border payment architecture families .....                                                       | 22  |
| Table 3.1. Public quantitative evidence base and observation windows .....                                                                 | 31  |
| Table 4.1. Source map for the quantitative evidence base.....                                                                              | 51  |
| Table 4.1A. Measurement hierarchy and observability by dimension .....                                                                     | 51  |
| Table 4.2. Public cost benchmarks for cross-border payments (Q1 2025).....                                                                 | 54  |
| Table 4.2A. Additional RPW cost benchmarks by funding method, disbursement method, and transfer size (Q1 2025).....                        | 55  |
| Table 4.3. Supplementary public risk indicators .....                                                                                      | 63  |
| Table 4.4. Quantitative synthesis of architecture trade-offs across cost, speed, transparency, and access .....                            | 65  |
| Table 5.1. Qualitative evidence base and analytical role.....                                                                              | 69  |
| Table 5.2. Structured expert-elicitation panel profile .....                                                                               | 71  |
| Table 5.3. Delphi-informed expert-elicitation prioritisation and 2030 outlook.....                                                         | 73  |
| Table 5.4. Governance, barrier, and mitigation findings from the structured expert elicitation.....                                        | 76  |
| Table 5.5. Descriptive median architecture ratings from the structured expert elicitation (1–5 scale; usable n shown in parentheses) ..... | 81  |
| Table 5.6. Joint display of quantitative–qualitative integration by research question.....                                                 | 83  |
| Table D.1. Inclusion criteria for the documentary corpus .....                                                                             | 110 |

|                                                                                  |     |
|----------------------------------------------------------------------------------|-----|
| Source: Author’s documentary corpus selection criteria. ....                     | 111 |
| Table E.1. Quantitative evidence hierarchy by dimension .....                    | 115 |
| Table E.2. Core KPI operational definitions .....                                | 116 |
| Appendix F.1. Section A KPI weighting summary .....                              | 123 |
| Appendix F.2. Section B architecture selected as best / worst by criterion ..... | 123 |
| Appendix F.3. Section C descriptive median ratings.....                          | 124 |
| Appendix F.4. Section D material risks and mitigations .....                     | 124 |
| Appendix F.5. Section E outlook, adoption drivers, and barriers.....             | 125 |
| Appendix F.6. Selected FSB 2025 aggregate KPI context .....                      | 127 |
| Appendix F.7. Supplementary RPW configuration benchmarks (Q1 2025) .....         | 127 |
| Table F.8. Historical corridor screening and public data availability .....      | 128 |

### LIST OF FIGURES

|                                                                                                    |    |
|----------------------------------------------------------------------------------------------------|----|
| Figure 5.1. Author-developed hybrid-complementary multi-layer stack for cross-border payments..... | 86 |
|----------------------------------------------------------------------------------------------------|----|

## CHAPTER I: INTRODUCTION

### **1.1 Background and Persistent Frictions of Cross-Border Payments**

Cross-border payments underpin international trade, remittances, capital flows, and global business activity. Despite major improvements in domestic payment infrastructures, cross-border transactions remain more expensive, less transparent, and less predictable than many domestic payments because they typically require coordination across multiple institutions, currencies, legal regimes, compliance controls, and operating hours (CPMI, 2020; FSB, 2021).

Official monitoring under the G20 Roadmap reinforces the persistence of these frictions. In its 2025 consolidated progress report, the Financial Stability Board concluded that, although much of the policy agenda has advanced, end-user improvements at the global level remain limited and the 2027 targets are unlikely to be met globally on current trajectories (FSB, 2025). In parallel, the World Bank reported a global average remittance cost of 6.49 per cent in Q1 2025, still far above the United Nations Sustainable Development Goal benchmark of 3 per cent (World Bank, 2025).

Recent innovation has therefore broadened rather than converged around a single replacement model. One strand emphasises the interlinking of instant payment systems (IPS) to improve retail reach and time-to-credit. A second explores tokenised settlement using regulated forms of tokenised money, including tokenised commercial bank money and wholesale central bank money (BIS, 2025; BIS Innovation Hub, 2025). A third involves incumbent adaptation. In September 2025, Swift announced plans to add a blockchain-based shared ledger to its infrastructure, and in March 2026 it began rolling out a new retail payments framework focused on predictability, full-value delivery, traceability, and faster end-to-end outcomes (Swift, 2025; Swift, 2026).

This blurring of boundaries between “traditional rails” and “digital rails” is important. Swift reports that 75 per cent of payments over its network already reach destination banks within 10 minutes or less, yet major frictions remain in the front-end and final domestic leg of the payment journey (Swift, 2026). The central issue is therefore no longer whether one technology will simply replace another. Rather, it is how different architectures perform under real institutional constraints, and whether they substitute for, complement, or reconfigure existing payment networks and intermediary roles.

Against this background, this dissertation compares three broad architecture families: correspondent banking and incumbent upgrades, interlinked instant payment systems, and tokenised settlement arrangements. It evaluates them not as isolated technologies, but as governance-embedded coordination systems whose performance depends on legal, institutional, and liquidity conditions as much as on technical capability (North, 1990; Williamson, 1985).

## **1.2 Academic and Practical Research Gap**

A growing body of literature examines cross-border payments from several angles, including correspondent banking and financial intermediation, transaction cost economics, platform and network economics, payment system design, tokenisation, and financial stability (Kahn and Roberds, 2009; Catalini and Gans, 2020; Bindseil and Pantelopoulos, 2022). However, this literature remains fragmented. Policy reports tend to focus on headline outcomes such as cost or speed. Technical studies often focus on the capabilities of distributed ledger technology, smart contracts, or tokenised money. Governance and systemic-risk studies, by contrast, tend to focus on legal finality, compliance, resilience, concentration, and oversight (Kahn and Roberds, 2007; CPMI-IOSCO, 2012; Brummer, 2012).

As a result, like-for-like comparative benchmarking across architecture families remains limited. Publicly available evidence is uneven: cost and some speed data are more visible than liquidity usage, compliance burdens, operational resilience, or governance feasibility. In addition, debate around blockchain in cross-border payments is often polarised between technological optimism and systemic caution. This makes it difficult to distinguish between architectures that appear efficient in narrow pilots and those that are genuinely viable at scale across jurisdictions and use cases (Brummer, 2012; CPMI-IOSCO, 2012). What remains underdeveloped, however, is a single evaluative frame that compares architecture families across observable performance signals, governance feasibility, liquidity design, and systemic-risk implications under corridor-specific conditions. Existing studies usually privilege one of these dimensions rather than examining how they interact in practice (Brummer, 2012; Bindseil and Pantelopoulos, 2022).

This dissertation addresses that gap by integrating performance benchmarking with governance and risk analysis. It treats cross-border payment reform not simply as a technology adoption question, but as a problem of institutional coordination, incentive alignment, and risk allocation (North, 1990; Williamson, 1985). In doing so, it seeks to provide a more balanced and empirically grounded assessment of how blockchain-related and IPS-based innovations compare with incumbent arrangements.

### **1.3 Problem Statement**

The central problem motivating this research is not whether blockchain can be applied to cross-border payments. It is whether alternative architectures materially improve payment outcomes under real-world institutional, regulatory, and operational constraints.

Potential gains in speed, cost, transparency, or programmability may be offset by legal fragmentation, compliance burdens, liquidity requirements, operational

concentration, cyber vulnerabilities, or uncertainty regarding settlement finality (Kahn and Roberds, 2007; Brunnermeier and Pedersen, 2009; CPMI-IOSCO, 2012). An architecture that appears efficient in a pilot, or in a specific corridor, may therefore prove more difficult to scale across jurisdictions, currencies, or participant types.

The analytical challenge, then, is to assess cross-border payment architectures in a way that is both performance-sensitive and institutionally realistic. This requires a framework that evaluates observable outcomes together with governance feasibility and systemic resilience.

#### **1.4 Research Questions**

This dissertation addresses four research questions:

RQ1: How do alternative cross-border payment architectures compare in performance across cost, speed, transparency, and access dimensions?

RQ2: What governance, compliance, and systemic risk implications arise from each architecture family?

RQ3: To what extent do tokenised and IPS-based architectures reconfigure existing intermediation structures?

RQ4: Under which corridor and institutional conditions is each architecture more feasible or effective?

These questions are examined through a comparative framework developed in Chapter 2 and operationalised in Chapter 3.

#### **1.5 Scope and Delimitations**

The study compares three broad architecture families: (i) correspondent banking and incumbent upgrades, (ii) interlinked instant payment systems, and (iii) tokenised

settlement arrangements, including policy-relevant DLT-based models and regulated forms of tokenised money.

The analysis spans retail, SME, and corporate payment contexts. However, the quantitative benchmarking relies primarily on publicly available corridor-level and scheme-level data, which are more abundant in retail and remittance use cases. The study therefore uses retail-dominant KPI evidence as an observable anchor while using qualitative evidence to interpret broader institutional and wholesale implications.

The dissertation does not attempt a full legal comparison of every jurisdiction, nor does it empirically evaluate unregulated crypto-assets or decentralised stablecoin channels as a core architecture family. Such channels are acknowledged as empirically relevant in some remittance settings, particularly where access to mainstream infrastructures is weak, but they raise materially different questions of money quality, consumer protection, prudential treatment, and AML/CFT design that fall beyond the analytical boundaries of this study (Bains et al., 2022). It is therefore a time-stamped comparative study of institutionally anchored architecture families and selected corridor conditions rather than a prediction of a single universal end-state.

## **1.6 Methodological Overview**

Given the multidimensional nature of cross-border payment reform, this dissertation adopts a pragmatic convergent mixed-methods design (Morgan, 2007; Creswell and Plano Clark, 2018).

The quantitative strand assembles a descriptive public benchmark of architecture-relevant indicators using publicly available outcome data aligned, where possible, with the G20 Roadmap dimensions of cost, speed, transparency, and access. The qualitative strand comprises four purposively selected semi-structured expert interviews, documentary and thematic analysis of a curated corpus of 45 public policy and practitioner transcripts, and a

single-round Delphi-informed structured expert elicitation exercise that produced 11 returned records overall.

These qualitative components are designed for explanatory depth, triangulation, and structured expert judgement rather than statistical representativeness. The interview component is justified through purposive sampling and information power in a narrow expert field, while overall qualitative adequacy is strengthened through triangulation across the interviews, the transcript corpus, and the expert-elicitation panel (Patton, 2015; Malterud et al., 2016).

Because only one elicitation round was completed, the Delphi-informed exercise is used to elicit and compare expert judgement rather than to generate formal consensus through iteration. Integration occurs at the interpretation stage, allowing quantitative patterns to be read alongside expert, documentary, and elicited evidence in order to generate meta-inferences about feasibility, governance, and risk (Fetters et al., 2013). Given the modest panel size, findings are reported descriptively, with raw counts foregrounded and percentages used only with explicit denominators where helpful.

## **1.7 Contribution to Knowledge and Practice**

This dissertation makes five main contributions.

First, it develops an integrated framework for comparing cross-border payment architectures across performance, governance, and risk dimensions rather than treating them as purely technical alternatives.

Second, it provides a defensible, time-stamped comparative assessment of architecture-relevant trade-offs across architecture families and corridor archetypes using reproducible public evidence interpreted alongside triangulated qualitative analysis.

Third, it contributes to the debate on disintermediation by showing that the key issue is not simply whether banks or networks disappear, but how intermediary functions

may be redistributed across liquidity provision, compliance, orchestration, custody, and settlement roles.

Fourth, it offers practical relevance for banks, payment service providers, infrastructure operators, and policymakers by identifying where hybrid or complementary models appear more plausible than outright replacement.

Fifth, it develops an author-developed Hybrid-Complementary Multi-Layer Stack as a conceptual synthesis model of how cross-border payment architectures are likely to coexist in practice. The model integrates the dissertation's findings into a practitioner-oriented representation of how user-interface, distribution, tokenised-settlement, and governance layers may interact across different corridors and use cases.

## **1.8 Structure of the Dissertation**

Chapter 2 reviews the literature and develops the theoretical framework used to compare alternative architectures.

Chapter 3 explains the research design, data sources, sampling strategy, and analytical approach.

Chapter 4 presents the quantitative benchmarking results across the selected performance dimensions.

Chapter 5 analyses the qualitative evidence and integrates it with the quantitative findings to discuss governance, intermediation, and systemic-risk implications.

Chapter 6 summarises the findings, answers the research questions, outlines theoretical and managerial implications, and identifies directions for future research.

## CHAPTER II: REVIEW OF LITERATURE

### 2.1 Introduction

Chapter 1 established the policy and research context for this dissertation by showing that cross-border payments remain persistently constrained by cost, speed, transparency, and access frictions. The purpose of the present chapter is to develop the analytical foundation for comparing alternative cross-border payment architectures in a way that is theoretically coherent and empirically useful.

A central argument of this dissertation is that cross-border payments should not be treated merely as technical transfer mechanisms. They are better understood as coordination systems embedded in legal, institutional, and financial structures. For that reason, no single theory is sufficient. Transaction cost economics helps explain why different governance forms emerge and persist; financial intermediation theory explains why intermediary roles are resilient even under technological change; network and platform economics explain path dependence, standard-setting, and adoption barriers; diffusion of innovation theory helps explain why technically superior models may still diffuse slowly; and financial stability theory explains why efficiency gains may reallocate, rather than eliminate, risk (Williamson, 1985; Diamond, 1984; Rochet and Tirole, 2003; Rogers, 2003; Allen and Gale, 2000).

Accordingly, this chapter adopts a three-tier framework. The first tier examines the economic structure of cross-border payment architectures, focusing on coordination, intermediation, network effects, and liquidity design. The second tier addresses governance, standards, and regulatory coordination, since real-world feasibility depends on legal alignment, compliance rules, and institutional oversight. The third tier examines

risk, resilience, and systemic implications, since faster or cheaper architectures are not necessarily safer or more scalable.

Taken together, these perspectives are used not only as interpretive lenses but also as analytical expectations. Transaction cost and intermediation perspectives suggest that lower messaging frictions may coexist with persistent governance and liquidity costs, while network and diffusion perspectives suggest that technically promising alternatives may still scale slowly where compatibility, installed base, or regulatory trust remain limited (Williamson, 1985; Diamond, 1984; Katz and Shapiro, 1985; Rogers, 2003). Within this framework, transaction cost economics and financial intermediation theory provide the primary explanatory backbone for the dissertation because they speak most directly to coordination, governance choice, liquidity, and the persistence or redistribution of intermediary functions. Network, diffusion, and financial-stability perspectives operate as complementary lenses that clarify adoption dynamics, path dependence, and risk redistribution once those core coordination problems are in view.

## **2.2 Conceptual Definitions and Terminological Boundaries**

Cross-border payments involve the transfer of monetary value between parties located in different jurisdictions. In practice, this typically requires some combination of messaging, clearing, settlement, foreign exchange conversion, liquidity management, sanctions screening, and regulatory reporting across heterogeneous legal and institutional environments (CPMI, 2020; FSB, 2021). In this dissertation, cross-border payments are analysed as architecture-wide infrastructures, not merely as isolated transactions.

Correspondent banking refers to arrangements under which one financial institution provides payment and settlement services to another, commonly through bilateral relationships supported by nostro and vostro accounts (CPMI, 2016). It remains the baseline architecture for many international payments and is characterised by sequential

settlement, prefunded liquidity, and layered compliance responsibilities across multiple institutions.

An instant payment system (IPS) is a domestic payment infrastructure that enables near real-time credit transfers with high availability, typically on a 24/7 basis (CPMI, 2024). IPS interlinking refers to the technical and governance arrangements through which separate domestic systems are connected for cross-border use.

Tokenised settlement refers, in this dissertation, to institutionally anchored arrangements in which monetary value is represented and transferred using distributed ledger or similar shared-state infrastructures. This includes policy-relevant forms such as tokenised deposits, wholesale central bank money experiments, and other regulated token-based liabilities. It excludes unbacked crypto-assets or speculative tokens that fall outside mainstream regulated payment infrastructures (Bains et al., 2022; BIS, 2023; World Bank, 2024).

This category is analytically useful but internally heterogeneous. Tokenised deposits, wholesale central-bank-money experiments, and other regulated tokenised-liability arrangements are not identical institutional models and may differ materially in governance design, liquidity structure, access conditions, and legal-finality treatment (Bindseil and Pantelopoulos, 2022; BIS, 2025).

Blockchain or distributed ledger technology (DLT) refers to shared digital record-keeping systems maintained through distributed validation or synchronisation mechanisms. Economically, blockchain may be understood as a coordination mechanism that can reduce reconciliation and verification frictions by allowing participants to act on a common state rather than on multiple asynchronously updated ledgers (Narayanan et al., 2016; Catalini and Gans, 2020).

Smart contracts are programmable scripts that execute predefined logic on digital infrastructures. In payment settings, they are often discussed as tools for automation, conditional release of funds, and programmable settlement, but they also introduce governance, legal, and operational questions that are highly relevant to this study (Werbach and Cornell, 2017; Khan et al., 2021).

Two further concepts require clarification. Transparency refers both to user-facing transparency, such as visibility of fees, FX spreads, and payment status, and to operational or data transparency, such as completeness and traceability of information across the payment chain. Access refers both to institutional access, meaning who can participate in an infrastructure, and end-user reach, meaning how widely the infrastructure can be used in practice (CPMI, 2021).

These definitions matter because the dissertation compares architecture families, not isolated technologies or vendor products. The focus is therefore on structural features, governance logic, and performance implications.

## **2.3 Economic Structure of Cross-Border Payment Architectures**

### **2.3.1 Intermediation and Structural Persistence**

Financial intermediation theory provides an important corrective to simplistic claims that new technologies will eliminate intermediaries. Banks and related institutions do not persist merely because of legacy inertia; they persist because they perform economically valuable functions under conditions of uncertainty, asymmetric information, and fragmented trust. Delegated monitoring, liquidity transformation, and risk absorption remain relevant even when messaging and settlement technologies improve (Diamond, 1984; Gorton and Winton, 2003).

This is particularly visible in cross-border payments. Correspondent banking has historically performed more than a messaging role. It has also provided liquidity access,

credit intermediation, trust substitution, market knowledge, and compliance processing across jurisdictions. From this perspective, innovation is more likely to reconfigure intermediary functions than to eliminate them entirely. This view is consistent with literature arguing that relationship-based intermediation adapts under technological change rather than simply disappearing (Boot and Thakor, 2000; Scholtens and Van Wensveen, 2003).

For the present dissertation, this point is central to RQ3. The relevant analytical question is not whether banks, networks, or payment service providers disappear, but how their roles shift across settlement, orchestration, compliance, liquidity provision, custody, and governance.

### 2.3.2 Transaction Costs and Governance Choice

Transaction cost economics (TCE) explains why different governance structures emerge when coordination, enforcement, and information costs are high. In cross-border payments, these costs arise from fragmented legal regimes, heterogeneous standards, sanctions obligations, FX conversion, counterparty uncertainty, and the need to reconcile multiple institutional records (Coase, 1937; Williamson, 1985).

From a TCE perspective, correspondent banking may be understood as a hybrid governance solution. It is not fully centralised, but neither is it decentralised. It relies on repeated bilateral or networked relationships, contractual trust, and institutional reputation. IPS interlinking represents a more coordinated multilateral model, typically dependent on formal rulebooks, scheme governance, and agreed participation criteria. Tokenised settlement architectures, by contrast, are often presented as protocol-based or shared-state coordination models in which part of the governance logic is embedded in technical design.

However, claims of lower transaction cost must be treated carefully. A new architecture may reduce some operational frictions while creating others. Governance

migration, legal adaptation, technical conversion, and participant onboarding all carry costs. New infrastructures may also create forms of asset specificity and platform dependence, especially where adoption requires commitment to a particular consortium, ledger model, or standards stack (North, 1990; Masten, 1993). The relevant comparison is therefore not only between direct transaction fees, but between broader coordination costs across the whole architecture. Recent scholarship on digital finance and platformised banking also points to increasing modularity, in which APIs, specialised service providers, and ledger-based components are recombined across institutional boundaries rather than delivered through a single vertically integrated bank stack (Arner, Barberis and Buckley, 2017; Zetzsche, Arner and Buckley, 2020; Zachariadis and Ozcan, 2022). In cross-border settings, however, modularity does not remove governance costs; it relocates them into interface standards, liability allocation, data-sharing rules, and the legal enforceability of automated logic (Remolina, 2019; Werbach and Cornell, 2017; Aleinieh and Zoboli, 2021; Capocasale and Perboli, 2022).

### 2.3.3 Network Effects, Interoperability, and Diffusion

Cross-border payment systems also exhibit strong characteristics of network and platform economies. Their usefulness depends not only on internal efficiency but on how many relevant participants are connected, how compatible standards are, and how easily value and data can move across institutional boundaries (Rochet and Tirole, 2003; Armstrong, 2006). Network externalities help explain why large infrastructures can remain dominant even when newer technologies appear technically superior. Existing networks benefit from installed base, standardisation, trust, and switching cost advantages (Katz and Shapiro, 1985; Economides, 1996).

This helps explain the durability of incumbent infrastructures such as Swift. Incremental innovations such as improved tracking or richer data formats can enhance user

experience and operational visibility without fundamentally replacing the underlying architecture. They improve information quality, but do not necessarily remove sequential settlement, nostro/vostro dependency, or repeated compliance checks across the chain (Scott and Zachariadis, 2014; BIS, 2023; CPMI, 2024).

Diffusion of innovation theory adds a second layer to this analysis. In financial infrastructure, adoption depends not only on relative advantage, but also on compatibility, complexity, observability, and perceived implementation risk (Rogers, 2003). This is highly relevant to cross-border payments, where institutions are typically risk-averse, highly regulated, and deeply dependent on interoperability. A technically elegant solution may diffuse slowly if it requires major legal reform, changes in treasury operations, or new forms of governance. This insight helps explain why hybrid and incremental approaches often advance faster than purer “replacement” models. In tokenised and multi-ledger settings, moreover, interoperability itself can become a new adoption barrier: bridges and cross-chain connectors may expand reach, but they can also create only partial compatibility and additional governance complexity (Belchior et al., 2022).

Taken together, these literatures make hybrid outcomes theoretically plausible. Where installed-base advantages, interoperability costs, regulatory fragmentation, and heterogeneous user needs remain high, layering new distribution or settlement functions onto incumbent governance and access infrastructures should be expected to diffuse more readily than pure replacement models. Hybridisation is therefore not treated in this dissertation as a compromise slogan, but as a theoretically expected response to coordination-heavy payment environments.

#### 2.3.4 Settlement Design, Finality, and Liquidity Trade-Offs

Payment systems economics highlights the importance of trade-offs between settlement speed, finality, credit exposure, and liquidity demand. Real-time gross

settlement reduces settlement risk by settling individually, but it can increase liquidity needs. Deferred or multi-hop arrangements may economise on liquidity in some contexts, but they can increase delay, opacity, and exposure (McAndrews and Roberds, 1995; Kahn and Roberds, 2009).

This matters because many claims about cross-border innovation focus heavily on speed. Yet faster processing does not automatically remove liquidity constraints. Prefunding may still be required somewhere in the architecture; FX must still be sourced; and operational windows, access rules, and settlement asset design remain relevant. Tokenised atomic settlement may reduce timing mismatches and reconciliation frictions, but it does not abolish the economic need for liquidity or the institutional need for credible settlement assets (Bech and Garratt, 2017).

For this reason, settlement design must be analysed jointly with liquidity structure. In architectural terms, the question is not only how fast value can move, but under what conditions, with what funding model, and with what degree of finality. This is directly relevant to RQ1 and RQ4.

### 2.3.5 The Unified Ledger Concept

A prominent recent conceptual development in the policy literature on tokenised settlement is the BIS ‘unified ledger’ model set out in the Annual Economic Report 2025 (BIS, 2025). The BIS argues that tokenisation can support a next-generation monetary and financial system built around the combined use of tokenised central bank reserves, tokenised commercial bank money, and tokenised government bonds. In this framing, messaging, reconciliation, and settlement can be more tightly integrated, including through atomic execution under appropriate institutional governance. Importantly, the BIS contrasts this institutionally anchored model with private stablecoins, arguing that the latter do not meet the monetary-system requirements of singleness, elasticity, and integrity (BIS,

2025). For the purposes of this dissertation, the unified ledger is therefore treated not as an established market end-state, but as a conceptual benchmark for thinking about how tokenised architectures may compress coordination and settlement functions under regulated conditions.

## **2.4 Governance, Standards, and Regulatory Coordination**

### **2.4.1 Fragmented Authority and Soft-Law Coordination**

Cross-border payments operate in a governance environment that is fragmented by design. No single authority controls the global payment system. Instead, governance emerges through overlapping standards, contractual arrangements, domestic regulations, supervisory cooperation, and soft-law coordination among public and private actors (Abbott and Snidal, 2000; Brummer, 2012).

This means that technical feasibility does not guarantee institutional feasibility. An architecture may work in a pilot or in a controlled bilateral setting, but scaling across jurisdictions requires agreement on participation rules, liability, data standards, access rights, dispute resolution, and oversight responsibilities. Governance completion on paper does not automatically translate into implementation convergence in practice.

This point is particularly important for IPS interlinking and tokenised arrangements. Both depend heavily on coordination beyond national borders. Even where domestic infrastructures are robust, cross-border extension requires an additional layer of governance architecture.

### **2.4.2 AML/CFT, Sanctions, Data, and Identity Frameworks**

Compliance is not a peripheral matter in cross-border payments; it is a core architectural constraint. AML/CFT obligations, sanctions screening, travel-rule requirements, and identity verification influence both cost and speed. In legacy correspondent chains, screening may be duplicated across institutions, contributing to

friction and false positives. In more integrated architectures, richer and more structured data may improve traceability and screening quality, but they may also increase short-term implementation complexity (Erbenová et al., 2016; CPMI, 2020; FSB, 2021).

This creates an important tension. Greater transparency can improve payment integrity, but it can also increase data-handling burdens unless standards are sufficiently harmonised. From an analytical perspective, transparency must therefore be interpreted in two ways: as a user benefit and as a compliance input. That distinction is essential for RQ2, because architectures that appear more transparent to the end user may still face unresolved data-governance challenges behind the scenes.

#### 2.4.3 Bank and Non-Bank Regulatory Alignment

The literature also shows that regulatory asymmetries between banks and non-bank payment providers can shape market structure and payment efficiency. Non-bank PSPs often introduce innovation and user-centric design, but they may face different prudential, safeguarding, and access rules from those applied to banks. Conversely, banks may carry heavier regulatory burdens but possess stronger balance sheets, broader market access, and more direct links to settlement systems.

The contemporary financial landscape is also characterised by the unbundling of traditional banking into modular components delivered through application programming interfaces (APIs). Open banking and open finance can support competition, product innovation, and specialised service provision, but they also redistribute operational and compliance dependencies across banks, fintechs, data intermediaries, and platform providers (Zachariadis and Ozcan, 2022; Remolina, 2019; Remolina Leon, 2023).

This matters because the efficiency of a payment architecture depends partly on whether regulation is both credible and proportionate. Overly restrictive rules may reduce access and competition, while weak supervision may undermine trust and resilience. The

growth of digital finance therefore does not eliminate the need for regulation; it changes the problem toward one of adaptive and proportionate supervisory design (Arner et al., 2017; Zetsche, Arner and Buckley, 2020).

#### 2.4.4 Governance of IPS and Tokenised Systems

Governance challenges are especially visible in newer architectures. IPS interlinking requires agreement on scheme rules, operational responsibilities, participation criteria, hours of operation, FX handling, exception management, and dispute resolution. It is therefore not merely a technical connection between domestic rails, but a multilateral governance project (CPMI, 2024).

Tokenised systems raise additional governance questions. These include who validates transactions, who can issue or redeem value, how ledger changes are controlled, how identity and compliance logic are embedded, how errors are handled, and how liability is allocated between public and private actors. In this sense, tokenisation is not simply a technological proposition. It is a question of institutional design, rule-making, and accountability. The literature therefore suggests that governance quality is likely to be a decisive factor in determining whether apparent technical efficiency translates into sustainable real-world adoption.

While technical interoperability is often foregrounded in debates about interlinked instant payment systems and tokenised networks, the literature and policy practice suggest that rulebooks, liability allocation, and governance frameworks are equally decisive for scale. Interoperability at the messaging or ledger layer does not by itself resolve questions of admission, dispute resolution, exception handling, or legal finality. The Regulated Liability Network (RLN) is useful here not as evidence of settled market convergence, but as a policy-industry experiment in hybrid and programmable settlement design. The original RLN white paper framed the concept as a regulated financial market infrastructure

capable of integrating central bank money, commercial bank money, and e-money on a shared network, with possible future scope for regulated stablecoins. Subsequent UK and U.S. experimentation explored how deposit tokens and shared-ledger arrangements might support settlement under a common governance framework. In the context of this dissertation, RLN is therefore treated as an example of how tokenised settlement may preserve regulated intermediation while seeking greater interoperability and programmability, rather than as a case of outright disintermediation (Regulated Liability Network, 2022; UK Finance, 2024; Citigroup, 2023).

## **2.5 Risk, Resilience, and Systemic Implications**

### **2.5.1 Systemic Topology and Concentration Risk**

From a financial stability perspective, payment architectures should be evaluated not only on efficiency but on how they reshape network topology and contagion channels. Financial systems propagate shocks through patterns of interconnectedness, concentration, and dependency (Allen and Gale, 2000; Haldane, 2009).

Different architectures distribute these risks differently. Correspondent banking may diffuse activity across multiple institutions, but it can also conceal fragility in thin or poorly served corridors. IPS interlinking can improve operational speed, but it may increase reliance on a smaller set of scheme operators, gateways, or public infrastructures. Tokenised architectures may reduce some forms of reconciliation friction while concentrating operational dependence on a common ledger, validator set, or interoperability layer. In other words, efficiency gains may come with different patterns of concentration and failure.

### **2.5.2 Liquidity, Stablecoins, and Funding Risk**

Liquidity remains a fundamental constraint in all payment systems. Even architectures designed for real-time processing require access to credible settlement assets,

robust liquidity arrangements, and confidence in convertibility. The literature on liquidity stress therefore remains relevant even in tokenised contexts (Brunnermeier and Pedersen, 2009).

Stablecoins illustrate this clearly. Where reserve credibility is weak, design is opaque, or redemption mechanisms are uncertain, stablecoins may be vulnerable to run dynamics and funding stress. Their performance therefore depends heavily on reserve structure, governance, and legal claims, not merely on technical transfer speed (Klages-Mundt et al., 2020; Lyons and Viswanath-Natraj, 2023). More institutionally anchored forms of tokenised money may mitigate some of these concerns, but they do not eliminate the broader question of how liquidity is sourced, managed, and distributed across participants. Stablecoins are discussed here because the risk literature is analytically relevant to tokenised-payment debates more broadly. However, unregulated forms remain outside the empirical scope of the dissertation, which is limited to institutionally anchored and policy-relevant cross-border payment architectures.

For this dissertation, the implication is straightforward: liquidity efficiency gains must be assessed in risk-adjusted terms. A system that reduces prefunding in one location may create dependency, concentration, or funding sensitivity elsewhere.

### 2.5.3 Operational and Cyber Resilience

A further theme in the literature concerns operational resilience. Cross-border systems that operate continuously and at high speed expand the importance of cyber security, uptime, recovery arrangements, governance controls, and exception management. Smart contracts can automate processing, but they can also hard-code errors or create vulnerabilities that are difficult to reverse once deployed (Werbach and Cornell, 2017; Khan et al., 2021).

This suggests that operational resilience should not be treated as secondary to speed. Faster architectures may create tighter coupling between systems and narrower time windows for human intervention. Interoperability layers may also create additional failure points. For infrastructures of systemic importance, resilience requirements remain fundamental, as reflected in the Principles for Financial Market Infrastructures (CPMI-IOSCO, 2012).

#### 2.5.4 Legal Finality and Cross-Jurisdictional Enforceability

Legal finality is one of the most important, and often underappreciated, issues in the cross-border payment literature. In practical terms, the question is not only whether an architecture can execute a transaction, but whether that execution is legally final, enforceable, and robust under insolvency, dispute, and cross-border conflict-of-law conditions.

This issue is especially salient in tokenised or programmable environments. Automated execution may occur rapidly, but legal certainty still depends on how claims are recognised across jurisdictions and under what conditions transactions can or cannot be challenged. IPS interlinking faces related issues because domestic legal regimes may not treat settlement timing, reversibility, or participant liability in exactly the same way. Legal uncertainty therefore conditions both adoption and systemic safety (Bindseil and Pantelopoulos, 2022). In programmable environments, this implies that legal and technical design must be co-developed: standardisation of contractual logic, data models, and compliance interfaces can support interoperability, but cannot substitute for clear jurisdictional recognition of claims and finality (Werbach and Cornell, 2017; Aleinieh and Zoboli, 2021; Capocasale and Perboli, 2022).

The broader implication is that architectural choice cannot be judged solely by technical design. Legal infrastructure remains part of payment infrastructure.

## 2.6 Comparative Synthesis of Architecture Families

The literature reviewed above suggests that the main architecture families differ not only in technical design, but in economic logic, governance burden, and risk profile.

Table 2.1 provides a stylised comparative synthesis of the main cross-border payment architecture families discussed in the literature. Its purpose is not to rank them empirically, but to summarise their typical economic logic, governance burden, liquidity implications, and risk profile in a form that supports the analytical framework used in the remainder of the dissertation.

*Table 2.1. Comparative synthesis of cross-border payment architecture families*

| <b>Dimension</b>                        | <b>Correspondent banking and incumbent upgrades</b>                                                           | <b>Interlinked instant payment systems (IPS)</b>                                                    | <b>Tokenised settlement arrangements</b>                                                             |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Primary coordinating logic</b>       | Bilateral or networked intermediation through established correspondent relationships and messaging standards | Multilateral linkage of domestic real-time / instant payment infrastructures                        | Shared-state or token-based coordination across participating institutions                           |
| <b>Main performance strength</b>        | Global reach, institutional familiarity, and legal embeddedness                                               | Faster retail distribution and improved beneficiary-side availability where domestic IPS are mature | Potential gains in programmability, reconciliation, and liquidity coordination in selected use cases |
| <b>What it does not solve by itself</b> | Delay, opacity, repeated compliance checks, and trapped liquidity may persist                                 | Global multilateral coordination, FX design, and universal reach remain difficult                   | Access, legal certainty, convertibility, and governance still require strong institutional design    |
| <b>Governance requirement</b>           | Contractual trust, messaging standards, and long-established                                                  | Rulebooks, participation standards, cross-border                                                    | Clear issuance/redemption rules, identity and compliance design,                                     |

|                                                           |                                                                            |                                                                                                |                                                                                                                                       |
|-----------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
|                                                           | institutional relationships                                                | agreements, and operational alignment                                                          | legal wrapper, and node/governance arrangements                                                                                       |
| <b>Liquidity / settlement logic</b>                       | Nostro/vostro balances and prefunding remain important                     | Faster message and credit transfer, but liquidity and FX arrangements still matter             | May reduce reconciliation frictions and support new liquidity structures, but still depends on credible settlement assets             |
| <b>Main risk or vulnerability</b>                         | Opaqueness, manual repair, cut-off dependence, and sequential processing   | Coordination failure, limited reach across jurisdictions, and dependence on gateway governance | Smart-contract, bridge, concentration, legal-finality, and interoperability risks                                                     |
| <b>Typical role of intermediaries</b>                     | Central across settlement, compliance, FX, and access                      | Banks and PSPs remain important for access, compliance, distribution, and liquidity            | Intermediary functions are redistributed rather than eliminated, especially in issuance, custody, compliance, and liquidity provision |
| <b>Best-fit contexts</b>                                  | Heterogeneous global corridors requiring broad reach and legal familiarity | Retail corridors with strong domestic schemes and clear beneficiary-side infrastructure        | Selected wholesale, institutional, or liquidity-sensitive settings where programmability or settlement compression matter             |
| <b>Potential complementarity with other architectures</b> | Provides reach, standards, and coordination utility                        | Strengthens last-mile distribution and retail payment delivery                                 | Supports wholesale settlement, liquidity management, and programmable transfer logic                                                  |

Source: Author's synthesis based on the literature reviewed in Sections 2.2–2.5

Table 2.1 indicates that no architecture is uniformly superior across all dimensions. Correspondent and incumbent models retain advantages in reach, familiarity, and legal embeddedness; IPS interlinking appears strongest in retail distribution where domestic infrastructures are already robust; and tokenised settlement arrangements appear most

promising where liquidity coordination, reconciliation, or programmability are especially important. This comparative synthesis supports the dissertation's central proposition that cross-border payment reform is better analysed as an architecture choice under performance, governance, and risk constraints than as a binary contest between legacy systems and blockchain-based alternatives.

## **2.7 Research Gaps and Chapter Conclusion**

Four gaps emerge from the literature.

First, much of the literature remains segmented. Studies often focus on either technical efficiency, policy reform, or systemic risk, but rarely integrate these perspectives within a single architecture-wide framework.

Second, available evidence is uneven across dimensions. Cost and some speed indicators are more visible than governance feasibility, compliance burden, operational resilience, and liquidity structure. This creates a risk of over-weighting what is easy to observe.

Third, the literature often frames the future of cross-border payments in overly binary terms: legacy versus blockchain, incumbent versus disruptor, centralised versus decentralised. Yet the literature reviewed here suggests that a more useful question concerns functional reconfiguration rather than simple replacement.

Fourth, corridor context remains underdeveloped in much of the debate. Architecture performance is likely to vary by currency pair, regulatory environment, market depth, and local infrastructure quality, but many claims are still made at an overly general level.

The unresolved gap is therefore not simply a shortage of technical studies or policy commentary, but the absence of a single evaluative frame that compares architecture

families across observable performance signals, governance feasibility, and risk under corridor-specific conditions.

This dissertation addresses these gaps by adopting an integrated framework across economic structure, governance, and risk/resilience, and by combining observable KPI benchmarking with structured qualitative evidence in later chapters. The literature therefore supports the central proposition of this study: cross-border payment architectures should be assessed not only by whether they are faster or cheaper, but by whether they are institutionally feasible, operationally resilient, and scalable under real-world conditions.

The next chapter explains how this framework is operationalized through the dissertation's mixed-methods research design.

## CHAPTER III: METHODOLOGY

### 3.1 Introduction

This chapter explains and justifies the research design used to evaluate alternative cross-border payment architectures. The study is comparative and evaluative rather than experimental: it asks how architecture families perform across observable dimensions and how those performance patterns interact with governance, legal, liquidity, and risk considerations. Because the object of inquiry is a complex socio-technical system rather than a single intervention, the methodological task is to assemble evidence that is sufficiently rigorous, comparable, and context-sensitive to support defensible doctoral-level inference.

The research questions span both measurable outcomes and institutionally embedded processes. RQ1 focuses on observable performance across cost, speed, transparency, and access. RQ2-RQ4 require interpretation of governance quality, compliance burden, systemic-risk implications, and the reconfiguration of intermediation. No single method can adequately address both sets of questions in a field where some data are public and quantifiable while other material is dispersed across expert practice, policy documents, and scheme disclosures (Creswell and Plano Clark, 2018).

Accordingly, the dissertation adopts a pragmatic mixed-methods design. Pragmatism is appropriate because the research problem is applied, policy-relevant, and methodologically plural: methods are selected for their fitness to the question and for the quality of the inferences they can support, rather than to satisfy a single epistemological orthodoxy (Morgan, 2007; Creswell and Plano Clark, 2018). The aim is not universal causal proof, but a transparent and well-grounded comparative assessment.

The chapter proceeds from design logic to data, sampling, analysis, integration, quality criteria, limitations, and ethics. Throughout, emphasis is placed on the alignment between the research questions, the unit of analysis, the available evidence, and the scope of the claims ultimately made.

### **3.2 Research Questions and Analytical Mapping**

The dissertation is organised around four research questions:

RQ1: How do alternative cross-border payment architectures compare in performance across cost, speed, transparency, and access dimensions?

RQ2: What governance, compliance, and systemic-risk implications arise from each architecture family?

RQ3: To what extent do tokenised and IPS-based architectures reconfigure existing intermediation structures?

RQ4: Under which corridor and institutional conditions is each architecture more feasible or effective?

These questions are mapped onto the three-tier framework developed in Chapter 2: economic structure, governance/coordination, and risk/resilience. RQ1 aligns most directly with the economic-structure tier because it concerns observable outcomes and settlement/liquidity trade-offs. RQ2 aligns most directly with the governance tier because it concerns rulebooks, compliance, oversight, liability, and legal feasibility. RQ3 and RQ4 traverse all three tiers because intermediation and corridor fit depend on how performance, governance, and risk interact.

The primary unit of analysis is the cross-border payment architecture family as instantiated in corridor-specific or scheme-specific settings. Stated differently, the dissertation does not treat individual firms or isolated transactions as the main analytical unit. It evaluates architecture families through publicly observable corridor benchmarks,

infrastructure schemes, policy initiatives, and expert accounts of operational practice. This distinction is important because the thesis compares institutional configurations rather than testing a single provider-level effect.

This mapping also imposes an analytical discipline. It prevents the study from privileging what is easiest to count over what is most important to explain. For example, cost data are more widely available than legal-finality data; yet the latter remain essential to answering RQ2 and RQ4. The mixed-methods design therefore follows the structure of the research problem rather than the convenience of any single dataset.

### **3.3 Research Design, Philosophical Positioning, and Justification**

This dissertation uses a convergent mixed-methods design with integration at the interpretation stage (Creswell and Plano Clark, 2018). The quantitative and qualitative strands address the same overarching problem from different vantage points: one benchmarks observable outcomes, while the other explains why those outcomes arise, where they are constrained, and how far they can plausibly travel across jurisdictions and use cases. The design is therefore complementary rather than redundant.

The two strands are therefore asymmetrical in what they contribute. The quantitative strand provides observable performance signals and a bounded public benchmark, whereas the qualitative strand provides the explanatory and institutional interpretation required to assess governance feasibility, corridor fit, and intermediary reconfiguration.

The choice of a convergent design is methodologically significant. A sequential design would imply that one strand is preliminary to the other. That is not the logic here. Public performance data and expert or documentary evidence each carry independent evidential value, but neither is sufficient on its own. Quantitative indicators can show that an architecture appears fast or cheap; they cannot by themselves explain whether those

outcomes depend on unusual corridor conditions, fragile governance arrangements, or unobserved liquidity costs. Qualitative evidence helps supply that interpretive depth.

The study comprises three linked sources of qualitative evidence in addition to the quantitative benchmark:

- (i) semi-structured expert interviews;
- (ii) documentary and thematic analysis of a curated corpus of 45 public policy and practitioner transcripts; and
- (iii) a single-round Delphi-informed structured expert elicitation exercise.

This design is justified for three reasons. First, public cross-border payment data are incomplete and non-equivalent across architectures. Second, the research questions require explanation of institutional dynamics that are not well captured in standardised KPI datasets. Third, the dissertation seeks not only description, but comparative evaluation of feasibility, risk, and intermediary reconfiguration in an applied field characterised by rapid innovation and uneven disclosure.

Methodologically, the design aims to produce stronger meta-inferences through triangulation and complementarity. Convergence across strands increases confidence in the final interpretation, while divergence is treated as analytically informative rather than as methodological failure. In a field marked by competing narratives, disagreement may reveal architecture-specific boundary conditions, unresolved governance issues, or the difference between pilot-stage promise and scalable deployment.

The design is also deliberately conservative in its claims. It does not attempt to infer treatment effects, estimate market-wide causal impacts, or generalise statistically from a small expert sample. Its purpose is to develop a defensible comparative judgement about architecture trade-offs under real institutional conditions.

### 3.4 Quantitative Data Sources and Source Selection Logic

The quantitative strand relies on publicly accessible secondary data relevant to cross-border payment performance. These sources include international policy monitoring documents, corridor-level remittance cost datasets, infrastructure or scheme disclosures, and official institutional reports containing measurable indicators related to cost, speed, transparency, access, and selected risk variables. The purpose of this strand is not to create an exhaustive market database, but to construct a reproducible public benchmark from the most credible comparable evidence available.

Source selection followed five criteria: authority, traceability, recency, relevance to one or more research questions, and a minimum level of comparability across architecture families. Official and institutional sources were privileged over vendor marketing claims or unsupported media commentary. Where a provider claim was analytically useful, it was treated cautiously and only retained when it could be interpreted alongside public monitoring or corroborating documentary material.

The principal rationale for using public data is reproducibility. A doctoral comparative study in this field cannot depend on confidential bank- or scheme-level datasets that external readers cannot inspect. Public sources make it possible to audit the evidence trail, revisit the benchmark as newer data appear, and distinguish clearly between what is observed directly and what is inferred at the interpretation stage.

At the same time, public data introduce important constraints. Different sources report different units of observation, reporting frequencies, and performance definitions. Some disclose corridor-level prices; others disclose network-level transit times or broad access metrics. These data were therefore treated as structured but heterogeneous evidence, requiring careful analytical separation rather than mechanical aggregation.

#### 3.4.1 Data Parameters and Timeframes

Given this public-data strategy, the main observation window for the benchmark runs from 2022 to early 2026, with the core benchmark anchored in the World Bank’s Q1 2025 Remittance Prices Worldwide release and supplemented by official scheme, policy, and regulatory evidence where later or complementary data were available. This window is long enough to capture multi-year patterns, yet recent enough to reflect the rapidly changing state of payment architecture reform.

*Table 3.1. Public quantitative evidence base and observation windows*

| <b>Dimension</b>    | <b>Primary source(s)</b>                                              | <b>Observation window</b>                      | <b>Analytical use</b>                                         |
|---------------------|-----------------------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------|
| <b>Cost</b>         | World Bank, Remittance Prices Worldwide                               | Q1 2025, anchored in the RPW historical series | Primary corridor-comparable KPI                               |
| <b>Speed</b>        | FSB (2025); Swift (2026)                                              | 2025–2026                                      | Aggregate context plus network-transit evidence               |
| <b>Transparency</b> | FSB (2025); selected scheme/infrastructure disclosures                | 2025–2026                                      | Aggregate monitoring and architecture-characteristic evidence |
| <b>Access</b>       | FSB (2025); selected scheme/infrastructure evidence                   | 2025–2026                                      | Aggregate reach and participation evidence                    |
| <b>Fraud / risk</b> | EBA and ECB (2025); Central Bank of Ireland (2025); UK Finance (2025) | 2022–2024                                      | Supplementary public risk lens                                |

Source: Author’s synthesis of the public quantitative evidence base used in Chapter 4

Note: Corridor-level comparability is strongest for cost. Speed is observed partly through aggregate end-user availability measures and partly through network-transit evidence. Transparency and access are more unevenly observed and therefore rely more heavily on aggregate monitoring, scheme-level, network-level, or jurisdiction-level

evidence. Fraud / risk indicators are treated as a supplementary public risk lens rather than as a fully comparable fifth KPI. This asymmetry is methodologically important and is addressed explicitly in the analytical strategy rather than obscured through false standardisation.

For that reason, the quantitative strand distinguishes between direct indicators and proxy indicators. Cost is treated as a primary direct KPI at corridor level, whereas speed, transparency, and access are often interpreted through a combination of direct measures and architecture-relevant proxies. The study makes these distinctions explicit in Chapter 4 so that readers can see where evidence is strong, where it is partial, and where qualitative interpretation becomes especially important.

### **3.5 Variable Operationalisation and Decision Rules**

The quantitative benchmark is organised around four core dimensions: cost, speed, transparency, and access. These dimensions were selected because they align with the G20 Roadmap framing and because they are the most widely recognised outcome categories in both policy and industry debates. However, each dimension had to be operationalised carefully because cross-border payment data do not use fully uniform definitions across sources.

Cost refers primarily to the end-user or corridor-level price of sending value across borders, including explicit transfer fees and, where visible, exchange-rate spread effects. In addition, the study recognises that some economically important costs, such as prefunding, treasury management, and compliance overhead, are often hidden from user-facing price data. Those deeper cost components are therefore treated qualitatively rather than forced into an incomplete quantitative proxy.

Speed is operationalised as elapsed payment time, but with an important distinction between stages of the payment journey: interbank transit, settlement completion, and

beneficiary funds availability. These stages are not analytically equivalent. For example, a scheme disclosure that a payment reaches the beneficiary bank within minutes is not necessarily evidence that the end user can access final funds within the same time period. The benchmark therefore compares speed claims only at like stages, and where stages differ, it treats the difference as substantively meaningful rather than as measurement noise (Kahn and Roberds, 2007).

Transparency refers to the degree to which the payment journey is visible and predictable. In practice, this includes clarity on fees, FX conversion, payment status, timing, and the completeness of payment data across the chain. Because direct corridor-level transparency measures are scarce, this dimension often relies on a combination of direct evidence and architecture characteristics, such as tracking functionality, rulebook discipline, or the use of richer structured data.

Access is operationalised in two senses: institutional access and practical end-user reach. Institutional access concerns which actors can participate in or connect to the relevant infrastructure; end-user reach concerns whether customers can actually use the service in the relevant corridor with reasonable continuity and payout certainty. This distinction matters because an architecture may be technically open to multiple institutions while remaining narrow in consumer or merchant reach.

These four dimensions structure the quantitative benchmark, but they do not exhaust the analysis. Liquidity structure, legal finality, governance burden, compliance frictions, and operational resilience are treated as architecture characteristics that shape interpretation across all four dimensions. This decision avoids an artificial scoring model in which weakly observed variables would be given the appearance of precision they do not in fact possess.

A useful methodological example is speed: when one source reports payment arrival at the beneficiary bank and another reports customer funds availability, the study does not average or normalise these into a single number. Instead, it retains the distinction and interprets it as evidence about where along the architecture chain friction persists. This example illustrates the broader decision rule used throughout the chapter: preserve conceptual meaning even when that reduces numerical neatness.

### **3.6 Corridor Selection Strategy and Analytical Archetypes**

Because cross-border payment performance varies materially across corridor types, the study uses purposive rather than representative corridor selection. The objective is not to estimate a global average effect of one architecture, but to compare how architecture families behave under meaningfully different institutional and market conditions. Purposive selection is appropriate where the researcher seeks information-rich cases that illuminate contrast, mechanism, and boundary conditions (Patton, 2015).

The first filter was data availability. Recent, publicly accessible, and reasonably comparable observations had to exist within the study's main observation window. This criterion was essential because the quantitative strand prioritises transparency and reproducibility over speculative inference. Corridors that were substantively interesting but poorly evidenced were not allowed to dominate the benchmark.

The second filter was analytical contrast. Retained corridors had to reflect materially different payment environments in terms of remittance intensity, infrastructure maturity, reliance on correspondent banking or cash-based distribution, digital or wallet penetration, and exposure to stronger local-rail or instant-payment arrangements. In methodological terms, the corridor set functions as a set of analytical archetypes rather than a statistically representative sample.

This distinction is important. The selected corridors are used to show how architecture performance changes with context. For example, a corridor with strong digital origination and payout infrastructure may reveal very different cost and speed dynamics from a corridor still dependent on cash-out networks, bank dominance, or fragmented domestic settlement capacity. The value of the comparison lies in the contrast, not in the claim that the selected corridors mirror the global population of corridors.

Corridor selection also interacts with the study's broader unit of analysis. The purpose is not to write miniature case studies of each corridor, but to use corridors as observation points through which architecture families can be compared under different institutional conditions. This is directly relevant to RQ4, which is concerned with feasibility and effectiveness under varying corridor and governance environments.

### **3.7 Quantitative Analytical Approach**

The quantitative strand uses descriptive comparative analysis rather than inferential statistics. Data were organised by architecture family and, where relevant, by corridor, scheme, or use-case context. The analysis then compared patterns across the four core dimensions and examined trade-offs rather than attempting to attribute outcomes to a single causal variable.

This approach is appropriate for three reasons. First, the available public data do not support a robust quasi-experimental or causal design across heterogeneous infrastructures. Second, the study compares institutional arrangements that differ in legal form, access rules, liquidity design, and reporting practices; they are not standardised treatments. Third, the dissertation's purpose is evaluative and explanatory: it seeks to judge comparative architecture performance under real institutional conditions, not to estimate a universal average treatment effect.

Analytically, the benchmark proceeds through structured comparison. Source data were extracted into architecture-by-dimension matrices, compared within and across corridors, and interpreted conservatively where definitions differed. Any synthetic comparison table or summary visual is therefore illustrative rather than determinative; the principal empirical claims remain dimension-by-dimension comparisons grounded in the underlying evidence.

Where indicators were non-equivalent, the study used conceptual harmonisation rather than numerical harmonisation. For example, metrics describing interbank transit speed were compared with other interbank transit measures, whereas claims about beneficiary availability or end-user receipt were treated as a different stage of performance. This prevents the creation of spurious precision while preserving analytically meaningful differences.

The quantitative analysis also retained negative evidence. If a dimension could not be observed with reasonable consistency for a given architecture family, that gap was not silently filled by assumption. Instead, the asymmetry of observability was documented and later incorporated into the integrated discussion. This is particularly important in cross-border payments, where opacity itself can be a substantive finding.

### **3.8 Qualitative Evidence Base and Sampling Logic**

The qualitative strand brings together multiple forms of expert, documentary, and elicited evidence to examine aspects of cross-border payment reform that are not consistently visible in public KPI datasets. In this dissertation, qualitative evidence is not a secondary anecdotal add-on to the quantitative strand. It is a necessary source of explanatory depth on governance feasibility, compliance architecture, liquidity practice, institutional incentives, and the redistribution of risk.

Selection across the qualitative strand was purposive and guided by relevance to the research questions rather than by statistical representativeness (Patton, 2015). The evidence base comprises four semi-structured expert interviews, a curated corpus of 45 public policy and practitioner transcripts, and a single-round Delphi-informed structured expert elicitation exercise that produced 11 returned records overall. These materials were chosen because they offered information-rich views from different vantage points across infrastructure, policy, operations, regulation, and market practice.

Sample adequacy is defended differently across the qualitative components. For the semi-structured interviews, the logic of information power is used in preference to a simple numerical sufficiency logic because the study aim is relatively narrow, participants were highly specific to the field, the interview guide was theory-informed, and the objective was explanatory depth rather than numerical representativeness (Malterud et al., 2016). No claim is made that the interview component alone exhausts the full range of possible field perspectives. Rather, adequacy at study level is strengthened through triangulation with the curated transcript corpus and the expert-elicitation panel. For the structured expert elicitation component, adequacy rests on purposive expert relevance, heterogeneity of institutional perspective, and the bounded use of the instrument for disciplined comparison of expert judgement rather than consensus measurement. For the curated transcript corpus, adequacy lies in breadth across institutional and practitioner positions, allowing recurring governance, liquidity, and interoperability issues to be identified across a wider public record.

Sampling also sought heterogeneity of perspective. A mixed corpus that includes private-sector practitioners, public policy sources, and structured expert judgement is methodologically valuable because it reduces the risk that one institutional narrative will dominate the interpretation. In a field as contested as cross-border payments, this form of

triangulated perspective is often more informative than a larger but more homogeneous sample.

Across the qualitative strand, the analytic logic was both deductive and inductive. Deductively, the coding frame drew on the dissertation's four research questions and the three-tier framework developed in Chapter 2. Inductively, the analysis remained open to emergent themes and practitioner language, such as hybridisation, orchestration problems, 'spaghetti risk', last-mile bottlenecks, or the re-specialisation of intermediaries (Braun and Clarke, 2006; Miles et al., 2014).

### **3.9 Semi-Structured Expert Interviews**

The interview component comprised four semi-structured expert interviews designed to capture practitioner perspectives on the operational, institutional, and strategic implications of different cross-border payment architectures. Participants were selected purposively for direct relevance to infrastructure, operational, or strategic questions raised by the research questions. The interview guide was aligned explicitly to the research questions and covered payment frictions, correspondent banking, IPS interlinking, tokenised settlement, liquidity and prefunding, governance barriers, legal finality, and plausible future configurations. This ensured that each interview generated evidence relevant to the comparative framework rather than broad but weakly focused industry commentary. Although the interview guide in Appendix B asked participants to rank cost, speed, transparency/traceability, and reliability/availability, the Delphi-informed structured expert-elicitation instrument in Appendix C used the analytically expanded categories of cost, speed, transparency and traceability, risk and compliance, and liquidity and PvP. This was deliberate: reliability/availability in the interview strand was interpreted analytically alongside operational resilience, risk/compliance, and liquidity/settlement design in order to support more architecture-sensitive comparison across use cases.

A semi-structured format was selected because it offers both comparability and depth. It allows a common line of inquiry across participants while preserving flexibility to probe architecture-specific examples, disagreements, and implementation details that may not emerge in a rigidly standardised instrument (Patton, 2015). This is particularly important in technically complex, fast-moving markets where expert insight often lies in nuance, conditionality, and exceptions rather than in uniform responses.

Interviews were conducted either synchronously or asynchronously via Qualtrics using the same semi-structured guide; asynchronous participants submitted recorded audio or video responses, which were transcribed and lightly cleaned for readability before analysis.

The interview material was analysed thematically. Initial familiarisation was followed by coding against the dissertation's core constructs and by comparison across respondents to identify recurring themes, deviant views, and boundary conditions. The analytical emphasis was not on frequency counting alone, but on explanatory significance: for instance, whether respondents independently returned to the same issues of liquidity, interoperability governance, or legal certainty when discussing ostensibly different architectures (Braun and Clarke, 2006).

The interviews therefore serve an interpretive rather than representative function. Their value lies in clarifying causal narratives, surfacing implementation constraints, and providing concrete operational examples that help explain why similar headline performance claims may translate very differently across corridors or institutional settings. Four interviews were conducted; three yielded sufficiently complete material for thematic coding, and two of those three are used as anchor cases for visible quotation. Where direct quotations are reproduced in Chapter 5, they are drawn selectively from the most

analytically rich and sufficiently anonymisable interviews; quotation density is therefore not intended as a proxy for analytical weight.

The interview component is not presented as a standalone saturation-based study. Its analytic value lies in providing information-rich depth and explanatory leverage within a broader triangulated qualitative design that also includes the curated transcript corpus and the structured expert-elicitation exercise.

### **3.10 Single-Round Delphi-Informed Structured Expert Elicitation**

The final qualitative component is a single-round Delphi-informed structured expert elicitation exercise. In classical form, Delphi research involves multiple rounds, controlled feedback, iterative revision, and an explicit attempt to clarify convergence or stabilise disagreement over time (Linstone and Turoff, 1975; Hsu and Sandford, 2007). In this dissertation, only one structured round was completed. The exercise therefore draws on Delphi logic in instrument design and expert selection, but it is not presented as a classical iterative Delphi.

Terminological precision is therefore essential. The study does not claim iterative consensus formation. Instead, the exercise is used to elicit and compare expert judgement in a disciplined way, making stronger and weaker areas of alignment visible across knowledgeable respondents. Although the instrument was administered through a structured questionnaire, it was not a separate exploratory survey; the questionnaire constituted the single round of the expert-elicitation exercise itself.

The panel comprised 11 purposively selected experts drawn from payments, financial infrastructure, regulation, digital assets, and adjacent policy domains. In the raw Qualtrics export, nine returned records were flagged by the platform as finished, while two additional returned records were not platform-marked as finished but nevertheless contained substantive answers to the closed-ended analytical items. The analysis therefore

retained answered-item data on an item-by-item basis rather than excluding records solely on the basis of the platform's finished flag. Usable denominators consequently vary by item. Most Section A, B, D, and E closed-ended items have 10–11 usable responses, while Section C architecture-rating cells vary more widely because some panellists left particular architecture/outcome combinations blank where they did not feel they had sufficient evidence. In Delphi-type work, there is no universally agreed panel-size threshold divorced from research purpose; adequacy depends on the relevance of expertise, the heterogeneity and clarity of panel definition, and the fit between instrument design and the claims ultimately made (Hsu and Sandford, 2007). In the present study, adequacy is therefore judged by relevance of expertise, heterogeneity of perspective, and fit with the exercise's bounded interpretive purpose rather than by any assumption that a larger panel would automatically yield better knowledge. Responses were analysed descriptively using measures of central tendency and dispersion, with raw counts presented first and percentages reported only with explicit denominators where helpful. In analytical terms, lower-dispersion responses indicate areas of stronger alignment, whereas higher-dispersion responses indicate contested issues, unresolved uncertainty, or genuine heterogeneity of expert judgement.

This distinction matters because overclaiming consensus would weaken, not strengthen, the methodology. The Delphi-informed structured expert elicitation exercise is valuable precisely because it makes structured disagreement visible. In a rapidly evolving field, divergence on issues such as the scalability of IPS interlinking or the feasibility of tokenised settlement can be as informative as agreement. It therefore operates as a bridge between narrative evidence and comparative judgement while remaining methodologically honest about the limits of a single-round design.

### **3.11 Documentary and Thematic Analysis**

The documentary component is based on a curated corpus of 45 public policy and practitioner transcripts, including public speeches, panel discussions, recorded interviews, and institutional presentations that speak directly to architecture design, interoperability, compliance, liquidity, and risk. These transcript materials were selected because they preserve actor language and reasoning in a form that can be coded comparatively across institutions and viewpoints. Selection prioritised direct relevance to the dissertation's architecture questions, identifiable institutional or practitioner provenance, public accessibility, and sufficient substantive discussion of interoperability, governance, liquidity, settlement, or risk to support meaningful coding. This provides a clearer audit trail for why these 45 transcripts were treated as information-rich documentary evidence rather than as a residual collection of public commentary.

These materials were analysed thematically using a coding process informed by Braun and Clarke (2006). The analysis moved from familiarisation to initial coding, theme development, review, refinement, and reporting. Documentary sources were not treated as neutral facts in the same way as audited KPI datasets; rather, they were read as situated institutional accounts that illuminate how actors define problems, justify design choices, and perceive barriers to scale.

Methodologically, this distinction is important. A public speech by an infrastructure operator, for example, may not prove realised performance, but it can still be highly valuable for identifying the governance logic, implementation priorities, or coordination challenges that shape architecture choice. Documentary analysis therefore contributes both substantive evidence and interpretive context.

The thematic analysis used both framework-informed and emergent coding. Deductive codes reflected the dissertation's main constructs - performance, governance, intermediation, corridor fit, and risk - while emergent codes captured practitioner language

and unexpected patterns. This dual strategy improves analytical discipline without forcing the evidence into a rigid pre-existing template (Braun and Clarke, 2006; Miles et al., 2014). Because the coding was undertaken by a single researcher, no formal inter-coder reliability statistic was calculated. Dependability was instead strengthened through iterative recoding, repeated comparison across interviews and transcripts, explicit retention of contradictory material, and movement back and forth between framework-informed and emergent codes (Lincoln and Guba, 1985; Miles et al., 2014).

### **3.12 Integration Strategy and Meta-Inference**

Integration occurs at the interpretation stage through convergent analysis and explicit comparison across evidence types (Creswell and Plano Clark, 2018; Fetter et al., 2013). The quantitative and qualitative strands are first analysed within their own logic, after which they are brought together to generate higher-order conclusions about architecture performance, governance feasibility, and risk. The purpose of integration is not merely to place two sets of findings side by side, but to produce stronger meta-inferences than either strand could support independently.

This approach is necessary because some relevant findings are directly observable while others are institutionally embedded. A corridor may appear fast on a scheme metric, for example, yet interview and documentary evidence may show that beneficiary-side crediting, compliance repair, or domestic operating windows still slow the end-user experience. Conversely, an architecture that appears governance-heavy may still be attractive in selected use cases because it improves programmability, reconciliation, or liquidity timing.

The integrated analysis therefore examines three relationships between strands:

(i) convergence, where quantitative and qualitative evidence point in the same direction;

(ii) complementarity or qualification, where one strand explains or narrows the meaning of the other; and

(iii) dissonance, where the strands point to unresolved tension, contested interpretation, or architecture performance that appears context-dependent rather than uniform.

In practical terms, the study used a joint-display logic, even where not all integrations are presented as formal tables in the final manuscript. Findings were compared question by question and theme by theme so that observable performance patterns could be read alongside explanatory evidence on governance, liquidity, legal certainty, and intermediary roles. This integration process is central to the dissertation's final argument that cross-border payment reform is best understood as an architecture-choice problem rather than a single-metric race.

### **3.13 Quality Criteria: Validity, Reliability, Trustworthiness and Integration**

Because the dissertation combines different forms of evidence, methodological quality must be assessed at three levels: the quantitative strand, the qualitative strand, and the integrated mixed-methods argument as a whole. The relevant question is not whether each strand satisfies identical criteria, but whether each is rigorous within its own logic and whether the combined interpretation is transparent, credible, and proportionate to the evidence.

For the quantitative strand, credibility is supported through transparent source selection, reproducible public data, explicit variable definitions, conservative handling of non-equivalent measures, and clear separation between direct observation and interpretive inference. Reliability, in this context, lies less in repeated measurement by the researcher than in the traceability of the data and the consistency of the decision rules used to compare heterogeneous indicators.

For the qualitative strand, the study draws on the classic criteria of credibility, dependability, confirmability, and transferability (Lincoln and Guba, 1985). Credibility is strengthened through triangulation across semi-structured expert interviews, documentary material, and the Delphi-informed structured expert elicitation exercise. Dependability is strengthened by making the analytical logic explicit. Confirmability is supported by grounding claims in multiple evidence types rather than in isolated anecdotes. Transferability is approached cautiously by specifying the corridor, governance, and institutional conditions under which findings appear more or less plausible.

For the Delphi-informed structured expert elicitation component specifically, methodological integrity depends on transparent labelling. Because only one round was completed, the exercise is not presented as a consensus-building Delphi. Its credibility instead derives from structured prompts, purposive expert selection, descriptive analysis of agreement and dispersion, explicit item-level denominators where response counts vary, and triangulation with the wider evidence base.

At the level of the integrated argument, the key quality criterion is the plausibility of the meta-inference. A strong mixed-methods conclusion is one in which the strands either converge or qualify one another in a way that is theoretically coherent and empirically transparent. Where the strands diverge, the dissertation reports that divergence openly rather than collapsing it into an artificial conclusion (Fetters et al., 2013).

Reflexive discipline is also important. In an applied field shaped by strong industry narratives and rapid innovation cycles, there is a risk of over-weighting vivid claims, pilot successes, or technologically elegant propositions. The research design counters this risk by privileging triangulation, public traceability, and careful distinction between demonstrated performance and projected scalability.

### 3.14 Limitations

This dissertation has several methodological limitations, which should be read as boundaries on inference rather than as defects that nullify the study.

Relatedly, the quantitative strand relies on mixed-level public indicators—corridor-level, scheme-level, network-level, and jurisdiction-level—which illuminate architecture-relevant performance but do not constitute a controlled, architecture-isolated measurement design.

First, public quantitative data on cross-border payments remain incomplete and uneven. Cost and selected speed measures are substantially more visible than liquidity usage, repair rates, exception handling, legal certainty, operational resilience, or compliance error rates. This limits the degree of direct like-for-like comparison across architectures.

Second, the corridor analysis is purposive rather than statistically representative. The selected corridors and illustrative cases are used as analytical archetypes, not as a basis for population inference. The study therefore supports reasoned analytical generalisation rather than statistical generalisation.

Third, the qualitative evidence base is intentionally small and expert-oriented. Semi-structured expert interviews, documentary analysis, and Delphi-informed structured expert elicitation evidence provide informed insight, but they do not represent the views of the full population of market participants. In particular, institutional actors with strong public voices may be more visible in the documentary record than smaller providers or end users.

Fourth, the Delphi-informed structured expert elicitation component consists of one round only. It should therefore be interpreted as structured expert elicitation and descriptive

prioritisation, not as a multi-round consensus-building Delphi. This limitation is explicitly incorporated into the terminology and claims used throughout the dissertation.

Fifth, the field itself is evolving rapidly. Cross-border payment infrastructures, policy frameworks, and commercial initiatives continue to change, meaning that the dissertation should be read as a time-stamped comparative assessment rather than as a final statement on a settled industry end-state.

Finally, the heterogeneity of the evidence base means that some conclusions are necessarily stronger than others. The study can speak more confidently about broad comparative patterns and recurring governance constraints than about precise numerical differences across all architectures and corridors. Being explicit about that unevenness is part of the methodological integrity of the thesis.

### **3.15 Ethical Considerations**

The study was conducted with appropriate attention to research ethics. Interview and Delphi-informed structured expert elicitation participation was voluntary and informed, and care was taken to avoid unnecessary disclosure of commercially sensitive or institutionally identifying information. Where appropriate, reporting was kept at role level or thematic level rather than at a level that would allow easy deduction of individual identities. Interview quotations are reported under fully anonymised participant labels and lightly cleaned for readability without altering substantive meaning.

Ethical care is especially important in expert research. In small professional communities, even when names are withheld, combinations of role, geography, or specialism can make participants identifiable. The dissertation therefore treats deductive disclosure as a real risk and prioritises analytical reporting over descriptive biographical detail.

The study also distinguishes between private and public-source ethics. Public speeches, panels, transcripts, and other openly available materials do not require the same consent procedures as primary interviews; however, they still demand careful contextualisation and accurate representation. Documentary materials are therefore cited and interpreted in a way consistent with normal academic standards of fair use, attribution, and non-distortive analysis.

A further ethical consideration concerns researcher judgement in a commercially and politically sensitive field. Because claims about payment architecture can intersect with institutional interests, strategic narratives, and regulatory positioning, the dissertation seeks to minimise advocacy bias by using cross-source triangulation and by reporting counter-evidence or disagreement where it materially affects the interpretation.

### **3.16 Conclusion**

This chapter has set out the methodological logic of the dissertation and justified the study's pragmatic convergent mixed-methods design. The quantitative strand provides a reproducible public benchmark across cost, speed, transparency, and access, while the qualitative strand explains how governance, legal, liquidity, and intermediation dynamics shape the meaning of those observed outcomes.

Methodologically, the chapter has also clarified the status of the qualitative components. Semi-structured expert interviews provide depth, the curated documentary corpus provides broader triangulation and visible disagreement, and the single-round Delphi-informed structured expert elicitation exercise provides disciplined expert comparison rather than classical consensus generation. This terminological precision is important to the credibility of the dissertation's later claims.

The next chapter presents the quantitative findings. Chapter 5 then integrates those findings with the qualitative evidence to produce the dissertation's comparative judgement

on hybridisation, governance frictions, intermediary reconfiguration, and corridor-specific fit.

## CHAPTER IV: QUANTITATIVE FINDINGS

### 4.1 Introduction

This chapter presents the quantitative findings of the dissertation. Consistent with the methodological approach set out in Chapter 3, the purpose here is descriptive and comparative rather than causal. The chapter benchmarks observable cross-border payment outcomes across the core dimensions of cost, speed, transparency, and access, using publicly available corridor-level, scheme-level, network-level, and jurisdiction-level evidence. These dimensions are aligned, where possible, with the G20 Roadmap monitoring framework, which continues to assess cross-border payment outcomes primarily through those four KPI families (FSB, 2025).

The chapter does not attempt to produce a single universal ranking of all payment architectures. That would be artificial, given differences in corridor characteristics, user segments, data quality, and architecture design. Instead, the findings are presented as comparative patterns and trade-offs across architecture families and corridor contexts. This is especially important because public data are richer for some dimensions than for others. Cost and parts of speed are more visible than liquidity usage, legal certainty, operational resilience, exception handling, or governance burden. The FSB's 2025 consolidated progress report reinforces this point: while some progress has been made, satisfactory global improvements are unlikely to be achieved in line with the 2027 timetable (FSB, 2025).

For that reason, the quantitative material is organised in three layers. First, direct corridor-comparable KPI evidence, strongest for cost and selected remittance-speed measures. Second, scheme-, network-, or infrastructure-level operational evidence, especially for interbank transit, transparency functionality, and reachability. Third,

contextual public risk evidence, used not as a fifth harmonised KPI but as a supplementary lens on whether visible performance improvements coexist with new vulnerabilities. This distinction is methodologically important because the best available public evidence is not uniform in level, timing, or definition.

*Table 4.1. Source map for the quantitative evidence base*

| <b>Dimension / context</b>           | <b>Primary source(s)</b>                                              | <b>Data time window</b> | <b>Analytical role</b>                                        |
|--------------------------------------|-----------------------------------------------------------------------|-------------------------|---------------------------------------------------------------|
| <b>Cost</b>                          | World Remittance Bank, Prices Worldwide (Issue 53)                    | Q1 2025                 | Direct retail/remittance benchmark                            |
| <b>Speed</b>                         | FSB (2025); Swift (2026)                                              | 2025–2026               | Aggregate speed context plus network-transit evidence         |
| <b>Transparency</b>                  | FSB (2025); selected scheme/infrastructure disclosures                | 2025–2026               | Aggregate monitoring and architecture-characteristic evidence |
| <b>Access</b>                        | FSB (2025); selected scheme/infrastructure evidence                   | 2025–2026               | Aggregate reach and participation evidence                    |
| <b>Fraud / risk</b>                  | EBA and ECB (2025); Central Bank of Ireland (2025); UK Finance (2025) | 2022–2024               | Supplementary public risk lens                                |
| <b>Illustrative innovation cases</b> | Banco Central do Brasil (2025); Verifone (2025); BIS (2024)           | 2024–2025               | Supplementary cases, not core benchmark                       |

Source: Author’s synthesis based on the public sources used in Chapter 4

*Table 4.1A. Measurement hierarchy and observability by dimension*

| <b>Dimension</b>                   | <b>Strongest public evidence</b> | <b>Level of observation</b> | <b>Direct or proxy</b>       | <b>KPI</b> | <b>Role in Chapter 4</b> |
|------------------------------------|----------------------------------|-----------------------------|------------------------------|------------|--------------------------|
| <b>Cost</b>                        | World RPW Bank                   | Corridor / provider-level   | Direct                       | Direct KPI | Core benchmark           |
| <b>Speed (retail / remittance)</b> | FSB (2025)                       | Service-level aggregate     | Direct but architecture-pure | KPI, not   | Core benchmark           |

|                                |                                                                       |                              |                      |                                   |
|--------------------------------|-----------------------------------------------------------------------|------------------------------|----------------------|-----------------------------------|
| <b>Speed (network transit)</b> | Swift (2026)                                                          | Network-level                | Operational evidence | Qualification of speed discussion |
| <b>Transparency</b>            | FSB (2025) plus scheme disclosures                                    | Service jurisdiction-level   | Partial KPI / proxy  | Secondary benchmark               |
| <b>Access</b>                  | FSB (2025) plus infrastructure evidence                               | Jurisdiction / service-level | Partial KPI / proxy  | Secondary benchmark               |
| <b>Fraud / risk</b>            | EBA and ECB (2025); Central Bank of Ireland (2025); UK Finance (2025) | Jurisdiction / region-level  | Contextual indicator | Supplementary lens                |

Source: Author's methodological synthesis based on the quantitative evidence strategy described in Chapter 3 and applied in Chapter 4

Table 4.1 and Table 4.1A together make a central methodological point: the chapter does not rely on one uniform class of evidence. Cost is the most directly observable corridor-level KPI. Speed is partly observable through end-user availability measures and partly through network-transit evidence. Transparency and access are only partially observable and often rely on aggregate monitoring or architecture-characteristic proxies. Fraud and risk data are used as contextual public indicators rather than as a fully comparable fifth KPI. This is why the quantitative chapter is descriptive and comparative, and why its findings are interpreted alongside the qualitative evidence in Chapter 5.

## 4.2 Cost Findings from Public Remittance Benchmarks

Cost remains one of the clearest and most policy-salient weaknesses of cross-border payments. The World Bank's *Remittance Prices Worldwide* (RPW) Q1 2025 data show that the global average cost of sending USD 200 stood at 6.49 per cent, while the global average for digital remittances was 4.85 per cent. The same release shows that the digital-only MTO index was 3.55 per cent, the international MTO index was 5.91 per cent, the

global weighted average was 4.92 per cent, and banks remained the most expensive provider category at 14.55 per cent (World Bank, 2025).

These benchmarks are important because they show that the cross-border payment cost problem remains structurally unresolved at system level. Even though some digitally oriented providers now approach the long-standing 3 per cent policy target, the global average remains materially above it. This suggests that system-wide frictions have not been eliminated and that cost improvements remain uneven across provider types, corridor conditions, and delivery models.

However, the analytical status of these data must be stated clearly. The World Bank data observe provider categories and funding/disbursement configurations, not architecture families in a one-to-one sense. They therefore function as architecture-relevant public evidence rather than as direct proof that one architecture alone causes lower cost. Their value lies in showing which payment-chain configurations are consistently associated with lower or higher user-facing prices.

The same RPW release also shows that payment configuration matters materially. In Q1 2025, mobile-money funding was the cheapest observed funding method at 3.63 per cent, followed by cards at 4.68 per cent, whereas bank-account funding averaged 8.81 per cent. On the disbursement side, debit-card payout averaged 3.44 per cent, cash payout 5.70 per cent, bank-account payout regardless of originating bank 7.99 per cent, and payout to an account within the same bank or partner bank 13.46 per cent. Transfer size also matters: the global average cost of sending USD 500 was 4.26 per cent, materially lower than the 6.49 per cent global average for USD 200 (World Bank, 2025).

From the perspective of architecture comparison, the cost evidence suggests three broad patterns. First, legacy correspondent and incumbent models continue to impose cost frictions through multi-institution processing, repeated compliance checks, FX spreads,

and, in some corridors, limited competitive pressure. This interpretation is consistent with the correspondent-banking literature, which treats such arrangements as strategically valuable for reach and institutional coverage but structurally exposed to contracting, coordination, and relationship-management costs (Naughton and Chan, 1998). It is also consistent with work showing that blockchain-remittance narratives have frequently centred on trapped liquidity, idle capital, and interoperability problems rather than on simple technological substitution (Rella, 2019).

Second, digital and more directly connected payment models tend to show lower user-facing prices where they compress the number of intermediated steps or simplify origination and payout. The digital-only MTO index is especially significant in this regard. While it should not be interpreted as proof that one architecture alone causes lower cost, it strongly suggests that compressed origination structures, lower physical-distribution overhead, and more streamlined payout models are closely associated with lower end-user pricing.

Third, lower visible transaction pricing does not necessarily mean lower total economic cost. Some architectures shift cost away from explicit fees toward infrastructure investment, liquidity design, compliance integration, governance coordination, or customer-acquisition expenditure. Cost should therefore not be interpreted solely as a user-fee variable. It is also a reflection of how the payment chain is organised and where frictions are absorbed.

*Table 4.2. Public cost benchmarks for cross-border payments (Q1 2025)*

| <b>Public benchmark</b>                       | <b>Q1 2025 value</b> | <b>What it indicates</b>                                             | <b>Analytical implication</b>           |
|-----------------------------------------------|----------------------|----------------------------------------------------------------------|-----------------------------------------|
| <b>Global average cost of sending USD 200</b> | 6.49%                | Overall system-wide retail/remittance benchmark remains above target | Structural frictions remain significant |

|                                               |                 |        |                                                                                      |                                                                           |
|-----------------------------------------------|-----------------|--------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <b>Global average for digital remittances</b> |                 | 4.85%  | Digital channels are cheaper on average than the full market                         | Digitisation improves outcomes, but does not by itself solve the problem  |
| <b>Digital-only index</b>                     | <b>MTO</b>      | 3.55%  | Digitally native remittance providers come closest to the 3% target                  | Origination and distribution compression matter materially                |
| <b>International index</b>                    | <b>MTO</b>      | 5.91%  | Large international MTOs outperform the full market average, but remain above target | Specialist non-bank models reduce some frictions without eliminating them |
| <b>Global average</b>                         | <b>weighted</b> | 4.92%  | Large-flow corridors are cheaper than the simple global average                      | Corridor economics and market depth matter                                |
| <b>Banks average</b>                          |                 | 14.55% | Banks remain the costliest provider category                                         | Institutional familiarity and reach can come with a pricing penalty       |

Source: Author's synthesis based on World Bank, Remittance Prices Worldwide, Issue 53, Q1 2025

*Table 4.2A. Additional RPW cost benchmarks by funding method, disbursement method, and transfer size (Q1 2025)*

| <b>Public benchmark</b>          | <b>Q1 2025 value</b> | <b>What it indicates</b>                    | <b>Analytical implication</b>                                            |
|----------------------------------|----------------------|---------------------------------------------|--------------------------------------------------------------------------|
| <b>Mobile-money funding</b>      | 3.63%                | Cheapest observed funding method            | Origination design matters materially                                    |
| <b>Debit/credit-card funding</b> | 4.68%                | Mid-range funding cost                      | Card-based origination can compress front-end friction                   |
| <b>Bank-account funding</b>      | 8.81%                | Highest-cost mainstream funding method      | Account-based origination can remain friction-heavy                      |
| <b>Debit-card disbursement</b>   | 3.44%                | Cheapest observed payout method             | Payout design materially affects end-user cost                           |
| <b>Cash disbursement</b>         | 5.70%                | Still cheaper than many bank-account routes | Cash-out remains relevant in some corridors despite operational friction |

|                                                             |        |                                                    |                                                                   |
|-------------------------------------------------------------|--------|----------------------------------------------------|-------------------------------------------------------------------|
| <b>Bank-account disbursement (any bank)</b>                 | 7.99%  | Higher-cost payout channel                         | Bank payout does not guarantee cost efficiency                    |
| <b>Bank-account disbursement (same bank / partner bank)</b> | 13.46% | Highest observed payout benchmark in this category | Institutional proximity does not necessarily reduce end-user cost |
| <b>Global average cost of sending USD 500</b>               | 4.26%  | Larger transfer sizes face lower percentage costs  | Retail/remittance benchmarks are amount-sensitive                 |

Source: Author's synthesis based on World Bank, Remittance Prices Worldwide, Issue 53, Q1 2025

These public benchmarks do not eliminate corridor variation, but they provide a safer and more reproducible basis for comparison than bilateral corridor tables whose values cannot always be directly traced to stable public observations. They also support the dissertation's wider argument that cost outcomes are shaped not only by technology labels, but by origination design, payout structure, transfer size, and the degree of intermediation embedded in the payment chain.

#### 4.3 Speed Findings from Public Retail, Remittance, and Network Evidence

Speed is often the most visible performance claim in cross-border payment reform. It is also one of the most politically salient outcome dimensions because faster end-to-end payments are tangible to users and frequently cited by infrastructure providers and policymakers alike.

Official aggregate monitoring indicates that speed improvements are real, but uneven. In its 2025 consolidated progress report, the FSB reported that only 35.4 per cent of retail cross-border payment services credited recipients within one hour of initiation and 67.3 per cent within one business day. For remittances, 54.4 per cent of services made funds available within one hour. For wholesale cross-border payments, 54.6 per cent were credited within one hour of payment initiation (FSB, 2025). These figures indicate that

rapid end-user or institution-level availability is no longer rare, but remains far from universal.

Network-reported evidence must be interpreted separately. In March 2026, Swift reported that 75 per cent of payments over its network reached destination banks within 10 minutes or less, which it presented as ahead of the G20 target (Swift, 2026). However, that metric measures arrival at the beneficiary bank, not legally final crediting of the end-user. It is therefore an indicator of interbank transit performance rather than a direct measure of beneficiary funds availability. This distinction matters analytically: fast transmission between institutions is not identical to fast end-user availability, and fast transfer is not the same as legally final and economically complete settlement (Kahn and Roberds, 2007).

The two sources are not directly equivalent, but together they show why speed must be analysed by stage. Some incumbent infrastructures have improved materially in message transmission and interbank predictability, yet aggregate public metrics show that end-user availability remains uneven. By contrast, IPS-linked models are attractive precisely because they are designed around faster domestic beneficiary availability and continuous operating windows. Their comparative strength is therefore clearest where the final domestic leg matters most and where domestic instant-payment infrastructures are already robust (CPMI, 2024).

At the same time, the evidence cautions against equating speed with full system efficiency. Faster messaging, or even faster settlement, does not remove the need for FX sourcing, sanctions screening, liquidity provision, exception handling, and beneficiary-side processing. In corridor terms, some routes benefit more from architecture upgrades than others. Speed gains appear strongest where domestic infrastructures are already strong and where institutional coordination is sufficient to minimise cross-border handoff friction.

They appear less decisive where local infrastructure, governance, or payout arrangements remain weak.

The overall pattern is therefore not that one architecture simply wins on speed in all conditions. Rather, IPS-linked and more integrated models appear especially promising for time-to-credit in suitable corridors, while incumbent models have improved materially in interbank transit performance without fully removing final-leg friction. Speed in cross-border payments is therefore architecture-dependent, but also stage-dependent.

#### **4.4 Transparency and Access Findings from Aggregate Monitoring Evidence**

Transparency and access are often less visible than cost and speed in public debate, yet they are central to the quality of cross-border payment services. Payments can become faster without becoming easier to understand, easier to trace, or easier to use. These dimensions are also less consistently observed at corridor level than cost and therefore require greater reliance on aggregate monitoring, scheme disclosures, and interpretive comparison.

The FSB's 2025 monitoring indicates that access to cross-border payment services remains broadly stable overall. Its retail access indicators reported that 90.4 per cent of MSMEs had a transaction account at a regulated financial institution, while the share of adults aged 15 and above with such an account was 78.7 per cent (FSB, 2025). On transparency, the FSB reported more visible improvement: the share of payment services providing both cost and speed information rose to 62.9 per cent in 2025, up from 55.6 per cent in 2024 (FSB, 2025).

These indicators are useful, but they are not pure architecture-family KPIs. Account ownership is an access precondition rather than a direct measure of usable cross-border reach, while disclosure of cost and speed information is narrower than full transparency over total fees, FX spreads, status tracking, repair, or exception handling. For that reason,

transparency and access are treated here as partially observed dimensions that require cautious interpretation rather than as corridor-pure benchmarks.

Even with that caution, the pattern is analytically useful. Architectures with clearer rulebooks, stronger data standardisation, and simpler end-to-end chains are more likely to improve predictability and status visibility, while architectures with wider domestic connectivity or broader institutional admission are better placed to expand practical reach. This is consistent with the literature on cooperative network governance and platform-based financial infrastructures, which stresses that interoperability and participation depend not only on technical connectivity but also on common standards, admission rules, and incentives for adoption (Scott and Zachariadis, 2014; Zachariadis and Ozcan, 2022).

A key implication is that transparency and access do not necessarily move together. An architecture may improve visibility for existing users without materially expanding participation, or it may broaden technical reach without offering full fee and status clarity. For that reason, these dimensions are best interpreted as related but distinct secondary comparative categories whose main value lies in revealing how architecture design interacts with governance discipline and infrastructure maturity.

#### **4.5 Illustrative Innovation Cases: US–Brazil and Hong Kong–China**

The following two cases are not part of the core public benchmark set used in Sections 4.2–4.4. They are included as supplementary innovation cases to illustrate how two reform trajectories—IPS-linked retail distribution and tokenised wholesale settlement—are moving from conceptual possibility toward operational deployment. Because the cases differ in metric type, maturity, and institutional setting, they are not used to create additional KPI scores or to alter the chapter’s comparative benchmark tables.

The US–Brazil case is included as an illustrative example of IPS-linked retail extension. Pix, launched by the Central Bank of Brazil in 2020, had achieved mass

domestic adoption and very large annual transaction volumes by 2024 (Banco Central do Brasil, 2025). In July 2025, Verifone and PagBrasil announced a U.S. in-store payment arrangement enabling Brazilian shoppers to pay U.S. merchants in Brazilian reais using Pix with real-time currency conversion at the point of sale (Verifone, 2025). This should not be interpreted as evidence that Pix has become a general-purpose public cross-border rail. Rather, it illustrates a pragmatic internationalisation path in which a highly successful domestic instant-payment system is extended through merchant-acquiring, FX-conversion, and acceptance partnerships to reduce user-facing friction in a specific corridor context.

The Hong Kong–China case illustrates the institutional reality of tokenised cross-border settlement more clearly than the retail-remittance benchmarks discussed earlier in the chapter. Project mBridge, a multi-CBDC platform built on distributed ledger technology, reached the minimum viable product stage in June 2024. The BIS stated that more central banks and commercial banks could join the platform through the MVP legal framework and perform real transactions on it, while the platform remained supported by a bespoke governance and rulebook structure (BIS, 2024). This makes the case analytically valuable not because it proves a settled end-state, but because it shows that tokenised cross-border settlement is institutionally feasible under tightly governed conditions. At the same time, the case highlights the substantial governance, legal, and geopolitical coordination required to sustain a multi-sovereign ledger environment. It should therefore be interpreted as an illustrative innovation case showing both the promise and the institutional complexity of tokenised cross-border infrastructure.

#### **4.6 Cross-Dimension Trade-Offs and Emerging Patterns**

When the quantitative findings are considered together, five cross-dimension patterns emerge. Because these patterns cut across architecture families as well as performance dimensions, Section 4.8 consolidates them in a cross-architecture comparison

matrix. The matrix is intended to make visible the trade-offs that otherwise remain distributed across the cost, speed, transparency, and access discussions, while the supplementary risk lens in Section 4.7 qualifies how those performance gains should be interpreted.

First, cost and speed improvements do not necessarily coincide. Some configurations improve transit time more visibly than they reduce end-user price. This reflects the fact that time compression and fee compression depend on different parts of the payment chain. Speed may improve through operational redesign, while cost remains constrained by FX, compliance, payout design, or market structure.

Second, last-mile conditions remain decisive. A payment may move rapidly between institutions or infrastructures yet still fail to deliver an equivalent end-user experience if the final domestic leg remains fragmented, delayed, or poorly integrated. This is one of the clearest recurring patterns in the chapter.

Third, architecture performance is corridor-sensitive. Public data do not support the idea of a universal best model across all contexts. Instead, performance depends on combinations of domestic infrastructure quality, liquidity arrangements, regulatory alignment, participant mix, payout conditions, and local market depth. This supports the dissertation's corridor-archetype approach rather than a single global ranking.

Fourth, public observability is itself uneven and analytically consequential. Cost is measurable more directly than transparency, access, settlement finality, repair, or resilience. That asymmetry does not invalidate comparison, but it does mean that some dimensions can be benchmarked more directly than others. In cross-border payments, opacity is not just a measurement problem; it is part of the institutional phenomenon being studied.

Fifth, the quantitative evidence points toward functional complementarity rather than simple replacement. Incumbent systems continue to matter because of reach, familiarity, and institutional coverage. IPS-linked models appear especially promising for retail distribution and time-to-credit. More integrated or tokenised arrangements may offer advantages in reconciliation, transparency, or settlement compression in selected contexts. This reading is consistent with Rella's (2019) argument that blockchain applications in remittances often become incorporated into broader financial infrastructures rather than cleanly displacing them.

Taken together, these patterns also help explain why the FSB concluded in 2025 that satisfactory improvements at the global level are unlikely to be achieved in line with the 2027 Roadmap timetable. Visible gains have occurred, but they remain uneven across dimensions, stages, and institutional settings (FSB, 2025).

#### **4.7 Supplementary Public Risk Indicators**

Although the main quantitative benchmark in this dissertation follows the standard dimensions of cost, speed, transparency, and access, public data on fraud and payment-security outcomes can usefully enrich the analysis. These indicators are not sufficiently harmonised to function as a fifth architecture KPI across all payment models, but they help show that payment-system improvement cannot be judged by speed and cost alone. Official data also show that low fraud rates in percentage terms can coexist with very material absolute losses.

Recent European evidence makes this point clearly. The joint EBA/ECB report found that the total value of fraudulent payment transactions across the EEA amounted to EUR 4.2 billion in 2024, up 17 per cent year-on-year. Within that total, fraudulent credit transfers amounted to EUR 2.5 billion, with a fraud rate of 0.001 per cent (EBA and ECB, 2025). The report also indicates that fraud rates for card payments outside the EEA were

17 times higher than inside the EEA, underlining how cross-border governance fragmentation and uneven security standards can materially affect payment safety (EBA and ECB, 2025).

National evidence reinforces the relevance of fraud as a supplementary lens. The Central Bank of Ireland reported that Irish resident PSPs recorded EUR 160 million in fraudulent payments in 2024, up from EUR 129 million in 2023. It also reported that fraudulent money remittances more than doubled to EUR 20.4 million and that money remittances showed the highest fraud rate among payment methods at 0.081 per cent by value (Central Bank of Ireland, 2025).

UK evidence points in a similar direction. UK Finance reported that fraudulent international payments in authorised push payment scams rose to 5,983 cases and GBP 49.9 million in 2024, up sharply from GBP 25.9 million in 2023 (UK Finance, 2025). This suggests that digitisation and faster payment capability can coexist with substantial fraud exposure if authentication, verification, and information-sharing controls do not keep pace.

Taken together, these public indicators support a simple but important inference: faster or more digital payment flows do not automatically imply lower fraud or lower risk. That conclusion is also consistent with Braithwaite’s (2024) analysis of APP fraud, which treats fraud not as a marginal anomaly but as a structurally significant feature of modern payment systems. Risk outcomes remain highly dependent on instrument design, user behaviour, authentication controls, data quality, and cross-border governance arrangements. For that reason, fraud and security indicators are best used here as contextual enrichments rather than as direct architecture-comparison KPIs.

*Table 4.3. Supplementary public risk indicators*

| <b>Jurisdiction<br/>region</b> | <b>/ Metric</b> | <b>Reported value /<br/>rate</b> | <b>Source</b> |
|--------------------------------|-----------------|----------------------------------|---------------|
|--------------------------------|-----------------|----------------------------------|---------------|

|                       |                                           |                                           |                                |
|-----------------------|-------------------------------------------|-------------------------------------------|--------------------------------|
| <b>EU/EEA</b>         | Total payment fraud value                 | EUR 4.2 billion (2024)                    | EBA and ECB (2025)             |
| <b>EU/EEA</b>         | Fraudulent credit transfers               | EUR 2.5 billion; fraud rate 0.001% (2024) | EBA and ECB (2025)             |
| <b>EU/EEA</b>         | Card fraud rate outside EEA vs inside EEA | 17x higher outside EEA                    | EBA and ECB (2025)             |
| <b>Ireland</b>        | Total payment fraud                       | EUR 160 million (2024)                    | Central Bank of Ireland (2025) |
| <b>Ireland</b>        | Fraudulent money remittances              | EUR 20.4 million (2024)                   | Central Bank of Ireland (2025) |
| <b>Ireland</b>        | Money remittance fraud rate               | 0.081% (2024)                             | Central Bank of Ireland (2025) |
| <b>United Kingdom</b> | International payments                    | APP 5,983 cases / GBP 49.9 million (2024) | UK Finance (2025)              |

Source: Author's synthesis of regulatory and central-bank disclosures.

#### 4.8 Summary of Quantitative Findings

The quantitative evidence presented in this chapter supports six main conclusions. Before presenting them narratively, Table 4.4 consolidates the architecture-level trade-offs across cost, speed, transparency, and access. The table should be read as a structured synthesis of the public benchmark evidence presented in Sections 4.2 to 4.6, qualified by the supplementary risk indicators in Section 4.7, rather than as a numerical scoring model. Its purpose is to make the comparative pattern visible: incumbent and correspondent models retain advantages in reach and institutional familiarity; IPS-linked models are strongest where domestic instant-payment infrastructures support rapid retail distribution; tokenised settlement arrangements show greater potential where reconciliation, programmability, liquidity timing, and settlement compression matter; and hybrid or layered configurations appear most consistent with the observed pattern of functional complementarity.

*Table 4.4. Quantitative synthesis of architecture trade-offs across cost, speed, transparency, and access*

| <b>Dimension</b>      | <b>Correspondent / incumbent</b>                                                                 | <b>Interlinked IPS</b>                                                                                   | <b>Tokenised settlement</b>                                                                                 | <b>Hybrid / layered*</b>                                                                               |
|-----------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>Cost</b>           | Weakest visible cost position; bank-led routes remain expensive.                                 | Lower where local rails reduce intermediaries and payout costs.                                          | Potential back-office, liquidity, and reconciliation savings; retail evidence less mature.                  | Combines lower-cost local distribution with specialised settlement or liquidity layers.                |
| <b>Speed</b>          | Improved network transit, but beneficiary availability can still depend on last-mile processing. | Strongest retail time-to-credit where domestic IPS are mature and linked.                                | Potentially strong for settlement compression, atomic execution, and programmable transfer.                 | Uses IPS for distribution and upgraded or tokenised rails for settlement coordination.                 |
| <b>Transparency</b>   | Better tracking and richer messaging, but FX, fees, and repair visibility may remain uneven.     | Improves predictability where rulebooks, data standards, and status obligations align.                   | Shared-state auditability possible, but depends on identity, privacy, and compliance design.                | Potentially strongest where tracking, standards, and rulebooks operate across layers.                  |
| <b>Access</b>         | Broadest institutional reach and legal familiarity across heterogeneous corridors.               | Strong in participating corridors; limited where domestic IPS or scheme links are absent.                | Narrower at present; often restricted to pilots, regulated participants, or wholesale settings.             | Potentially broadest practical model if incumbent reach is combined with IPS and tokenised components. |
| <b>Main trade-off</b> | Reach and familiarity, but with higher cost, opacity, and sequential-processing frictions.       | Fast retail distribution, but dependent on governance alignment, FX design, and scheme interoperability. | Programmability and settlement gains, but higher uncertainty around legal finality, access, and governance. | Most consistent with the chapter's evidence: complementarity rather than single-rail replacement.      |

Source: Author's synthesis based on the quantitative findings in Sections 4.2–4.7

\*Note. The table is a structured synthesis of the quantitative findings rather than a numerical scoring model. Cost is the most directly observable public KPI; speed is partly observed through end-user and network-transit indicators; and transparency and access rely more heavily on aggregate monitoring and architecture-characteristic evidence. The hybrid/layered column is included as an interpretive synthesis of the observed trade-offs, not as a separate benchmark architecture.

Table 4.4 reinforces the central quantitative finding of the chapter: architecture performance is multidimensional and corridor-sensitive. The evidence does not identify a single superior architecture across all dimensions. Instead, it shows that each model resolves some frictions while leaving others in place or relocating them elsewhere in the payment chain. For that reason, the quantitative findings point toward complementarity rather than replacement.

First, cost remains structurally problematic in cross-border payments. Global retail and remittance pricing remains materially above international policy ambitions, even where digital channels perform better than traditional averages.

Second, speed has improved, but unevenly. Faster interbank transmission is increasingly visible, yet final beneficiary availability still depends heavily on last-mile conditions, domestic infrastructure, and institutional coordination.

Third, transparency and access remain more uneven and more weakly observed than headline speed claims often suggest. Improvements in disclosure, tracking, and account access are visible, but they do not automatically translate into full user predictability or broad practical reach.

Fourth, the quantitative evidence is stronger for some dimensions than for others. Cost is benchmarked most directly; speed is benchmarked partly through end-user measures and partly through network-transit evidence; transparency and access remain

partly aggregate and partly proxy-based. That asymmetry is substantive and must be retained rather than hidden.

Fifth, as Table 4.4 makes explicit, the quantitative evidence does not support a universal winner across all corridors and use cases. Instead, it points to layered strengths, corridor sensitivity, and functional complementarity. Incumbent models retain advantages in reach, legal familiarity, and institutional coverage; IPS-linked models appear strongest for retail distribution and time-to-credit where domestic infrastructures are mature; and tokenised settlement arrangements appear more promising where reconciliation, programmability, liquidity coordination, or settlement compression are central. This uneven pattern is consistent with the FSB's 2025 judgement that global progress remains insufficient to meet the 2027 timetable.

Sixth, supplementary public fraud and risk data show that payment modernisation must be assessed alongside safety and governance considerations, not purely by faster settlement or lower visible fees.

## 4.9 Conclusion

This chapter has presented the dissertation's quantitative findings across cost, speed, transparency, access, illustrative innovation cases, and a supplementary public risk lens. The evidence supports a comparative rather than binary interpretation of cross-border payment reform. Observable performance improvements exist, but they are uneven, stage-dependent, corridor-sensitive, and partly obscured by uneven public observability.

For that reason, the chapter should be read as a **descriptive public benchmark of architecture-relevant indicators and performance signals**, not as a controlled architecture-isolated measurement exercise. That distinction is deliberate. In cross-border payments, some frictions are visible in user-facing price and timing data, whereas others

remain embedded in governance, liquidity, legal-finality, repair, and resilience processes that are only partially measurable through public quantitative evidence.

The cross-architecture matrix in Section 4.8 provides the bridge from descriptive benchmarking to the integrated qualitative discussion in Chapter 5. Chapter 5 examines why these trade-offs arise, focusing on governance, liquidity, legal finality, intermediation, and systemic-risk evidence. The implication is that public KPI benchmarking is useful, but not sufficient on its own: quantitative patterns must be interpreted alongside institutional conditions to assess which architectures are genuinely feasible, scalable, and resilient. That is the task of the next chapter.

## CHAPTER V: QUALITATIVE FINDINGS AND INTEGRATED DISCUSSION

### 5.1 Introduction and Evidence Base

Chapter 4 provided a descriptive public benchmark of architecture-relevant indicators across cost, speed, transparency, and access. However, as Chapters 2 and 3 argued, public KPI data do not reveal all of the institutional conditions that determine whether an architecture can scale safely. Governance feasibility, liquidity design, legal finality, operational resilience, reachability, and the allocation of compliance responsibility are only partially visible in public datasets. A qualitative chapter is therefore necessary not as an optional add-on, but as the interpretive component that explains why apparently similar KPI outcomes can rest on very different institutional foundations.

The qualitative evidence comprises four semi-structured expert interviews, documentary and thematic analysis of a curated corpus of 45 public policy and practitioner transcripts, and a single-round Delphi-informed structured expert elicitation exercise. Four interviews were conducted; three yielded sufficiently complete material for thematic coding, and two of those three are used as anchor cases for visible quotation. Within that set, two especially information-rich semi-structured expert interviews are used here as anchor cases for visible quotation, representing one large-institution practitioner perspective and one non-bank payments practitioner perspective. Short extracts are lightly cleaned for readability and reported with fully anonymised participant labels.

*Table 5.1. Qualitative evidence base and analytical role*

| Source                            | Scope used in Chapter 5                                        | Analytical role                                           | Main contribution                              |
|-----------------------------------|----------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------|
| Semi-structured expert interviews | 4 interviews; information-rich interviews used as anchor cases | 2 High-density primary evidence on settlement, liquidity, | Provides verbatim practitioner explanation and |

|                                                                            |                                                                                                             | governance, and<br>strategic outlook                                               | corridor-specific<br>nuance                                                  |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| <b>Public policy and practitioner transcript corpus</b>                    | 45 curated transcripts                                                                                      | Broader triangulation across institutions, initiatives, and architecture families  | Confirms recurring themes and makes disagreement visible                     |
| <b>Single-round Delphi-informed structured expert elicitation exercise</b> | Panel n = 11 overall; item-level usable n varies (Sections A/B/D/E mostly 10–11; Section C cell-level 5–11) | Structured expert elicitation and descriptive prioritisation, not formal consensus | Shows stronger alignment, weaker alignment, and divergence across key issues |

Source: Author’s analysis of the qualitative evidence base

The structured expert-elicitation component adds particular value because it makes areas of stronger and weaker alignment visible across a purposively selected expert panel. The panel comprised 11 respondents across banks, fintech/PSPs, regulatory/central-bank, and academic/consulting backgrounds, with a strong concentration of product, solutions, and liquidity-management expertise and a predominantly senior experience profile. In the raw Qualtrics export, nine returned records were flagged by the platform as finished, while two additional returned records were not platform-marked as finished but nevertheless contained substantive answers to the closed-ended analytical items. The analysis therefore retained answered-item data on an item-by-item basis rather than excluding records solely on the basis of the platform’s finished flag. Usable denominators consequently vary by item: most Section A, B, D, and E items have 10–11 usable responses, while Section C architecture-rating cells range from 5 to 11 because some panellists left specific architecture/outcome combinations blank. Consistent with Chapter 3, these data are treated as structured expert elicitation and descriptive prioritisation, not as a classical multi-round consensus Delphi.

Table 5.2. Structured expert-elicitation panel profile

| Panel characteristic                               | Distribution                                                                                | Analytical relevance                                                                                 |
|----------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Organisation type</b>                           | 4 banks/FIs; 4 fintech/PSPs; 1 regulator/central bank; 2 academic/consulting                | Cross-institutional rather than single-sector panel                                                  |
| <b>Main expertise</b>                              | 7 product/solution/liquidity; operations/infrastructure; regulatory/risk; academic/research | Practitioner-heavy orientation with liquidity/architecture emphasis                                  |
| <b>Experience in payments</b>                      | 10 reported 10+ years (6 at 10–20 years; 4 at >20 years); 1 at <5 years; none at 5–10 years | Predominantly senior panel with a small minority of earlier-career participants                      |
| <b>Section A client-segment lens</b>               | 5 corporate/institutional; consumer; 5 mixed/general                                        | Helps explain variation in KPI priorities and user-value rankings                                    |
| <b>Usable responses in architecture/risk items</b> | Panel n = 11 overall; Sections A/B/D/E mostly n = 10–11; Section C cell-level n = 5–11      | Requires item-level denominators and conservative interpretation as descriptive alignment/divergence |

Source: Author’s analysis of structured expert-elicitation records

Note: The structured expert-elicitation exercise produced 11 returned records overall. Nine were platform-marked as finished, while two additional returned records were not marked as finished but nevertheless contained substantive answers to the closed-ended analytical items. Item-level answered data were therefore retained on an item-by-item basis rather than excluded solely on the basis of the platform’s finished flag.

The chapter uses this evidence base in two ways. First, it uses short interview extracts and selected Delphi displays to make the evidentiary trail visible. Second, it integrates those materials back into the quantitative patterns from Chapter 4, consistent with the dissertation’s convergent design, so that convergence, qualification, and dissonance are shown rather than merely asserted (Fetters et al., 2013). Four themes structure the analysis: architectural pragmatism and hybridisation; interoperability, governance coordination, and “spaghetti risk”; liquidity, prefunding, and the re-

specialisation of intermediaries; and legal finality, operational resilience, and smart-contract risk.

## **5.2 Architectural Pragmatism and the Case for Hybridisation**

A central theme across the curated transcript corpus, supported by the semi-structured interviews and the structured expert-elicitation results, is that the near-term future of cross-border payments is more likely to be hybrid than revolutionary. This finding is theoretically plausible. In infrastructures characterised by high switching costs, entrenched installed bases, and heavy regulatory dependence, incremental architectures often diffuse more readily than pure replacement models because they preserve compatibility while reducing selected transaction costs (Williamson, 1985; Katz and Shapiro, 1985; Rogers, 2003). Across the wider documentary corpus, this logic appears repeatedly in arguments for selective recombination of functions rather than wholesale system substitution. The qualitative evidence therefore points less to a contest between “legacy” and “blockchain” than to selective hybridisation under corridor-specific and governance-specific constraints.

Interview Participant B described a corridor arrangement in which a transfer routed through local payment rails and cross-border FX/payout orchestration “takes about 30 seconds without any pre-funding”. The analytical significance of this example is not that it proves a universal architecture, but that it demonstrates how visible performance gains can arise from recombining local rails, FX conversion and orchestration without waiting for one universal settlement rail. Interview Participant A made a related, but more institutionally cautious, point: real-time payments ultimately require real-time settlement, and in a “perfect world” the two must coexist. In that participant’s view, the most plausible end-state is a high-capability traditional rail combined with a DLT-enabled settlement and liquidity layer.

“...the most plausible end-state is a traditional rail with a high capability coupled with a distributed ledger technology to do the settlement and the liquidity.” (Interview Participant A)

The Delphi-informed expert-elicitation results reinforce this interpretation. In the weighting exercise, speed ranked highest (mean = 25.91, n = 11), followed by cost (23.64, n = 11), risk/compliance (20.45, n = 11), and transparency (18.64, n = 11), while liquidity/PvP remained lowest (12.50, n = 10). Yet the Section B architecture comparison still did not produce a single dominant winner. In that item, DLT and hybrid models were presented as a combined response option (“DLT/Hybrid”), and that combined option was selected most often as the best architecture for cost efficiency (9/11) and speed (6/11), whereas SWIFT was selected most often for risk/compliance outcomes (6/11) and DLT/Hybrid led on transparency (5/11). Most importantly, the 2030 outlook still did not point to outright replacement: 6 of 11 respondents expected DLT to function primarily as an integrated component within hybrid architectures, 3 of 11 as a complementary layer connected to existing rails, and only 2 of 11 as the likely foundational settlement fabric.

*Table 5.3. Delphi-informed expert-elicitation prioritisation and 2030 outlook*

| <b>Delphi display</b>                                                            | <b>Result</b>                                                                                                                                                                                 | <b>Interpretive implication</b>                                                                           |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Average weighting (Section A)</b>                                             | Speed 25.91 (n = 11); cost 23.64 (n = 11); risk/compliance 20.45 (n = 11); transparency 18.64 (n = 11); liquidity/PvP 12.50 (n = 10)                                                          | Front-end user priorities dominate explicit weighting, but do not exhaust system design constraints       |
| <b>Architecture selected as 'best' by criterion (combined DLT/Hybrid option)</b> | Cost: DLT/Hybrid 9/11, IPS 1/11, SWIFT 1/11; speed: DLT/Hybrid 6/11 and IPS 5/11; transparency: DLT/Hybrid 5/11, SWIFT 4/11, IPS 2/11; risk/compliance: SWIFT 6/11, IPS 4/11, DLT/Hybrid 1/11 | Performance strengths are distributed across architecture families rather than concentrated in one winner |
| <b>2030 role of DLT (E1)</b>                                                     | Integrated hybrid component 6/11 (54.5%); complementary layer 3/11                                                                                                                            | The dominant expectation remains hybrid embedding                                                         |

---

|                                 |                                                                 |
|---------------------------------|-----------------------------------------------------------------|
| (27.3%);<br>fabric 2/11 (18.2%) | foundational<br>settlement rather than wholesale<br>replacement |
|---------------------------------|-----------------------------------------------------------------|

---

Source: Author's analysis of structured expert-elicitation results

Note: The structured expert-elicitation exercise produced 11 returned records overall. Nine were platform-marked as finished, while two additional returned records were not marked as finished but nevertheless contained substantive answers to the closed-ended items. In the Section B best/worst architecture item, DLT and Hybrid were presented as a single combined response option (“DLT/Hybrid”); later median ratings in Table 5.5 score SWIFT, IPS, DLT, and Hybrid separately. The evidence is interpreted descriptively and reported with explicit item-level denominators rather than as inferential statistics.

These results matter because they separate front-end performance from whole-system design. The panel recognised that architectures associated with programmability or tokenised settlement may offer visible advantages on cost and speed, but it did not infer from that a wholesale displacement of incumbent infrastructures. Instead, it suggests layered specialisation: local rails and IPS linkages for user-facing distribution, incumbent networks for reach and control, and tokenised or hybrid mechanisms where they solve specific settlement, liquidity, or data-coordination problems.

At the same time, the interview evidence usefully qualifies any over-generalised ranking of user priorities. Interview Participant A argued that, for many corporate payout contexts, reachability remains the first decision criterion because speed and cost have little value if the beneficiary cannot actually be reached. This nuance is important because it shows that the relevant question is not “which architecture is best in the abstract?” but “which architecture is best for which corridor, institution, and use case?” The most defensible conclusion is therefore pragmatic hybridisation under corridor-specific constraints rather than universal technological succession.

### 5.3 Interoperability, Governance Coordination, and “Spaghetti Risk”

A second major theme is that interoperability is not simply a technical linkage problem. It is a governance problem involving standards, rulebooks, liability, exception handling, access criteria, and the institutional capacity to sustain multilateral coordination over time. This finding aligns with network and platform economics: compatibility creates value only when the surrounding rules reduce coordination costs rather than multiply them (Rochet and Tirole, 2003; Armstrong, 2006). In payments, shared code without shared governance can produce more connections but not necessarily more scalable trust.

In this dissertation, “spaghetti risk” is used as an interpretive shorthand for the proliferation of only partially compatible payment infrastructures, bridges, overlays, and rulebooks whose cumulative complexity can exceed the coordination gains they promise. Across the wider documentary corpus, the same concern recurs in discussions of onboarding, dispute handling, identity, message standards, liability, and cross-system coordination. Read together, these materials suggest that interoperability problems are rarely solved by technical linkage alone; they are stabilised, where they are stabilised at all, through governance completion.

Interview Participant B framed this point very directly, arguing that SLAs and clear technical requirements matter more than whether a standard is formally ISO-branded, because instant or near-instant payments require partners to know exactly what data must be exchanged, how failures are handled, and who bears responsibility when systems go down. The same participant added that as payments become “instantly global”, legal rulebooks become crucial because otherwise disputes, reversals, and liability allocation become harder rather than easier. Interview Participant A reached a complementary conclusion from a different angle. Reflecting on an instant-payment linkage project, that

participant argued that the “easy part” was moving the payment instruction; the hard part was settlement, onboarding, and FX.

“So the settlement was the single biggest piece that let them down. Moving the payment instruction [was] fairly straightforward.” (Interview Participant A)

The expert-elicitation results strongly reinforce this governance reading. Among adoption drivers, regulatory clarity was selected by 7 of 11 respondents and interoperability/standards by 5 of 11. Among barriers, interoperability gaps dominated at 9 of 11, followed by regulatory uncertainty at 7 of 11. On the risk side, regulatory/compliance gaps were selected most often as the most material risk at 7 of 11, ahead of bridge or cross-ledger vulnerability at 5 of 11. The most commonly selected mitigations were regulated tokenised deposit/stablecoin frameworks at 5 of 11, enhanced compliance governance/rulebooks at 4 of 11, and audited smart-contract governance at 2 of 11.

*Table 5.4. Governance, barrier, and mitigation findings from the structured expert elicitation*

| <b>Category</b>                  | <b>Most selected item(s)</b>                                                                                          | <b>Count / % of usable responses</b>           | <b>Interpretive implication</b>                                             |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------|
| <b>Adoption drivers</b>          | Regulatory clarity; interoperability and standards                                                                    | 7/11 (63.6%);<br>5/11 (45.5%)                  | Technical take-up is expected to depend on governance conditions            |
| <b>Top barriers</b>              | Interoperability gaps; regulatory uncertainty                                                                         | 9/11 (81.8%);<br>7/11 (63.6%)                  | Scaling friction is institutional as much as technical                      |
| <b>Most material risks</b>       | Regulatory/compliance gaps; bridge or cross-ledger vulnerability                                                      | 7/11 (63.6%);<br>5/11 (45.5%)                  | Risk concerns centre on governance integrity and connection layers          |
| <b>Most selected mitigations</b> | Regulated tokenised deposits/stablecoin frameworks; enhanced compliance governance/rulebooks; audited code governance | 5/11 (45.5%);<br>4/11 (36.4%);<br>2/11 (18.2%) | Mitigation is seen as techno-legal and institutional, not purely code-level |

Source: Author’s analysis of structured expert-elicitation results.

The interview material also highlights that governance problems do not yield one-sided conclusions. One view in the corpus is that linked instant payment systems are the most promising practical route to improvement. Another, especially from Interview Participant B, is more sceptical: IPS linkages may be “exciting” but may not scale globally because too many governments, central actors, and competitive interests would need to align on a common operating framework. That disagreement is analytically valuable rather than problematic. It shows that interoperability risk is not reducible to engineering difficulty; it is rooted in divergent incentives and institutional bargaining.

This is precisely why “spaghetti risk” is a useful interpretive term in this dissertation. Without sufficient shared governance, the multiplication of domestic instant-payment systems, private stablecoin networks, API overlays, and DLT bridges can create a tangled system of partial compatibility. Faster rails may then coexist with slower dispute resolution, fragmented accountability, or duplicated compliance controls. In that sense, governance is not secondary to interoperability; it is a precondition for meaningful interoperability. This interpretation is also consistent with the literature on blockchain interoperability and with CPMI’s analysis of linked fast-payment systems, as well as FATF’s renewed emphasis on payment transparency, identity quality, and safer data-rich payment chains (Belchior et al., 2022; CPMI, 2024; FATF, 2025).

#### **5.4 Liquidity, Prefunding, and the Re-specialisation of Intermediaries**

Across the documentary corpus and the semi-structured interviews, a third recurring theme is that liquidity, rather than messaging alone, remains the core economic friction in cross-border payments. This finding is consistent with payments economics and the liquidity literature: faster communication does not remove the need to source settlement assets, manage time-zone risk, fund positions, or absorb market exposure (McAndrews and Roberds, 1995; Brunnermeier and Pedersen, 2009; Kahn and Roberds, 2009). The

qualitative evidence repeatedly returns to this point. What often appears, from the user interface, to be a problem of message speed is frequently, at infrastructure level, a problem of liquidity location and balance-sheet coordination.

Interview Participant A stated the point bluntly: regardless of how the industry markets new propositions, “pre-funding is the mechanism that reduces that friction to enable real-time payments”. The same participant noted that many supposedly future-proof solutions still depend operationally on prefunded balances, while real-time out-of-hours FX conversion remains difficult because market and treasury functions are not always truly 24/7. This account adds analytical depth to the quantitative results in Chapter 4. Faster beneficiary credit does not imply that the deeper liquidity problem has been solved; it may simply mean that the liquidity burden has been repositioned, priced differently, or hidden from the end user.

“...if you can’t do the conversion in a very efficient manner and quick manner, you’re building in a higher risk premium onto that FX spread...”  
(Interview Participant A)

Interview Participant B provides an important counterpoint. In some retail and remittance-like contexts, the visible need for prefunding can indeed be reduced by combining domestic payment rails, local currency conversion, and PSP orchestration. The earlier 30-second example shows that user-facing certainty on price and receipt can improve substantially when intermediaries are reduced and first- and last-mile payments are executed locally. The critical analytical point is that these two observations are not contradictory. They reveal different layers of the same architecture. User-facing frictions can fall sharply even while back-end liquidity, treasury, and FX constraints remain highly consequential.

This theme also helps explain why the findings do not support a simple disintermediation thesis. The need for intermediation does not disappear; it is redistributed.

Interview Participant B explicitly described banks as repositioning into more modern cross-border solutions as fintechs and PSPs take market share in customer-facing distribution. Interview Participant A described a parallel move toward orchestration and modular service consumption, where sanctions screening, KYC portals, AML validation, and regulatory reporting become specialised modules rather than monolithic in-house processes. This is better understood as re-specialisation of intermediary functions than as the disappearance of intermediaries altogether (Diamond, 1984; Gorton and Winton, 2003; Scholtens and van Wensveen, 2003).

The qualitative material also adds an important nuance regarding regulated stablecoins and tokenised money. One practitioner argued that customer demand, particularly in some emerging markets, may drive liquidity and use cases for dollar-linked tokenised networks; another remained sceptical that regulated stablecoins or CBDCs would displace well-functioning instant payment arrangements for the majority of use cases in the near term. Within the scope of this dissertation, such comments are interpreted as referring to regulated or institutionally anchored tokenised-money arrangements rather than to the unregulated crypto-asset channels excluded in Chapter 1. Read together, these views suggest that tokenised money may matter most where it improves access to credible settlement liquidity or reduces FX and treasury frictions, not simply because it is technologically novel (Klages-Mundt et al., 2020; Lyons and Viswanath-Natraj, 2023).

One non-bank practitioner went further, arguing that near-term DLT adoption in some corridors may be driven less by generic efficiency claims than by demand for dollar-linked tokenised payment networks, particularly where always-on access to U.S.-dollar liquidity is valuable. In this reading, regulatory clarity around payment stablecoins may accelerate certain corridor-specific use cases without implying wholesale displacement of incumbent infrastructures.

This distinction also helps clarify why tokenised money should not be treated as a single category. Regulated stablecoins are associated more strongly with internet-native, always-on access to U.S.-dollar liquidity and with retail or globally distributed use cases, whereas tokenised deposits are associated more strongly with wholesale, B2B, and regulated-bank environments in which legal continuity, prudential supervision, and balance-sheet integration remain important. The more plausible trajectory, therefore, is differentiated adoption by use case rather than convergence on one uniform token form.

### **5.5 Legal Finality, Operational Resilience, and Smart-Contract Risk**

The fourth major theme is that faster or more programmable architectures are not inherently safer. Rather, they reallocate risk across operational, legal, cyber, and governance domains. This is consistent with the literature on finality and infrastructure resilience: the relevant question is not merely whether a payment can be executed faster, but whether execution is robust under insolvency, dispute, failure, and cross-jurisdictional conflict, and whether the surrounding infrastructure can recover under stress (CPMI-IOSCO, 2012; Kahn and Roberds, 2007).

The descriptive rating pattern from the Section C matrix is especially useful here because it shows how experts balanced performance advantages against institutional readiness when SWIFT, IPS, DLT, and Hybrid were scored separately. On a 1–5 scale, DLT scored highest on lower user cost (median = 5.0) and transparency (median = 5.0), and it also led on settlement time / fewer returns (median = 4.5). Yet SWIFT scored highest on risk outcomes (median = 5.0) and regulatory/governance readiness (median = 5.0), with IPS remaining comparatively strong on governance readiness (median = 4.0) but materially lower on risk outcomes (median = 3.0). DLT and Hybrid were also rated as introducing more new systemic or bridge risk (median = 4.0 in both cases) than SWIFT (median = 1.5) or IPS (median = 3.0). These medians should be read descriptively because usable n varies

by cell. In several cells, one response can materially shift the reported median, so the matrix functions as a directional signal of alignment and divergence rather than as a stable rank-order device.

*Table 5.5. Descriptive median architecture ratings from the structured expert elicitation (1–5 scale; usable n shown in parentheses)*

| <b>Outcome / attribute</b>                         | <b>SWIFT</b> | <b>IPS</b>   | <b>DLT</b>   | <b>Hybrid</b> |
|----------------------------------------------------|--------------|--------------|--------------|---------------|
| <b>Lower total user cost</b>                       | 2.0 (n = 10) | 4.0 (n = 9)  | 5.0 (n = 10) | 4.0 (n = 10)  |
| <b>Settlement time / fewer returns</b>             | 2.0 (n = 10) | 4.0 (n = 9)  | 4.5 (n = 10) | 4.0 (n = 9)   |
| <b>Transparency / auditability</b>                 | 4.0 (n = 11) | 4.0 (n = 9)  | 5.0 (n = 11) | 4.0 (n = 11)  |
| <b>Risk outcomes (fraud / AML / sanctions)</b>     | 5.0 (n = 9)  | 3.0 (n = 9)  | 2.5 (n = 10) | 2.0 (n = 9)   |
| <b>Operational resilience (uptime / incidents)</b> | 4.0 (n = 9)  | 3.0 (n = 8)  | 3.0 (n = 9)  | 3.0 (n = 8)   |
| <b>Introduces new systemic or bridge risk*</b>     | 1.5 (n = 10) | 3.0 (n = 9)  | 4.0 (n = 10) | 4.0 (n = 9)   |
| <b>Regulatory / governance readiness</b>           | 5.0 (n = 11) | 4.0 (n = 11) | 2.0 (n = 11) | 3.0 (n = 10)  |

Source: Author’s analysis of structured expert-elicitation results.

\* Higher values in the 'Introduces new systemic or bridge risk' row indicate that the architecture was perceived as creating more new risk, not less. In this Section C matrix, SWIFT, IPS, DLT, and Hybrid were scored separately. Medians are descriptive and usable n varies by cell because some panellists left individual architecture/outcome combinations blank.

The interview evidence supports this pattern. Interview Participant A stressed that future competitiveness requires 24/7/365 availability, no “green zones”, and technology stacks capable of near-Stripe levels of uptime. That is not a superficial operational complaint. It is a reminder that once payment expectations shift toward always-on execution, uptime, release discipline, exception management, and recovery arrangements

become part of architecture quality itself. Interview Participant B similarly emphasised that SLAs and rulebooks are not administrative details but core components of system reliability.

The Delphi risk and mitigation items add further specificity. Regulatory/compliance gaps were viewed as the most material DLT-related risk, followed by bridge or cross-ledger vulnerability. The free-text trade-off about the “singleness of money” is especially significant because it moves the discussion beyond technical bugs toward monetary and institutional integrity. In other words, the harder question is not merely whether smart contracts can be audited, but whether the wider system preserves clear claims, consistent governance, and confidence in convertibility across different forms of money.

This is why the chapter interprets risk in terms of translation rather than elimination. Correspondent systems can be slow, opaque, and expensive. IPS-linked and tokenised systems may reduce some of those frictions while introducing new dependencies on scheme operators, API layers, common ledgers, bridge logic, or token frameworks. In that sense, efficiency gains and systemic safety are jointly determined. The most convincing architectures are not those that appear fastest in narrow pilots, but those that can reconcile speed with legal finality, resilience, and governable risk allocation (Werbach and Cornell, 2017; Khan et al., 2021; Liao et al., 2024; Rahman, 2025).

## **5.6 Integrated Discussion by Research Question**

The convergent value of the chapter becomes clearest when the quantitative and qualitative strands are read together. Table 5.6 provides a joint display by research question, linking the measurable patterns from Chapter 4 to the qualitative explanations developed above. The table is not intended as a substitute for the narrative discussion. Rather, it makes the integration logic explicit, which is important in mixed-method inquiry

because the evidential value lies not only in the individual strands but in how they qualify one another (Fetters et al.1, 2013).

*Table 5.6. Joint display of quantitative–qualitative integration by research question*

| <b>Research question</b>                              | <b>Quantitative anchor from Chapter 4</b>                                                                             | <b>Qualitative interpretation</b>                                                                                             | <b>Integrated answer</b>                                                                                   |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>RQ1: Comparative performance</b>                   | No single architecture dominated across cost, speed, transparency, and access; observed gains were corridor-sensitive | Panel responses split by criterion, while interviews emphasised reachability, settlement design, and use-case variation       | Performance is multidimensional and architecture-specific rather than universally rankable                 |
| <b>RQ2: Governance, compliance, and systemic risk</b> | Public risk and fraud indicators showed that modernisation cannot be inferred from speed and price alone              | Rulebooks, regulatory clarity, interoperability gaps, bridge risks, and legal finality emerged as decisive factors            | Governance quality is a primary determinant of scalable safety and credibility                             |
| <b>RQ3: Intermediation and industry structure</b>     | KPI gains did not by themselves indicate disappearance of intermediaries                                              | Liquidity, FX, compliance, orchestration, and exception management remain necessary but are being redistributed               | Intermediation is re-specialised, not eliminated                                                           |
| <b>RQ4: Corridor and institutional fit</b>            | Architecture outcomes varied with corridor maturity, reach, and infrastructure conditions                             | Interviews contrasted local-rail wins with settlement/governance bottlenecks; the panel expected hybrid roles for DLT by 2030 | Architecture fit is corridor- and institution-dependent; layered hybridity is the most plausible end-state |

Source: Author's integration of quantitative and qualitative findings

#### 5.6.1 Research Question 1: Comparative performance

The integrated answer to RQ1 is therefore comparative rather than binary. DLT/hybrid arrangements are perceived as stronger on lower visible cost and, in some contexts, on speed and transparency. IPS-linked/local-rail models are especially strong

where the objective is rapid beneficiary credit in corridors with mature domestic schemes. Incumbent networks remain stronger on reach, legal familiarity, and risk/compliance confidence. The ranking changes once the use case changes, which is why one large-bank interview prioritised reachability over raw speed for many corporate flows.

#### 5.6.2 Research Question 2: Governance, compliance and systemic risk

RQ2 is answered even more clearly. Governance, compliance, and systemic risk are not peripheral frictions standing outside the architecture; they are part of the architecture. Regulatory clarity, interoperability standards, legal rulebooks, and bridge design jointly determine whether apparent technical efficiency can scale. The qualitative strand therefore explains why public KPI gains must be interpreted cautiously: better speed or lower user fees do not, by themselves, establish institutional robustness.

#### 5.6.3 Research Question 3: Intermediation and industry structure

RQ3 is also clarified. The findings do not support a pure disintermediation narrative. Liquidity provision, FX pricing, compliance control, exception management, connectivity, custody, and orchestration remain necessary. What changes is who performs those functions and how modular the delivery model becomes. Banks, PSPs, infrastructure operators, and tokenised settlement providers therefore coexist in a re-specialised ecosystem rather than a winner-takes-all one.

#### 5.6.4 Research Question 4: Corridor and institutional fit

Finally, RQ4 should be answered in explicitly corridor- and institution-sensitive terms. Local-rail and IPS-linked solutions are more persuasive where domestic systems are strong, reach is high, and rulebooks can be aligned. Tokenised or hybrid settlement is more plausible where liquidity coordination, programmability, or PvP-type needs matter enough to justify governance investment. Correspondent or mixed models remain more practical where corridor heterogeneity, legal fragmentation, or market reach still dominate. This is

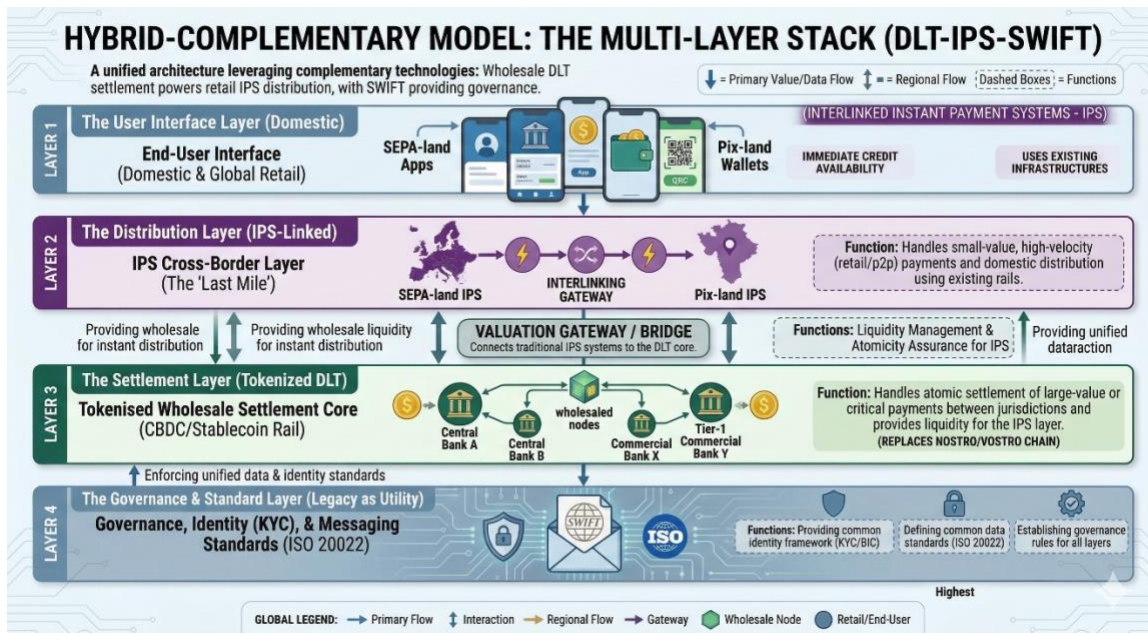
also why the Delphi panel's 2030 outlook is so important: it points to DLT as a complementary or integrated layer within broader hybrid architectures, not as a universal replacement rail.

Disagreement across the corpus should therefore be read as substantive data rather than methodological noise. It shows that the future of cross-border payments is being shaped not by one linear technological trajectory, but by competing institutional logics around reachability, efficiency, liquidity, governability, and risk.

### **5.7 Author-Developed Conceptual Synthesis Model: The Hybrid-Complementary Multi-Layer Stack**

The integrated findings of this dissertation suggest that the most plausible end-state for cross-border payments is not the wholesale replacement of incumbent infrastructures by a single new rail, but a layered and functionally differentiated configuration in which different infrastructures specialise according to their comparative strengths. Figure 5.1 presents an author-developed conceptual synthesis model—a heuristic representation of this hybrid-complementary configuration—derived from the combined interpretation of the quantitative benchmarking and qualitative evidence presented in Chapters 4 and 5.

Figure 5.1. Author-developed hybrid-complementary multi-layer stack for cross-border payments



Source: Author's synthesis based on quantitative benchmarking and qualitative findings.

Figure 5.1 should be read as a conceptual synthesis device rather than as a prediction that all markets will converge on one identical operational design. Unlike specific policy blueprints such as Project Nexus, mBridge, or unified-ledger proposals, the Hybrid-Complementary Multi-Layer Stack is not a design for one infrastructure project. It is a comparative coexistence model that distinguishes user-interface, distribution, tokenised wholesale-settlement, and governance layers in order to explain how multiple architectures may remain interdependent across corridors and use cases.

The model reflects a central conclusion of the dissertation: cross-border payment reform is better understood as a problem of architectural coordination than as a simple contest between legacy systems and blockchain-based alternatives. The evidence does not support a universal winner across all corridors and use cases. Instead, it suggests that different infrastructures are likely to remain relevant because they solve different parts of

the overall payment problem. In this interpretation, efficiency gains emerge less from total institutional displacement than from the clearer allocation of functions across layers.

At the top of the model sits the user interface layer, representing the customer-facing environment through which payments are initiated and received. This includes domestic banking applications, wallets, merchant-facing interfaces, and other end-user access points. The study's findings indicate that end-user value is strongly shaped by local usability, beneficiary reach, and payout certainty. This layer therefore remains domestically anchored even where the underlying payment flow is cross-border. The main function of this layer is not wholesale settlement, but practical access, initiation, and user experience.

Beneath this sits the distribution layer, represented by interlinked instant payment systems. This layer corresponds to the part of the architecture most directly associated with retail distribution and the so-called "last mile." The evidence presented in Chapter 4 showed that improvements in payment speed do not necessarily translate into improved end-user outcomes unless the final domestic leg is also efficient. The qualitative findings reinforced this point by showing that local-rail connectivity and fast domestic crediting are among the clearest sources of visible customer benefit. In the synthesis model, IPS interlinking therefore performs a distributional role: it supports small-value and high-velocity flows by connecting domestic infrastructures rather than replacing them.

The third layer is the tokenised wholesale settlement layer. This is the part of the model most closely associated with structural innovation in liquidity management, reconciliation, and settlement design. Across the evidence base, the strongest case for tokenised arrangements did not arise from retail front-end experience alone, but from their potential to reduce trapped liquidity, improve settlement coordination, and support more integrated or conditional transfer of value across jurisdictions. In the model, this layer

performs the wholesale settlement function for large-value, critical, or liquidity-sensitive flows, and can also support the funding and liquidity needs of the distribution layer above it. In that sense, tokenised settlement is not positioned here as a universal replacement rail, but as a specialised infrastructure layer with particular comparative advantages.

The fourth and foundational layer is the governance, identity, and standards layer. The findings of this dissertation consistently showed that interoperability is not merely a technical matter. It depends on messaging standards, identity frameworks, rulebooks, liability arrangements, access conditions, and broader governance coordination across jurisdictions. This layer therefore captures the continuing importance of common standards, KYC and identity mechanisms, and messaging or orchestration frameworks. In practical terms, it also reflects the study's conclusion that incumbent utility functions remain important even where other layers evolve significantly. The persistence of this foundational layer underscores that cross-border payments continue to depend on trusted institutional coordination, not on technical design alone.

Taken together, the four layers illustrate the dissertation's broader conclusion that the likely future of cross-border payments is hybrid and complementary rather than singular. In this model, legacy utilities, domestic instant-payment infrastructures, and tokenised settlement arrangements are not necessarily in zero-sum competition. Rather, they may coexist in a more modular architecture in which each performs a distinct role. Such an outcome is consistent with the study's findings on corridor sensitivity, re-specialisation of intermediation, and the continuing importance of governance and legal certainty.

Figure 5.1 should therefore be interpreted as a conceptual synthesis model, not as a claim that all markets will converge on an identical operational design. Its value lies in showing how the main findings of the dissertation can be integrated into a coherent

architectural proposition: one in which user access, retail distribution, wholesale settlement, and governance functions are more clearly separated, while remaining operationally linked. This layered interpretation offers a more realistic and defensible account of cross-border payment evolution than either pure legacy persistence or simple blockchain replacement.

## **5.8 Conclusion**

This chapter has explained why the quantitative results do not point to a simple replacement story. The qualitative evidence consistently suggests that cross-border payment reform is better understood as a problem of hybrid architecture design under institutional constraint.

Four conclusions follow. First, pragmatic incrementalism remains powerful because it is easier to implement and can still generate meaningful gains. Second, interoperability is fundamentally a governance problem, not merely a technical one. Third, liquidity and intermediation functions remain central even when technologies change. Fourth, legal finality, operational resilience and fraud control are decisive conditions for scale.

The most defensible interpretation of the evidence is therefore that the likely end-state is complementary and layered rather than singular. Incumbent networks, local instant-payment infrastructures, and selected tokenised-settlement arrangements are more likely to coexist and specialise than to converge quickly into one universal rail.

**This chapter also prepares the ground for Chapter VI. The dissertation can now conclude, on evidential rather than speculative grounds, that the future of cross-border payments is less about absolute technological replacement and more about the disciplined redesign of coordination, liquidity, governance, and trust.**

## CHAPTER VI: SUMMARY, IMPLICATIONS, AND CONCLUSION

### 6.1 Summary of the Study and Answers to the Research Questions

This dissertation set out to examine whether alternative cross-border payment architectures materially improve payment outcomes under real-world institutional, regulatory, and operational constraints. Rather than treating cross-border payments as a simple contest between legacy systems and blockchain-based alternatives, the study approached them as governance-embedded coordination systems whose performance depends not only on technical design, but also on liquidity structure, legal certainty, institutional interoperability, and network participation (McAndrews and Roberds, 1995; Kahn and Roberds, 2009; Scott and Zachariadis, 2014).

To address this problem, the dissertation adopted a pragmatic convergent mixed-methods design (Morgan, 2007; Creswell and Plano Clark, 2018). The quantitative strand assembled a descriptive public benchmark of architecture-relevant indicators across cost, speed, transparency, and access using mixed-level public evidence, including corridor-level, scheme-level, network-level, and jurisdiction-level sources. The qualitative strand combined four semi-structured expert interviews, documentary and thematic analysis of a curated corpus of 45 public policy and practitioner transcripts, and a single-round Delphi-informed structured expert elicitation exercise that produced 11 returned records overall, used to elicit and compare expert judgement rather than to generate consensus through multiple rounds (Malterud et al., 2016; Hsu and Sandford, 2007). The purpose of this design was not to claim universal causal inference, but to build a defensible comparative assessment grounded in triangulated evidence and integration at the interpretation stage (Fetters et al., 2013).

Across the quantitative and qualitative findings, a consistent conclusion emerged: no single architecture solves the cross-border payment problem in all contexts. Instead, different models perform better or worse depending on the corridor, user segment, governance environment, infrastructure maturity, and liquidity configuration involved. The study therefore concludes that the future of cross-border payments is more likely to be hybrid, layered, and functionally specialised than defined by the wholesale replacement of incumbent infrastructures, a conclusion consistent with broader work on interoperability, network effects, and path-dependent institutional change (North, 1990; Katz and Shapiro, 1985; Rogers, 2003).

#### 6.1.1 Research Question 1: Comparative Performance

The first research question asked how alternative cross-border payment architectures compare across cost, speed, transparency, and access.

The findings show that performance differs materially by architecture family, but not in a way that supports a universal winner. Cost remains a persistent weakness of cross-border payments overall, and the available public evidence shows that pricing remains above international policy ambitions in many retail and remittance contexts (FSB, 2021; FSB, 2025). Legacy correspondent models continue to suffer from structural frictions linked to multi-hop processing, fragmented information flows, repeated compliance steps, and prefunding requirements, although newer operational reforms have narrowed some of these gaps (CPMI, 2016; CPMI, 2020).

On speed, the study found that recent reforms and operational improvements have produced measurable gains, but these gains are uneven and often stage-specific. Faster transmission between institutions does not automatically remove delays in the final domestic leg or guarantee rapid end-user availability. IPS-linked models appear particularly strong where domestic instant-payment rails are already robust and where the

main objective is fast retail distribution. More integrated or tokenised arrangements may be capable of faster end-to-end movement or settlement coordination in some environments, but the evidence does not support the assumption that faster messaging or technical settlement necessarily resolves the last-mile constraints that matter for user experience (CPMI, 2024; BIS, 2025).

Transparency and access also differ by architecture, but the evidence suggests that improvements in these dimensions are more uneven than headline speed claims often imply. Greater traceability or better status messaging does not always translate into full fee predictability, and wider technical connectivity does not automatically imply broad practical access. Overall, the study finds that architecture performance must be interpreted as a set of trade-offs rather than as a single score, which is consistent with payment-economics work that treats speed, finality, information, and reach as related but distinct dimensions of payment performance (Kahn and Roberds, 2009; Bindseil and Pantelopoulos, 2022).

#### 6.1.2 Research Question 2: Governance, Compliance, and Systemic Risk

The second research question asked what governance, compliance, and systemic-risk implications arise from each architecture family.

The study finds that governance quality is central to architecture feasibility. Cross-border payments do not scale internationally on technical capability alone. They scale when institutions can align on participation rules, messaging and data standards, liability allocation, compliance expectations, exception handling, access conditions, and operational recovery arrangements. In that sense, interoperability is not merely a technical problem. It is also a problem of institutional coordination and rule compatibility (Abbott and Snidal, 2000; Brummer, 2012; CPMI, 2024).

The evidence also shows that better performance on speed or cost does not eliminate risk. Rather, risk is reallocated. Legacy systems tend to suffer from delay, opacity, fragmented compliance, and multi-hop execution risk. Newer architectures may reduce some of these frictions while introducing other vulnerabilities, including operational concentration, cyber exposure, governance dependency, legal-finality uncertainty, or new fraud pathways. The study therefore rejects any assumption that more digital or more programmable architectures are inherently safer; instead, safety depends on governance quality, resilience design, compliance controls, and the credibility of finality arrangements (CPMI-IOSCO, 2012; EBA and ECB, 2025; FATF, 2025).

#### 6.1.3 Research Question 3: Reconfiguration of Intermediation

The third research question asked to what extent tokenised and IPS-based architectures reconfigure existing intermediation structures.

The findings do not support a simple disintermediation thesis. Banks, PSPs, infrastructure operators, and network providers continue to perform economically valuable roles, even where new technologies compress certain transaction steps. What changes is not the need for intermediation itself, but the way intermediary functions are distributed (Diamond, 1984; Gorton and Winton, 2003; Scholtens and van Wensveen, 2003).

The study finds that core functions such as liquidity provision, FX execution, compliance screening, orchestration, settlement access, data handling, and customer-facing distribution remain necessary across architectures. However, the actors performing those functions may change, and the boundaries between them may shift. In some contexts, non-bank PSPs or specialist fintechs can improve user-facing speed and pricing by combining local-rail access, clearer front-end design, and more efficient orchestration. In other contexts, incumbent institutions remain central because they retain balance-sheet capacity, trusted access, regulatory standing, and settlement reach. This is more consistent with

functional re-specialisation than with simple disintermediation (Coase, 1937; Williamson, 1985; Boot and Thakor, 2000).

#### 6.1.4 Research Question 4: Corridor and Institutional Conditions

The fourth research question asked under which corridor and institutional conditions each architecture is more feasible or effective.

The study finds that corridor context matters decisively. Architecture effectiveness depends on combinations of domestic infrastructure maturity, regulatory coordination, liquidity depth, payout arrangements, legal clarity, market concentration, and participant incentives. IPS interlinking appears more feasible where domestic instant-payment infrastructures are already strong and where bilateral or multilateral coordination can be achieved with manageable governance burden. Tokenised settlement appears more credible where legal certainty, regulated money forms, interoperable standards, and institutionally trusted participants are already in place (North, 1990; Katz and Shapiro, 1985; Rogers, 2003; CPMI, 2024).

This means that cross-border payment reform should not be understood as a search for one universally superior rail. It is better understood as the selection and combination of architecture components under corridor-specific constraints.

## 6.2 Theoretical, Managerial, and Policy Implications

### 6.2.1 Theoretical Implications

This dissertation makes three main conceptual and theoretical contributions, primarily in the form of integration, refinement, and context-sensitive extension.

First, it contributes an integrated framework for analysing cross-border payment architectures across performance, governance, and risk rather than treating them as purely technical alternatives. This matters because much of the existing debate remains segmented between technical innovation narratives, policy reform agendas, and financial-stability

concerns. By bringing these strands together, the study offers a more institutionally grounded basis for comparison (Kahn and Roberds, 2009; Brummer, 2012; Scott and Zachariadis, 2014).

Second, the findings refine the application of transaction cost and intermediation perspectives to digital payment reform. The evidence suggests that newer architectures can reduce some coordination, reconciliation, or timing frictions, but they do not eliminate the need for governance, trust, liquidity, or specialist intermediation. This supports a view of technological change in financial infrastructure as functional reallocation rather than straightforward disintermediation (Coase, 1937; Williamson, 1985; Diamond, 1984; Scholtens and van Wensveen, 2003).

Third, the study contributes to diffusion and network-based perspectives by showing that relative technical advantage is only one part of adoption. Compatibility, governance burden, legal clarity, installed infrastructure, and institutional trust all shape whether a model can scale. This helps explain why hybrid configurations may advance more quickly than purer replacement narratives, even where those narratives appear attractive in principle (Katz and Shapiro, 1985; Economides, 1996; Rogers, 2003).

#### 6.2.2 Managerial Implications

For incumbent banks, the findings suggest that the key strategic issue is not simply whether new architectures are threatening, but which payment functions remain defensible and which are being commoditised. Banks are unlikely to retain advantage merely by sitting inside long payment chains. Several practitioner views in this study also suggest that banks are being pushed by newer PSPs and fintech providers to modernise their cross-border stacks, reduce avoidable legacy dependence, and compete more directly on orchestration, pricing transparency, and user experience. Their stronger positions are likely to lie in liquidity provision, regulated settlement access, trust infrastructure, corporate

integration, compliance capabilities, treasury solutions, and selected orchestration roles. These implications are consistent with work on relationship banking, platform competition, and network governance, which suggests that defensible positions persist where institutions retain trusted access, integration advantages, and coordination power rather than merely occupying legacy transaction steps (Boot and Thakor, 2000; Rochet and Tirole, 2003; Scott and Zachariadis, 2014).

For payment service providers and fintechs, the findings suggest that customer value is often created less through abstract technological novelty than through the practical combination of local-rail connectivity, better front-end transparency, efficient FX execution, and simplified beneficiary experience. In other words, market differentiation may come from orchestration quality and user-centred design as much as from the underlying rail itself, consistent with open-banking and data-sharing scholarship that treats competitive advantage as increasingly tied to connectivity, interface quality, and service design rather than exclusive ownership of end-to-end infrastructure (Remolina, 2019; Remolina Leon, 2023).

For infrastructure operators and network providers, the findings imply that continued relevance depends on reducing coordination costs, improving predictability, and preserving interoperability across an increasingly plural payment environment. The strategic challenge is to remain valuable as coordination layers in a system where more specialised rails and models may coexist. This aligns with two-sided-market and network-governance perspectives, in which coordination value and standard-setting remain strategic even when transaction execution becomes more modular (Armstrong, 2006; Rochet and Tirole, 2003; Scott and Zachariadis, 2014).

### 6.2.3 Policy and Regulatory Implications

For policymakers and regulators, the study suggests that the future of cross-border payments is unlikely to be secured by any single technological intervention. Public policy should therefore avoid framing the issue as a binary choice between preserving incumbents and embracing total disruption. The more practical regulatory objective is to support architectures that improve outcomes while preserving legal certainty, operational resilience, effective oversight, and financial integrity (FSB, 2021; CPMI-IOSCO, 2012; FATF, 2025).

Three implications follow.

First, interoperability governance deserves as much attention as technical infrastructure. Rulebooks, standards alignment, liability design, access policies, and data-quality requirements are central to whether faster systems scale safely (Abbott and Snidal, 2000; CPMI, 2024).

Second, liquidity design remains a core policy issue. Architectural reforms that reduce visible user friction but leave underlying liquidity inefficiencies unresolved may produce only partial gains (Brunnermeier and Pedersen, 2009; Bindseil and Pantelopoulos, 2022).

Third, risk and fraud controls need to evolve alongside speed and transparency initiatives. Faster and more digital systems can still create serious vulnerabilities if authentication, verification, recovery, and data-sharing arrangements do not keep pace (Braithwaite, 2024; EBA and ECB, 2025; UK Finance, 2025).

For a DBA audience, these implications are especially important because they link technological choice to practical organisational and policy decisions rather than to abstract innovation claims.

### **6.3 Recommendations for Future Research**

This study has provided a time-stamped comparative assessment of selected cross-border payment architectures, but several areas require further research.

First, future studies could develop richer corridor-level datasets that go beyond cost and speed to include more systematic evidence on liquidity usage, repair rates, fraud exposure, exception handling, and operational resilience. One of the clearest constraints of current research is that public data remain much stronger for some dimensions than for others. A further priority for future research is the systematic study of unregulated or shadow cross-border payment channels, including unbacked crypto-asset and decentralised stablecoin arrangements, especially in remittance settings where such channels have become materially relevant. Such work would complement the present dissertation's focus on institutionally anchored and policy-relevant architectures by clarifying where alternative forms of money and transfer compete with, bypass, or eventually interact with regulated payment infrastructures.

Second, future research could examine architecture performance longitudinally. Cross-border payment reform is evolving quickly, and some of the most important initiatives remain at early implementation or pilot stages (FSB, 2025; BIS, 2025). Longitudinal work would help distinguish durable structural change from short-term experimentation or announcement effects.

Third, future studies could investigate specific use-case segments separately rather than treating cross-border payments as one homogeneous category. Retail remittances, SME transfers, corporate treasury flows, securities-related settlement, and intra-group liquidity management may each favour different architectural configurations. Future research could also examine cross-border payment reform by institutional actor type rather than by technology alone. Comparative studies of regulators, incumbent banks, infrastructure providers, and challenger firms would help explain why different groups

favour IPS interlinking, tokenised deposits, or stablecoins under different use-case conditions.

This line of enquiry should also incorporate adoption dynamics, including legacy transformation costs, interoperability thresholds, and the minimum scale required for new networks to achieve commercially viable network effects (Katz and Shapiro, 1985; Economides, 1996). Related work could test more directly whether compliance innovations, such as richer payment data and collaborative analytics, reduce both false positives and liquidity frictions in practice.

Fourth, more focused legal and regulatory comparison would be valuable, particularly around settlement finality, tokenised money, liability allocation, insolvency treatment, and cross-border enforceability. These issues emerged strongly in the qualitative evidence but could not be fully developed within the scope of the present dissertation (Kahn and Roberds, 2007; CPMI-IOSCO, 2012).

Fifth, future qualitative work could expand the expert evidence base through additional semi-structured expert interviews, a broader documentary corpus, or a fully iterative Delphi study where such an approach is feasible. Because this dissertation completed only one round of Delphi-informed expert elicitation, a future multi-round Delphi design could examine whether areas of expert divergence narrow over time when controlled feedback is introduced (Linstone and Turoff, 1975; Hsu and Sandford, 2007).

A further line of enquiry concerns whether tokenised-money adoption is driven primarily by architecture efficiency or by currency hierarchy, particularly the relative attraction of dollar-linked payment stablecoins in emerging-market and liquidity-constrained settings.

Finally, future research could test the hybrid model more directly by examining concrete architecture combinations rather than single families in isolation. This would be

especially useful where local instant-payment rails, tokenised settlement elements, incumbent messaging networks, and non-bank distribution models are increasingly interacting in practice.

## **6.4 Conclusion**

This dissertation set out to examine whether blockchain-related and alternative payment architectures can materially improve cross-border payments when compared with correspondent and incumbent models. The overall conclusion is cautious but clear.

The findings do not support the view that one architecture is poised to replace all others across all corridors and use cases. Nor do they support the opposite view that legacy arrangements will remain sufficient with only minor adjustment. Instead, the evidence points to a more nuanced outcome: the future of cross-border payments is likely to be hybrid, layered, and functionally specialised, with different architectures coexisting and interacting according to corridor conditions, governance arrangements, liquidity needs, and institutional trust. This outcome is consistent with the combined logic of transaction-cost economics, payment-network theory, and institutionally grounded innovation diffusion (Coase, 1937; Kahn and Roberds, 2009; Rogers, 2003).

In that sense, the central contribution of this dissertation is not to declare a single winner. It is to offer a defensible comparative framework for judging architecture choice under performance, governance, and risk constraints, and to show why hybrid, layered configurations are currently more plausible than binary replacement narratives. That contribution is captured most clearly in the Hybrid-Complementary Multi-Layer Stack presented in Figure 5.1, which synthesises the dissertation's central finding that coexistence across user-interface, distribution, tokenised wholesale-settlement, and governance layers is more plausible than winner-takes-all replacement.

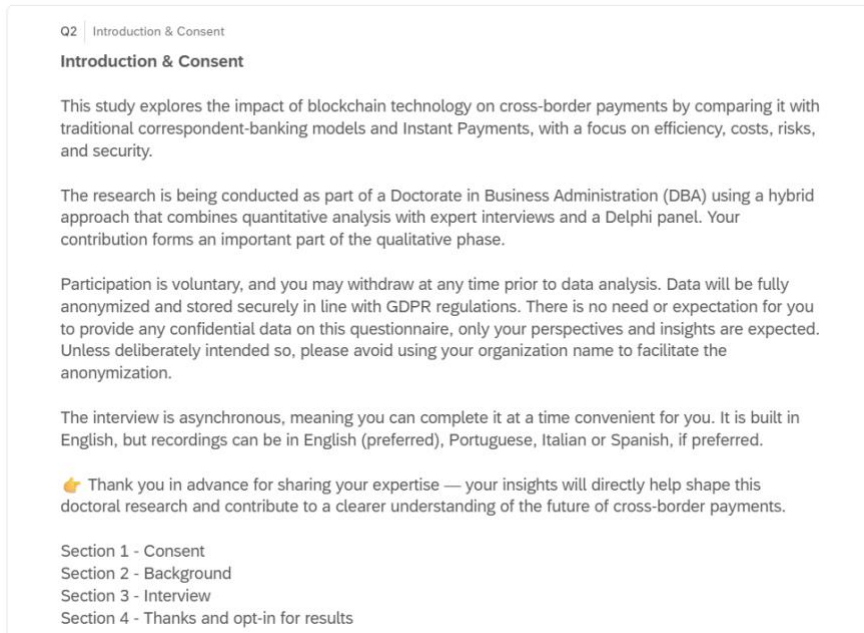
For a DBA dissertation, the practical implication is straightforward. The important question is not whether the future will be “blockchain” or “not blockchain.” The important question is which combinations of infrastructure, governance, and intermediation can deliver better cross-border payment outcomes without creating new weaknesses that outweigh the gains. On the evidence presented here, the most plausible answer is not total replacement, but disciplined redesign through complementary models.

## APPENDIX A

### INFORMED CONSENT / PARTICIPANT INFORMATION

The following screenshots reproduce the participant-facing consent and information screens used in the primary qualitative components of the study. In each case, participants were informed of the purpose of the research, the voluntary nature of participation, the intended academic use of the data, the treatment of quotations and anonymisation, and the right to decline participation. The same core consent logic was used across the live and asynchronous semi-structured interviews and the Delphi-informed structured expert elicitation exercise.

Live and Asynchronous semi-structured interview (screenshot from Qualtrics form):



The screenshot shows a Qualtrics form titled "Q2 | Introduction & Consent". The main heading is "Introduction & Consent". The text describes the study's focus on blockchain technology and cross-border payments, comparing it with traditional banking models. It mentions that the research is part of a Doctorate in Business Administration (DBA) and uses a hybrid approach of quantitative analysis, expert interviews, and a Delphi panel. It states that participation is voluntary and that data will be fully anonymized and stored securely in line with GDPR regulations. It also mentions that the interview is asynchronous and can be completed at a convenient time. A thank you message follows, stating that the participant's insights will help shape the doctoral research. At the bottom, there is a list of sections: Section 1 - Consent, Section 2 - Background, Section 3 - Interview, and Section 4 - Thanks and opt-in for results.

Q2 | Introduction & Consent

**Introduction & Consent**

This study explores the impact of blockchain technology on cross-border payments by comparing it with traditional correspondent-banking models and Instant Payments, with a focus on efficiency, costs, risks, and security.

The research is being conducted as part of a Doctorate in Business Administration (DBA) using a hybrid approach that combines quantitative analysis with expert interviews and a Delphi panel. Your contribution forms an important part of the qualitative phase.

Participation is voluntary, and you may withdraw at any time prior to data analysis. Data will be fully anonymized and stored securely in line with GDPR regulations. There is no need or expectation for you to provide any confidential data on this questionnaire, only your perspectives and insights are expected. Unless deliberately intended so, please avoid using your organization name to facilitate the anonymization.

The interview is asynchronous, meaning you can complete it at a time convenient for you. It is built in English, but recordings can be in English (preferred), Portuguese, Italian or Spanish, if preferred.

👏 Thank you in advance for sharing your expertise — your insights will directly help shape this doctoral research and contribute to a clearer understanding of the future of cross-border payments.

Section 1 - Consent  
Section 2 - Background  
Section 3 - Interview  
Section 4 - Thanks and opt-in for results

Delphi-informed structured expert elicitation (screenshot from Qualtrics form):

#### Instructions

##### Doctorate in Business Administration – Blockchain in Cross-Border Payments

**Purpose:** This Modified Delphi study invites senior experts to share perspectives on cross-border payment architectures — SWIFT/correspondent banking, Instant Payment Systems (IPS), blockchain/DLT, and hybrid combinations — to help build a risk-adjusted KPI framework and evidence-based guidance on where blockchain should complement, substitute, or integrate with existing infrastructure.

**How to participate** • Answer based on your professional experience. • If an item is outside your remit or you lack direct exposure, select N/A or skip it. • There are no right or wrong answers. • No confidential or proprietary information from any organisation is required.

This form works on mobile, but for the best experience (and clearer question layout), please use a larger screen.

**Consent & privacy.** Participation is voluntary. By continuing, you confirm you have read this information, are participating voluntarily, and consent to the anonymised use of your responses for this research. Once submitted, your responses will be included in aggregated analyses. All data are processed and stored securely in line with GDPR. You may withdraw anytime before data analysis. No names or identifying details will appear in any publication unless you explicitly request it.

## APPENDIX B SEMI-STRUCTURED INTERVIEW GUIDE

The following instrument was used to conduct the semi-structured expert interviews. To accommodate the geographic distribution and scheduling constraints of the expert participants, the interview guide offered an option to also be administered asynchronously via the Qualtrics platform. Participants were provided with a project overview, a glossary of key terms, and the option to record their responses via audio or video. The questions were designed to elicit detailed operational, strategic, and corridor-specific insights regarding the comparative performance, risks, and governance of different cross-border payment architectures.

### **Interview Questions**

#### **Background & Expertise**

- Current role/title; Organisation type; Main Area of Expertise; Years of experience in payments; Corridors/regions you know best

#### **Sub-Section A: Current Models & Constraints**

A1) Which cross-border payment models are most relevant in your work (e.g., correspondent banking via SWIFT messaging; IPS-linked; DLT/blockchain-based settlement)? Why these choices?

A2) What corridor constraints most shape model choice in your context (e.g., currency convertibility, regulation/AML, liquidity/prefunding, FX access, data/standards)?

#### **Sub-Section B: Performance**

B1) In your key corridors, where have you observed the largest improvements in end-to-end settlement time and total user cost? Please cite examples.

B2) How do transparency/traceability and return/failure rates compare across the three model classes in your experience?

### **Sub-Section C: Risk, Security & Compliance**

C1) How do outcomes differ across models for (i) fraud loss; (ii) AML false-positive rates/precision; (iii) sanctions-screening precision/recall?

C2) Which emerging risks are most material (e.g., smart-contract logic, bridge/connectors, wallet/KYC data quality, cyber)? How are these mitigated in practice?

### **Sub-Section D: Liquidity, FX & Settlement Mechanics**

D1) How does liquidity management differ across models (nostro/vostro balances; IPS prefunding/hub arrangements; tokenised/liquidity-pool constructs)?

D2) Give one concrete example in the last 12 months where changing the payment model affected one FX outcome in a corridor you know well (FX spread, FX slippage, or liquidity/FX-related return rate). Explain the direction and why.

### **Sub-Section E: Interoperability & Governance**

E1) Which interoperability mechanisms have worked or failed in your context (e.g., IPS-IPS linkages/hubs; RTGS-to-RTGS links; DLT bridges; API overlay networks)? Please provide one success and one failure, and why.

E2) Which governance features are most critical for safe interoperation (identity/KYC frameworks, ISO 20022/technical standards, legal rulebooks and SLAs)? List your top three.

### **Sub-Section F: Role Evolution & End-states**

F1) How do you see banks, SWIFT, and fintechs repositioning (e.g., compliance-as-a-service, liquidity overlays, orchestration/governance roles)?

F2) Under what corridor conditions does a DLT-based model substitute for IPS or correspondent banking, and when is it more likely to complement them?

### **Sub-Section G: Trends & Ecosystem Change (Foresight)**

G1) Over the next 3-5 years, what are the primary drivers of adoption for DLT-based cross-border models?

G2) Beyond regulation, what ecosystem-level shifts do you expect will have the greatest impact on cross-border payments?

**Sub-Section H: Outcomes & Priorities**

H1) For your primary client segment, rank the following by importance to end-users: Cost, Speed, Transparency/Traceability, Reliability/Availability.

H2) If you serve multiple segments, note differences.

**Final: Wrap-up & Ecosystem Foresight**

W1) How do you see the cross-border payments ecosystem evolving in 3-5 years? Highlight the most significant changes.

W2) Anything we missed that you'd like to add?

## APPENDIX C SINGLE-ROUND DELPHI-INFORMED STRUCTURED EXPERT ELICITATION INSTRUMENT

The following instrument was used for the single-round Delphi-informed structured expert elicitation exercise, administered digitally via Qualtrics. Consistent with the study's methodological design, this instrument functioned as a structured expert-elicitation tool rather than as a classical iterative consensus-building Delphi. It was designed to capture descriptive prioritisation of Key Performance Indicators (KPIs), comparative ratings of architecture outcomes, and strategic foresight regarding the scaled adoption of distributed ledger technologies.

### **Questionnaire Items**

#### **Background & Expertise**

- Current role/title; Organisation type; Main Area of Expertise; Years of experience in payments; Corridors/regions you know best

#### **Section A: KPI Prioritization**

- Target Client Segment: Indicate the main client segment for your responses (Large Corporate/Institutional, Consumer, SME, Mixed/General view)
- KPI Weighting: Allocate a total of 100 points across the following five criteria to show their relative importance when evaluating cross-border payment models: Cost, Speed, Transparency & Traceability, Risk & Compliance, Liquidity & PvP.
- Conjoint Comparison: Pairwise comparison rating the relative importance of the five criteria against one another (e.g., "Is Speed more important than Cost", etc.) on a scale from "Much more" to "Much less".

#### **Section B: Context Anchor & Architecture Outcomes**

- Select the corridor(s) you are familiar with or have observed in the last 12 months.
- Indicate which architecture (SWIFT, IPS, DLT/Hybrid) performs BEST in terms of: Cost efficiency, Speed, Transparency & traceability, Risk & compliance outcomes.
- Indicate which architecture (SWIFT, IPS, DLT/Hybrid) performs WORST in terms of: Cost efficiency, Speed, Transparency & traceability, Risk & compliance outcomes.
- (Optional) Add any rationale or consideration.

### **Section C: Architecture Outcomes Matrix**

- Rate how well each architecture (SWIFT, IPS, DLT, Hybrid) performs on a scale of 1 to 5 (1=Strongly disagree, 5=Strongly agree) for the following:
  - Delivers lower total user cost
  - Improves end-to-end settlement time and reduces returns
  - Enhances transparency and auditability
  - Maintains or improves risk outcomes
  - Offers superior operational resilience
  - Introduces new systemic or bridge risks
  - Security & data integrity in cross-ledger environments
- Rate the Regulatory & governance readiness for scaled use for each architecture on a scale of 1 to 5 (1=Very low, 5=Very high).

### **Section D: Risk & Compliance Focus**

- Select up to two risks that you view as most material: Smart-contract logic/automation error, Bridge/cross-ledger vulnerability, Data privacy/on-chain exposure, Liquidity fragmentation/token mispricing, Regulatory/compliance gaps, Operational resilience/cyber risk, AML/screening model bias.
- Select one key mitigation you believe is currently most effective for the above risks: Audited smart-contract governance, Regulated tokenised deposits/stablecoins, Stronger inter-ledger security standards, PvP/liquidity synchronisation, Enhanced compliance governance/rulebooks, Cyber/operational resilience controls.
- (Optional) Describe the hardest risk-performance trade-off you see in DLT payments.

### **Section E: Foresight & Strategic Outlook (2030)**

- Which option best describes how blockchain / DLT is most likely to function globally by 2030: Complementary layer, Substitute/alternative rail, Integrated component, Niche/experimental role, or Foundational settlement fabric.
- Select the top two adoption drivers: Regulatory clarity, Interoperability & standards, Liquidity solutions, Customer/Market demand, BigTech entry, CBDC Links, De-risking agenda.
- Select the top two barriers: Interoperability gaps, Regulatory uncertainty, Trust/identity, Liquidity constraints, Legacy integration cost.

- (Optional) Note one change that would most accelerate safer, cheaper cross-border payments.

## APPENDIX D. DOCUMENTARY CORPUS OF 45 PUBLIC TRANSCRIPTS

This appendix documents the public documentary corpus used in the thematic analysis. Consistent with Chapter 3, the corpus comprised 45 public policy and practitioner transcripts selected purposively for direct relevance to cross-border payment architecture, identifiable provenance, public accessibility, and sufficient substantive depth to support meaningful coding. For appendix purposes, “public transcripts” includes public speeches, panel discussions, podcast episodes, fireside chats, webinars, institutional presentations, and recorded interviews that were publicly accessible and coded as documentary evidence.

The corpus was not intended to be exhaustive. Rather, it was curated as an information-rich sample spanning public-sector, private-sector, infrastructure, and practitioner perspectives. It was used to identify recurring themes relating to interoperability, governance, liquidity, settlement, legal finality, compliance, risk, and the likely role of hybrid architectures. Not every item listed below was quoted directly in Chapter 5. Some informed coding, triangulation, and theme development without appearing as verbatim extracts in the main text.

*Table D.1. Inclusion criteria for the documentary corpus*

| <b>Criterion</b>                    | <b>Operational meaning in this study</b>                                                                                             | <b>Why it mattered analytically</b>                                      |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>Direct relevance</b>             | The transcript addressed cross-border payment architecture, interoperability, compliance, liquidity, settlement, governance, or risk | Ensured alignment with RQ1–RQ4                                           |
| <b>Identifiable provenance</b>      | The speaker, institution, or event context could be identified                                                                       | Reduced the risk of unattributed or low-traceability commentary          |
| <b>Public accessibility</b>         | The material was publicly available at the time of collection                                                                        | Supported transparency and auditability                                  |
| <b>Sufficient substantive depth</b> | The transcript contained more than passing remarks and offered usable content for coding                                             | Allowed meaningful thematic analysis rather than superficial referencing |

|                                    |                                                                                                                                                                            |                                                                         |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Institutional heterogeneity</b> | The corpus included public-sector, private-sector, infrastructure, and practitioner perspectives where possible                                                            | Reduced over-reliance on a single institutional narrative               |
| <b>Time relevance</b>              | The corpus prioritised contemporary material within the main observation window, while retaining a small number of earlier foundational items where conceptually important | Kept the corpus aligned with the study's time-stamped comparative logic |

*Source: Author's documentary corpus selection criteria.*

#### Corpus register

##### A. BIS Innovation Summit and BIS-related briefings

D01. Bech, M. et al. (2025) "Connecting the Dots – Public Sector Tokenisation." BIS Innovation Summit 2025.

D02. Bech, M. (2025) "Project Agorá – Cross-Border Payments Collaboration." BIS Innovation Summit 2025.

D03. Carstens, A. (2024) "Opening Remarks – Technological Innovation: Small Steps and Giant Leaps." BIS Innovation Summit 2024.

D04. Ford, J., Shin, H.S. and Maechler, A. (2023) "The Next-Generation Monetary and Financial System." BIS Media Briefing.

D05. Garratt, R., Cleland, V., Ingves, S., Adams, T. and Luo, Y. (2025) "Panel Discussion – Perspectives on Cross-Border Payments." BIS Innovation Summit 2025.

D06. Hopwood Road, F., El Demachy, M. and Shah, B. (2025) "Fighting Financial Crime: Project Aurora, Hertha, Mandala." BIS Innovation Summit 2025.

D07. Maechler, A., Skingsley, C., Carstens, A. et al. (2024) "Navigating Rapid Innovation (Day 2)." BIS Innovation Summit 2024.

D08. Maechler, A., Nagel, J., Schlegel, M., Yue, E. et al. (2025) "Future-Proofing Central Banks (Day 1)." BIS Innovation Summit 2025.

D09. McCormack, A., Gu, C., Jordan, T., Cunliffe, J. and McLaughlin, T. (2024) “Improving Cross-Border Payments – Should Central Banks Leave It to the Private Sector?” BIS Innovation Summit.

D10. Simmons, R. and Lee, J.G. (2025) “Fireside Chat – Designing a Legal Framework for Unified Ledgers.” BIS Innovation Summit 2025.

D11. Tangonan, M. (2024) “Project Nexus.” BIS Innovation Summit 2024.

D12. Tett, G., Carstens, A., Powell, J. and Weidmann, J. (2021) “How Can Central Banks Innovate in the Digital Age?” BIS Innovation Summit.

D13. Villeroy de Galhau, F. (2024) “Keynote Speech – Adopting New Technological Innovations.” BIS Innovation Summit 2024.

#### B. Sibos Conferences and Sibos TV

D14. Chatrath, S. (2024) “Unlocking Opportunities in Cross-Border Payments.” Sibos TV 2024.

D15. Corsini, L., Regal, D. and Abid (2023) “Removing Friction in Cross-Border Payments.” Sibos 2023, Toronto.

D16. Forest, H. (2024) “The Future of Real-Time Payments with Mastercard.” Sibos 2024.

D17. Richardson, S. (2025) “How Regulation Is Enabling, Not Hindering, the Integration of Stablecoins.” Sibos TV 2025.

D18. Swift (2025) “Future of Cross-Border Transactions with Swift’s Blockchain-Based Ledger.” Sibos TV 2025.

D19. Visa Cross-Border Solutions (2023) “Financial IT Interview with Visa Cross-Border Solutions.” Sibos 2023.

D20. Wallace, C. and Marquard, A. (2024) “Overcoming Transaction Banks’ Cross-Border Payments Pain Points.” Sibos 2024.

D21. Waller, C. (2025) “View from the Top: Governor Christopher Waller, Fed.” Sibos 2025.

D22. Williams, A. (2025) “Creating a Secure, Scalable and Innovation-Ready Fin Ecosystem.” Sibos TV 2025.

#### C. European Blockchain Convention

D23. European Blockchain Convention (2024) “Tokenization: Private Markets vs Public Markets.” EBC 2024.

D24. European Blockchain Convention (2024) “What Is Going on Behind the Scenes – Post MiCA.” EBC 2024.

D25. Klayman, J., Sabon, D., Libgi, G. et al. (2024) “Regulation of Digital Assets in UK vs EU vs US.” European Blockchain Convention.

D26. Leporchet, Y.M., Siedl, H., Tirado, J. et al. (2024) “Infrastructure Interoperability and Multi-Chain Networks.” European Blockchain Convention.

D27. Schwartzman, L., Madrolle, E. and Fenech, K. (2024) “Impact of Transfer of Funds Regulation in EU.” European Blockchain Convention.

#### D. Podcasts and institutional audio/video discussions

D28. Bantanidis, S. and Cornwall, M. (2025) “24x7 Finance in an Always-On World.” Citi Institute Future of Finance Forum, Citigroup.

D29. Gu, C. (2025) “Citi Stable Coins and Future of Money.” Citi Institute Future of Finance Forum, Citigroup.

D30. Miller, A., Ghose, R. and Pham, C. (2024) “Crypto, Stablecoins, and the Future of Digital Money.” The Citi Institute Podcast, Citigroup.

D31. Rugg, R. and Arena, C. (2023) “Exploring Web 3.0 and Digital Assets.” Citi Digital Dispatch, Episode 3, Citigroup.

D32. Rugg, R. and Bist, K. (2024) “Digital Dispatch E6.” Citi Digital Dispatch, Citigroup.

D33. Rugg, R. and McLaughlin, T. (2023) “Regulated Liability Network.” Citi Digital Dispatch, Episode 1, Citigroup.

D34. Rugg, R. and Ram, R. (2024) “Future of Borderless Networks.” Citi Digital Dispatch, Episode 9, Citigroup.

D35. Rugg, R. and Rooz, Y. (2024) “Digital Dispatch E10.” Citi Digital Dispatch, Citigroup.

D36. Rugg, R. and Zschach, T. (2024) “Digital Dispatch E8.” Citi Digital Dispatch, Citigroup.

D37. Steen, M. (host), featuring Cœuré, B., Chimenti, M.T. and Bullmann, D. (2019) “Innovation in Payments: Libra, Blockchain and Crypto-Assets.” The ECB Podcast, European Central Bank.

D38. Wiesenthal, J. and Alloway, T. (hosts), featuring Allaire, J. (2024) “Circle’s CEO on the Booming Business of Stablecoins.” Odd Lots Podcast, Bloomberg.

E. Other institutional conferences, policy dialogues, and webinars

D39. Bindseil, U., Petsan, D., Weishammer, C. and Storgaard, P. (2024) “Cross-Border Payments: TIPS for Getting There.” ECB Focus Session, European Central Bank.

D40. Bindseil, U., Chong, L.S. and Seju, D. (2024) “The Future of Cross-Border Payments: Connecting Instant Payment Systems Across Regions.” Singapore FinTech Festival 2024.

D41. Garcia Luna, J.A. (2024) “Governance of Scheme Systems.” Project FAST Webinar Series, World Bank.

D42. Garcia Luna, J.A. (2024) “WB Standards in Fast Payments.” World Bank.

D43. Guha, P. and Krishnan, S. (2024) “Cross-Border Payments – Retail and B2B.” Global Fintech Fest 2024.

D44. Ripple (2024) “Ripple Swell 2024.” Institutional conference / public session materials.

D45. Wise (2024) “Wise’s Journey: From Consumer-Focused to Global Payments Infrastructure.” Institutional presentation / public talk.

## APPENDIX E. QUANTITATIVE KPI SOURCE MAP AND VARIABLE DEFINITIONS

This appendix documents the quantitative evidence base used in Chapters 3 and 4. Its purpose is to make explicit the principal public sources used in the quantitative strand, the observation windows attached to those sources, the operational definitions of the core KPI dimensions, and the decision rules used to distinguish direct KPIs from architecture-relevant proxies. Consistent with the methodology chapter, the quantitative strand is designed as a descriptive public benchmark rather than a controlled architecture-isolated measurement exercise. Some dimensions are therefore more directly observable than others, and that asymmetry is treated as part of the empirical reality rather than obscured through false precision.

Source selection followed the principles set out in Chapter 3: authority, traceability, recency, relevance to one or more research questions, and a minimum level of comparability across architecture families. The main observation window runs from 2022 to early 2026, with the benchmark anchored in the World Bank’s Q1 2025 Remittance Prices Worldwide release and supplemented by official scheme, policy, regulatory, and network evidence where later or complementary data were available. This appendix should therefore be read as an audit trail for the quantitative strand rather than as a separate empirical exercise.

*Table E.1. Quantitative evidence hierarchy by dimension*

| <b>Dimension</b> | <b>Main public source(s)</b>                              | <b>Level of observation</b>           | <b>of</b> | <b>Evidence status</b>            |
|------------------|-----------------------------------------------------------|---------------------------------------|-----------|-----------------------------------|
| <b>Cost</b>      | World Bank, <i>Remittance Prices Worldwide</i> (Issue 53) | Corridor provider-level               | /         | Direct KPI                        |
| <b>Speed</b>     | FSB (2025); Swift (2026)                                  | Service-level aggregate network-level | /         | Direct KPI + operational evidence |

|                                      |                                                                       |                                   |   |                                   |
|--------------------------------------|-----------------------------------------------------------------------|-----------------------------------|---|-----------------------------------|
| <b>Transparency</b>                  | FSB (2025); selected scheme / infrastructure disclosures              | Service jurisdiction scheme-level | / | Partial KPI / proxy               |
| <b>Access</b>                        | FSB (2025); selected scheme / infrastructure evidence                 | Jurisdiction service-level        | / | Partial KPI / proxy               |
| <b>Fraud / risk</b>                  | EBA and ECB (2025); Central Bank of Ireland (2025); UK Finance (2025) | Jurisdiction regional-level       | / | Supplementary public risk lens    |
| <b>Illustrative innovation cases</b> | Banco Central do Brasil (2025); Verifone (2025); BIS (2024)           | Case-level                        |   | Supplementary, not core benchmark |

Note: Corridor-level comparability is strongest for cost. Speed is observed partly through aggregate availability measures and partly through network-transit evidence. Transparency and access are more unevenly observed and therefore rely more heavily on aggregate monitoring, scheme-level, network-level, or jurisdiction-level evidence. Fraud / risk indicators are treated as a supplementary public risk lens, not as a fully comparable fifth KPI.

*Table E.2. Core KPI operational definitions*

| Dimension | Operational definition used in this dissertation                                                                                          | Primary evidence                                  | Interpretive caution                                                                                                                     |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Cost      | End-user or corridor-level price of sending value across borders, including explicit transfer fees and, where visible, FX spread effects. | World Bank, Remittance Prices Worldwide (Q1 2025) | Public price data do not fully capture hidden institutional costs such as prefunding, treasury overhead, or governance-completion costs. |
| Speed     | Elapsed payment time interpreted by payment stage: interbank transit, settlement completion, or beneficiary funds availability.           | FSB (2025); Swift (2026)                          | Interbank transit is not identical to beneficiary funds availability, and neither is identical to legally final settlement.              |

|              |                                                                                                                                   |                                                                       |                                                                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transparency | Visibility and predictability of fees, FX conversion, payment status, timing, and data completeness across the payment chain.     | FSB (2025); selected scheme and infrastructure disclosures            | Direct corridor-level transparency measures are limited, so this dimension combines direct disclosure evidence with architecture-characteristic evidence. |
| Access       | Both institutional access and practical end-user reach.                                                                           | FSB (2025); selected infrastructure and scheme evidence               | Technical or institutional participation does not automatically imply broad practical customer or merchant usability in a given corridor.                 |
| Fraud / risk | Public fraud values and fraud rates used to contextualise the safety implications of faster or more digital payment environments. | EBA and ECB (2025); Central Bank of Ireland (2025); UK Finance (2025) | Fraud and risk indicators are not treated as a harmonised fifth KPI across architectures; they are used as a supplementary public risk lens.              |

**Interpretive caution:** Fraud and risk indicators are **not** treated as a harmonised fifth KPI across architectures. They are used as a supplementary public risk lens to show that visible efficiency gains may coexist with meaningful safety trade-offs.

## **E.2 Source cards**

### **E2.1 World Bank, *Remittance Prices Worldwide* (Issue 53)**

**Observation window:** Q1 2025, anchored in the RPW historical series.

**Level of observation:** Corridor / provider-level.

**Variables extracted for this study:** Global average cost of sending USD 200; digital remittance average; digital-only MTO index; international MTO index; global

weighted average; banks average; selected funding-method and disbursement-method benchmarks; global average cost of sending USD 500.

**Analytical role:** Core direct retail/remittance cost benchmark.

**Reason retained:** This is the strongest and most reproducible public source for user-facing cross-border payment cost comparison.

**Main limitation:** Provider categories do not map one-to-one onto the architecture families used elsewhere in the dissertation.

## **E2.2 Financial Stability Board (2025), *G20 Roadmap for Cross-Border Payments: Consolidated Progress Report for 2025***

**Observation window:** 2025.

**Level of observation:** Service-level aggregate.

**Variables extracted for this study:** Share of services credited within one hour; share credited within one business day; transparency disclosure share; access indicators; narrative assessment of progress toward 2027 targets.

**Analytical role:** Aggregate monitoring context aligned to the G20 KPI framework.

**Reason retained:** Provides the clearest official system-level view of global progress across the four main KPI families.

**Main limitation:** Aggregated monitoring does not isolate architecture effects cleanly and is not corridor-pure.

## **E2.3 Swift (2026), retail-payments framework announcement**

**Observation window:** March 2026.

**Level of observation:** Network-level.

**Variables extracted for this study:** Share of payments reaching destination banks within 10 minutes; last-mile discussion distinguishing arrival at destination bank from final beneficiary crediting.

**Analytical role:** Operational evidence qualifying interbank transit versus end-user availability.

**Reason retained:** Useful for separating network transit performance from final user-facing receipt.

**Main limitation:** Provider/network-reported evidence is not the same as a corridor-pure end-user KPI.

#### **E2.4 European Banking Authority and European Central Bank (2025), *Report on Payment Fraud***

**Observation window:** 2024 reporting year, with comparative discussion across periods.

**Level of observation:** Regional / jurisdictional.

**Variables extracted for this study:** Total payment fraud value; fraudulent credit transfer values and rates; relative fraud exposure inside versus outside the EEA.

**Analytical role:** Supplementary public risk lens for cross-border and payment-instrument safety.

**Reason retained:** Strong official source showing that low percentage fraud rates can coexist with high absolute losses and governance-fragmentation effects.

**Main limitation:** Regional and instrument-based rather than architecture-specific.

#### **E2.5 Central Bank of Ireland (2025), *Payment Fraud Statistics 2024***

**Observation window:** 2022–2024.

**Level of observation:** National / instrument-level.

**Variables extracted for this study:** Total fraud value; fraudulent money remittances; money-remittance fraud rate.

**Analytical role:** Supplementary remittance-specific public risk evidence.

**Reason retained:** Adds a particularly relevant lens on remittance fraud and the safety dimension of cross-border payment use cases.

**Main limitation:** National and instrument-specific rather than directly architecture-specific.

#### **E2.6 UK Finance (2025), *Annual Fraud Report 2025***

**Observation window:** 2024, with comparisons to 2023.

**Level of observation:** National / APP-focused.

**Variables extracted for this study:** International APP-payment cases and losses.

**Analytical role:** Supplementary evidence on fraud exposure in a mature retail market.

**Reason retained:** Shows that payment modernisation and digital convenience can coexist with significant authorised push payment losses.

**Main limitation:** National, APP-specific, and not a harmonised architecture-comparison measure.

#### **E2.7 Illustrative innovation case sources**

**Sources:** Banco Central do Brasil (2025); Verifone (2025); BIS (2024).

**Observation window:** 2024–2025.

**Level of observation:** Case-level.

**Variables / evidence used:** Pix scale and adoption context; public announcement of international Pix acceptance arrangement; mBridge MVP-stage and governance/rulebook status.

**Analytical role:** Supplementary innovation cases, not core benchmark evidence.

**Reason retained:** Useful for illustrating how two reform trajectories—IPS-linked retail extension and tokenised wholesale settlement—are moving from concept toward deployment.

**Main limitation:** These cases are not equivalent to the main benchmark indicators and are therefore treated illustratively rather than as additional KPI scores.

### **E.3 Decision rules used in Chapter IV**

**1. Direct KPIs were preferred over proxies whenever possible.**

Cost is the strongest direct KPI in the study and therefore carries the greatest weight in the benchmark.

**2. Speed was interpreted by payment stage, not collapsed into a single metric.**

Interbank transit, beneficiary funds availability, and legally final settlement were treated as analytically distinct.

**3. Provider categories were not treated as pure architecture labels.**

For example, digital-only MTOs were used as architecture-relevant public evidence, not as one-to-one proxies for a single architecture family.

**4. Transparency and access were treated as partially observed dimensions.**

Where direct corridor-level measures were weak or unavailable, the dissertation relied on aggregate monitoring and architecture-characteristic evidence while keeping the limitation explicit.

**5. Fraud and risk were treated as a supplementary public risk lens.**

They were not converted into a harmonised fifth KPI because the available evidence is jurisdictional, instrument-based, and non-equivalent across architectures.

**6. No composite architecture score was constructed.**

The dissertation preserves trade-offs and asymmetries rather than forcing heterogeneous indicators into a single numerical ranking.

**7. Negative evidence was retained.**

Where a dimension could not be observed cleanly for a given architecture family, the gap was reported rather than silently normalised away.

**E.4 Final note on interpretation**

This appendix should be read together with Chapters 3 and 4. Its purpose is not to imply that all variables are observed with equal strength. Rather, it makes explicit the dissertation's central methodological position: cross-border payment benchmarking is strongest where public evidence is direct and reproducible, weaker where evidence is aggregate or proxy-based, and necessarily interpretive where governance, liquidity, legal-finality, or resilience factors are only partially visible in public quantitative data. That unevenness is not a defect to be hidden; it is part of the empirical reality the dissertation seeks to analyse.

## APPENDIX F. SUPPLEMENTARY DELPHI / QUANTITATIVE TABLES

### *Appendix F.1. Section A KPI weighting summary*

| <b>KPI criterion</b>                                            | <b>Average weight</b> | <b>Minimum</b> | <b>Maximum</b> | <b>Standard deviation</b> | <b>Usable responses</b> |
|-----------------------------------------------------------------|-----------------------|----------------|----------------|---------------------------|-------------------------|
| <b>Cost (total user cost, FX spread)</b>                        | 23.64                 | 5              | 45             | 11.64                     | 11                      |
| <b>Speed (end-to-end settlement time)</b>                       | 25.91                 | 15             | 40             | 8.61                      | 11                      |
| <b>Transparency &amp; traceability</b>                          | 18.64                 | 10             | 40             | 8.69                      | 11                      |
| <b>Risk &amp; compliance (fraud, AML / sanctions precision)</b> | 20.45                 | 10             | 40             | 10.6                      | 11                      |
| <b>Liquidity &amp; PvP (prefunding, slippage, fails)</b>        | 12.5                  | 0              | 20             | 6.77                      | 10                      |

### *Appendix F.2. Section B architecture selected as best / worst by criterion*

| <b>Criterion</b>                                                        | <b>SWIFT</b> | <b>IPS</b> | <b>DLT Hybrid</b> | <b>Usable responses</b> |
|-------------------------------------------------------------------------|--------------|------------|-------------------|-------------------------|
| <b>Cost efficiency (lower total user cost)</b>                          | 1            | 1          | 9                 | 11                      |
| <b>Speed (faster, more predictable settlement)</b>                      | 0            | 5          | 6                 | 11                      |
| <b>Transparency &amp; traceability (real-time status, auditability)</b> | 4            | 2          | 5                 | 11                      |
| <b>Risk &amp; compliance outcomes (fraud / AML / sanctions)</b>         | 6            | 4          | 1                 | 11                      |

### **Section B architecture selected as WORST by criterion**

| <b>Criterion</b>                                                        | <b>SWIFT</b> | <b>IPS</b> | <b>DLT Hybrid</b> | <b>Usable responses</b> |
|-------------------------------------------------------------------------|--------------|------------|-------------------|-------------------------|
| <b>Cost efficiency (lower total user cost)</b>                          | 10           | 1          | 0                 | 11                      |
| <b>Speed (faster, more predictable settlement)</b>                      | 11           | 0          | 0                 | 11                      |
| <b>Transparency &amp; traceability (real-time status, auditability)</b> | 5            | 3          | 2                 | 10                      |

|                                                                 |   |   |   |    |
|-----------------------------------------------------------------|---|---|---|----|
| <b>Risk &amp; compliance outcomes (fraud / AML / sanctions)</b> | 1 | 3 | 6 | 10 |
|-----------------------------------------------------------------|---|---|---|----|

*Appendix F.3. Section C descriptive median ratings*

| <b>Outcome</b>                                                                                    | <b>SWIFT</b> | <b>IPS</b>   | <b>DLT</b>   | <b>Hybrid</b> |
|---------------------------------------------------------------------------------------------------|--------------|--------------|--------------|---------------|
| <b>Delivers lower total user cost</b>                                                             | 2.0 (n = 10) | 4.0 (n = 9)  | 5.0 (n = 10) | 4.0 (n = 10)  |
| <b>Improves end-to-end settlement time and reduces returns</b>                                    | 2.0 (n = 10) | 4.0 (n = 9)  | 4.5 (n = 10) | 4.0 (n = 9)   |
| <b>Enhances transparency and auditability</b>                                                     | 4.0 (n = 11) | 4.0 (n = 9)  | 5.0 (n = 11) | 4.0 (n = 11)  |
| <b>Maintains or improves risk outcomes (fraud / AML / sanctions)</b>                              | 5.0 (n = 9)  | 3.0 (n = 9)  | 2.5 (n = 10) | 2.0 (n = 9)   |
| <b>Section C descriptive median ratings: resilience, risk, and readiness outcomes (1–5 scale)</b> |              |              |              |               |
| <b>Outcome</b>                                                                                    | <b>SWIFT</b> | <b>IPS</b>   | <b>DLT</b>   | <b>Hybrid</b> |
| <b>Offers superior operational resilience (uptime / incidents)</b>                                | 4.0 (n = 9)  | 3.0 (n = 8)  | 3.0 (n = 9)  | 3.0 (n = 8)   |
| <b>Introduces new systemic or bridge risks (smart-contract, token liquidity)*</b>                 | 1.5 (n = 10) | 3.0 (n = 9)  | 4.0 (n = 10) | 4.0 (n = 9)   |
| <b>Security &amp; data integrity in cross-ledger environments</b>                                 | 4.0 (n = 8)  | 3.0 (n = 5)  | 4.0 (n = 7)  | 3.5 (n = 6)   |
| <b>Regulatory &amp; governance readiness for scaled use</b>                                       | 5.0 (n = 11) | 4.0 (n = 11) | 2.0 (n = 11) | 3.0 (n = 10)  |

*Appendix F.4. Section D material risks and mitigations*

| <b>Risk category</b>                                                             | <b>Count</b> | <b>Share of usable responses</b> |
|----------------------------------------------------------------------------------|--------------|----------------------------------|
| <b>Smart-contract logic or automation error</b>                                  | 1            | 9%                               |
| <b>Bridge or cross-ledger vulnerability</b>                                      | 5            | 45%                              |
| <b>Data privacy / on-chain exposure</b>                                          | 4            | 36%                              |
| <b>Liquidity fragmentation or token mispricing</b>                               | 1            | 9%                               |
| <b>Regulatory / compliance gaps (KYC, travel rule, jurisdiction uncertainty)</b> | 7            | 64%                              |
| <b>AML or screening model bias (AI/ML)</b>                                       | 4            | 36%                              |
| <b>Section D key mitigation counts</b>                                           |              |                                  |

| <b>Mitigation option</b>                                           | <b>Count</b> | <b>Share of usable responses</b> |
|--------------------------------------------------------------------|--------------|----------------------------------|
| <b>Audited smart-contract and code governance</b>                  | 2            | 18%                              |
| <b>Regulated tokenised deposits / stablecoin frameworks</b>        | 5            | 45%                              |
| <b>Enhanced compliance governance / rulebooks (ISO 20022, LEI)</b> | 4            | 36%                              |

Supplementary free-text note

“Impacting the singleness of money (stablecoins)”

*Appendix F.5. Section E outlook, adoption drivers, and barriers*

| <b>Outlook option</b>                                                                                          | <b>Count</b> | <b>Share of usable responses</b> |
|----------------------------------------------------------------------------------------------------------------|--------------|----------------------------------|
| <b>Complementary layer – enhances or connects existing rails</b>                                               | 3            | 27%                              |
| <b>Integrated component – embedded within hybrid architectures combining SWIFT, IPS, and DLT functions</b>     | 6            | 55%                              |
| <b>Foundational settlement fabric – provides the underlying ledger on which multiple networks interoperate</b> | 2            | 18%                              |

| <b>Section E top adoption-driver counts</b> |              |                                  |
|---------------------------------------------|--------------|----------------------------------|
| <b>Adoption driver</b>                      | <b>Count</b> | <b>Share of usable responses</b> |
| <b>Regulatory clarity</b>                   | 7            | 64%                              |
| <b>Interoperability &amp; standards</b>     | 5            | 45%                              |
| <b>Liquidity solutions</b>                  | 3            | 27%                              |
| <b>Customer / market demand</b>             | 3            | 27%                              |
| <b>De-risking agenda</b>                    | 2            | 18%                              |
| <b>BigTech entry</b>                        | 1            | 9%                               |
| <b>CBDC links</b>                           | 1            | 9%                               |

| <b>Section E top barrier counts</b> |              |                                  |
|-------------------------------------|--------------|----------------------------------|
| <b>Barrier</b>                      | <b>Count</b> | <b>Share of usable responses</b> |
| <b>Interoperability gaps</b>        | 9            | 82%                              |

|                                |   |     |
|--------------------------------|---|-----|
| <b>Regulatory uncertainty</b>  | 7 | 64% |
| <b>Trust / identity</b>        | 3 | 27% |
| <b>Legacy integration cost</b> | 2 | 18% |
| <b>Liquidity constraints</b>   | 1 | 9%  |

Note: In Section E, the 2030 outlook item required one dominant choice, while the adoption-driver and barrier items allowed multiple selections.

*Appendix F.6. Selected FSB 2025 aggregate KPI context*

| <b>INDICATOR</b>                                                           | <b>2025 VALUE</b>                                                     | <b>ANALYTICAL RELEVANCE</b>                                                      |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Retail services credited within one hour</b>                            | 35.4%                                                                 | Shows that rapid retail availability remains far from universal.                 |
| <b>Retail services credited within one business day</b>                    | 67.3%                                                                 | Confirms improvement, but not full real-time achievement.                        |
| <b>Remittance services making funds available within one hour</b>          | 54.4%                                                                 | Indicates better performance than broad retail averages, but still incomplete.   |
| <b>Wholesale cross-border payments credited within one hour</b>            | 54.6%                                                                 | Shows significant but still partial progress at wholesale level.                 |
| <b>Services providing both cost and speed information</b>                  | 62.9%                                                                 | Aggregate transparency indicator.                                                |
| <b>Adults aged 15+ with transaction account at a regulated institution</b> | 78.7%                                                                 | Broad access precondition rather than direct cross-border usability.             |
| <b>MSMES with transaction account at a regulated institution</b>           | 90.4%                                                                 | Institutional access / reachability context.                                     |
| <b>FSB overall assessment of 2027 trajectory</b>                           | Global targets unlikely to be met satisfactorily on current timelines | Reinforces the dissertation's conclusion that progress is uneven and incomplete. |

*Appendix F.7. Supplementary RPW configuration benchmarks (Q1 2025)*

| <b>Public benchmark</b>          | <b>Q1 2025 value</b> | <b>Analytical relevance</b>                                                     |
|----------------------------------|----------------------|---------------------------------------------------------------------------------|
| <b>Mobile-money funding</b>      | 3.63%                | Cheapest observed funding method; origination design matters materially.        |
| <b>Debit/credit-card funding</b> | 4.68%                | Mid-range funding cost; card-based origination can compress front-end friction. |
| <b>Bank-account funding</b>      | 8.81%                | Highest-cost mainstream funding method.                                         |
| <b>Debit-card disbursement</b>   | 3.44%                | Cheapest observed payout method.                                                |
| <b>Cash disbursement</b>         | 5.70%                | Shows that cash-out remains relevant in some corridors.                         |

|                                                             |        |                                                                    |
|-------------------------------------------------------------|--------|--------------------------------------------------------------------|
| <b>Bank-account disbursement (any bank)</b>                 | 7.99%  | Bank payout does not automatically imply lower user-facing cost.   |
| <b>Bank-account disbursement (same bank / partner bank)</b> | 13.46% | Institutional proximity does not necessarily reduce end-user cost. |
| <b>Global average cost of sending USD 500</b>               | 4.26%  | Demonstrates amount sensitivity in retail/remittance benchmarks.   |

*Source: Author's synthesis based on World Bank, Remittance Prices Worldwide, Issue 53, Q1 2025.*

*Table F.8. Historical corridor screening and public data availability*

This appendix documents the historical corridor-screening logic used in earlier phases of the dissertation. In the design stage, corridor selection was guided by two filters: **analytical relevance** and **public data availability**. The final dissertation later simplified the quantitative design and moved away from a full corridor-quarter panel, but the original screening logic remains important because it shows that corridor choice was not arbitrary and that public data availability was a practical and methodological constraint.

| <b>Corridor</b>           | <b>Original role in design</b> | <b>Public cost-series availability in working files</b> | <b>Analytical rationale</b>                                                     | <b>Current status in final thesis</b>          | <b>Reason for current status</b>                      |
|---------------------------|--------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------|
| <b>US→Mexico</b>          | Retained core corridor         | Strong / comparable RPW coverage                        | Large remittance corridor; high policy salience; legacy and digital competition | Core benchmark background / Chapter IV context | Strong public cost coverage and comparative relevance |
| <b>Singapore→Thailand</b> | Retained core corridor         | Strong / comparable RPW coverage                        | Asian corridor with strong IPS relevance                                        | Core benchmark background / Chapter            | Strong data coverage and infrastructure relevance     |

|                                |                                               |                                            |                                                                                        |                                                                       |                                                                                 |
|--------------------------------|-----------------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------|
|                                |                                               |                                            |                                                                                        | IV<br>context                                                         |                                                                                 |
| <b>UK→Kenya</b>                | Retained<br>core<br>corridor                  | Strong /<br>comparab<br>le RPW<br>coverage | Mobile-money<br>and digital-<br>wallet<br>relevance                                    | Core<br>benchmar<br>k<br>backgrou<br>nd /<br>Chapter<br>IV<br>context | Strong data<br>coverage<br>and<br>distinctive<br>retail<br>architectur<br>e     |
| <b>France→Morocco</b>          | Retained<br>core<br>corridor                  | Strong /<br>comparab<br>le RPW<br>coverage | Euro–North<br>Africa<br>remittance<br>corridor                                         | Core<br>benchmar<br>k<br>backgrou<br>nd /<br>Chapter<br>IV<br>context | Strong<br>public cost<br>coverage<br>and<br>regional<br>relevance               |
| <b>UAE→India</b>               | Retained<br>core<br>corridor                  | Strong /<br>comparab<br>le RPW<br>coverage | High-volume<br>remittance<br>corridor with<br>strong<br>digital/payment<br>relevance   | Core<br>benchmar<br>k<br>backgrou<br>nd /<br>Chapter<br>IV<br>context | Strong<br>public cost<br>coverage<br>and<br>corridor<br>salience                |
| <b>Italy→Romania</b>           | Retained<br>core<br>corridor                  | Strong /<br>comparab<br>le RPW<br>coverage | Intra-European<br>remittance<br>corridor with<br>persistent<br>frictions               | Core<br>benchmar<br>k<br>backgrou<br>nd /<br>Chapter<br>IV<br>context | Strong<br>public cost<br>coverage<br>and<br>institutiona<br>l contrast          |
| <b>US→Brazil</b>               | Candida<br>te /<br>robustne<br>ss<br>corridor | Strong /<br>comparab<br>le RPW<br>coverage | Relevant to Pix-<br>linked<br>internationalisat<br>ion and<br>innovation<br>discussion | Illustrativ<br>e case /<br>appendix<br>only                           | Data were<br>available,<br>but the<br>final<br>benchmark<br>set was<br>narrowed |
| <b>Hong Kong<br/>SAR→China</b> | Candida<br>te /<br>innovati                   | Weak or<br>non-<br>comparab                | Relevant to<br>tokenised<br>settlement /                                               | Illustrativ<br>e<br>innovatio                                         | Strong<br>innovation<br>relevance,                                              |

|                |                                       |                       |                |                                                |
|----------------|---------------------------------------|-----------------------|----------------|------------------------------------------------|
| on<br>corridor | le RPW<br>cost-<br>series<br>coverage | mBridge<br>discussion | n case<br>only | but weaker<br>public cost<br>comparabil<br>ity |
|----------------|---------------------------------------|-----------------------|----------------|------------------------------------------------|

**Source:** *Author's reconstruction from RPW-derived working files and Chapter IV source-development materials.*

Note: This table records the historical screening logic used during the development of the dissertation. It should not be read as evidence that all candidate corridors formed part of the final core benchmark set.

## REFERENCES

- Abbott, K.W. and Snidal, D. (2000) 'Hard and soft law in international governance', *International Organization*, 54(3), pp. 421–456.  
<https://doi.org/10.1162/002081800551280>
- Aleinieh, T.K. and Zoboli, L. (2021) 'Increasing standardization for smart(er) contracts', *Uniform Law Review*, 26(3), pp. 583–598. <https://doi.org/10.1093/ulr/unab022>
- Allen, F. and Gale, D. (2000) *Comparing financial systems*. Cambridge, MA: MIT Press.
- Armstrong, M. (2006) 'Competition in two-sided markets', *RAND Journal of Economics*, 37(3), pp. 668–691. <https://doi.org/10.1111/j.1756-2171.2006.tb00037.x>
- Arner, D.W., Barberis, J. and Buckley, R.P. (2017) 'FinTech, RegTech, and the reconceptualization of financial regulation', *Northwestern Journal of International Law & Business*, 37(3), pp. 371–413. Available at: <https://scholarlycommons.law.northwestern.edu/njilb/vol37/iss3/2/> (Accessed: 24 March 2026).
- Bains, P., Ismail, A., Melo, F. and Sugimoto, N. (2022) *Regulating the crypto ecosystem: the case of unbacked crypto assets*. IMF Fintech Note No. 2022/007. Washington, DC: International Monetary Fund. <https://doi.org/10.5089/9798400221361.063>
- Banco Central do Brasil (2025) *Pix at 5: the innovation that transformed payments in Brazil*. Available at: <https://www.bcb.gov.br/en/pressdetail/2640/nota> (Accessed: 27 March 2026).
- Bank for International Settlements (2023) *Annual Economic Report 2023: blueprint for the future monetary system: improving the old, enabling the new*. Basel: Bank for International Settlements. Available at: <https://www.bis.org/publ/arpdf/ar2023e3.pdf> (Accessed: 24 March 2026).
- Bank for International Settlements (2024) *Project mBridge reaches minimum viable product stage and invites further international participation*. Press release, 5 June. Basel: Bank for International Settlements. Available at: <https://www.bis.org/press/p240605.htm> (Accessed: 27 March 2026).
- Bank for International Settlements (2025) *Annual Economic Report 2025: the next-generation monetary and financial system*. Basel: Bank for International Settlements. Available at: <https://www.bis.org/publ/arpdf/ar2025e3.pdf> (Accessed: 24 March 2026).

- Bech, M.L. and Garratt, R. (2017) ‘Central bank cryptocurrencies’, *BIS Quarterly Review*, September, pp. 55–70. Available at: [https://www.bis.org/publ/qtrpdf/r\\_qt1709f.htm](https://www.bis.org/publ/qtrpdf/r_qt1709f.htm) (Accessed: 24 March 2026).
- Belchior, R., Vasconcelos, A., Guerreiro, S. and Correia, M. (2022) ‘A survey on blockchain interoperability: past, present, and future trends’, *ACM Computing Surveys*, 54(8), pp. 1–41. <https://doi.org/10.1145/3471140>
- BIS Innovation Hub (2025) *Project Rialto: improving instant cross-border payments using central bank money settlement*. Interim report. Basel: Bank for International Settlements. Available at: <https://www.bis.org/publ/othp91.pdf> (Accessed: 24 March 2026).
- Bindseil, U. and Pantelopoulos, G. (2022) *Towards the holy grail of cross-border payments*. ECB Working Paper No. 2693. Frankfurt am Main: European Central Bank. Available at: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2693~8d4e580438.en.pdf> (Accessed: 27 March 2026).
- Boot, A.W.A. and Thakor, A.V. (2000) ‘Can relationship banking survive competition?’, *The Journal of Finance*, 55(2), pp. 679–713. <https://doi.org/10.1111/0022-1082.00223>
- Braithwaite, J. (2024) ‘Authorized push payment bank fraud: what does an effective regulatory response look like?’, *Journal of Financial Regulation*, 10(2), pp. 174–193. <https://doi.org/10.1093/jfr/fjac006>
- Braun, V. and Clarke, V. (2006) ‘Using thematic analysis in psychology’, *Qualitative Research in Psychology*, 3(2), pp. 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Brummer, C. (2012) *Soft law and the global financial system: rule making in the 21st century*. Cambridge: Cambridge University Press.
- Brunnermeier, M.K. and Pedersen, L.H. (2009) ‘Market liquidity and funding liquidity’, *The Review of Financial Studies*, 22(6), pp. 2201–2238. <https://doi.org/10.1093/rfs/hhn098>
- Capocasale, V. and Perboli, G. (2022) ‘Standardizing smart contracts’, *IEEE Access*, 10, pp. 91203–91212. <https://doi.org/10.1109/ACCESS.2022.3202550>
- Catalini, C. and Gans, J.S. (2020) ‘Some simple economics of the blockchain’, *Communications of the ACM*, 63(7), pp. 80–90. <https://doi.org/10.1145/3359552>

Central Bank of Ireland (2025) *Payment fraud statistics 2024*. Dublin: Central Bank of Ireland. Available at: <https://www.centralbank.ie/statistics/data-and-analysis/payment-fraud-statistics> (Accessed: 27 March 2026).

Citigroup (2023) *U.S. financial services industry study demonstrates feasibility of a regulated digital asset settlement platform supported by shared ledger technology*. Press release, 6 July. Available at: <https://www.citigroup.com/global/news/press-release/2023/regulated-digital-asset-settlement-platform-support-shared-ledger-technology-us-financial-services-industry-study-feasibility> (Accessed: 27 March 2026).

Coase, R.H. (1937) 'The nature of the firm', *Economica*, 4(16), pp. 386–405. <https://doi.org/10.1111/j.1468-0335.1937.tb00002.x>

CPMI (2016) *Correspondent banking*. Basel: Bank for International Settlements. Available at: <https://www.bis.org/cpmi/publ/d147.pdf> (Accessed: 24 March 2026).

CPMI (2020) *Enhancing cross-border payments: building blocks of a global roadmap*. Basel: Bank for International Settlements. Available at: <https://www.bis.org/cpmi/publ/d193.pdf> (Accessed: 24 March 2026).

CPMI (2021) *Developments in retail fast payments and implications for RTGS systems*. CPMI Papers No. 201. Basel: Bank for International Settlements. Available at: <https://www.bis.org/cpmi/publ/d201.pdf> (Accessed: 24 March 2026).

CPMI (2024) *Linking fast payment systems across borders: governance and oversight*. Basel: Bank for International Settlements. Available at: <https://www.bis.org/cpmi/publ/d223.pdf> (Accessed: 24 March 2026).

CPMI-IOSCO (2012) *Principles for financial market infrastructures*. Basel: Bank for International Settlements. Available at: <https://www.bis.org/cpmi/publ/d101a.pdf> (Accessed: 24 March 2026).

Creswell, J.W. and Plano Clark, V.L. (2018) *Designing and conducting mixed methods research*. 3rd edn. Thousand Oaks, CA: Sage.

Diamond, D.W. (1984) 'Financial intermediation and delegated monitoring', *The Review of Economic Studies*, 51(3), pp. 393–414. <https://doi.org/10.2307/2297430>

Economides, N. (1996) 'The economics of networks', *International Journal of Industrial Organization*, 14(6), pp. 673–699. [https://doi.org/10.1016/0167-7187\(96\)01015-6](https://doi.org/10.1016/0167-7187(96)01015-6)

EBA and ECB (2025) *Report on payment fraud*. EBA/REP/2025/40. Paris and Frankfurt am Main: European Banking Authority and European Central Bank. Available at: <https://www.eba.europa.eu/sites/default/files/2025-12/1709846a-84d9-47cf-86a0->

[b155efb34d66/EBA%20and%20ECB%20Report%20on%20Payment%20Fraud.pdf](#)  
(Accessed: 24 March 2026).

Erbenová, M., Liu, Y., Kyriakos-Saad, N., López-Mejía, A., Gasha, J.G., Mathias, E., Norat, M., Fernando, F. and Almeida, Y. (2016) *The withdrawal of correspondent banking relationships: a case for policy action*. IMF Staff Discussion Note SDN/16/06. Washington, DC: International Monetary Fund.  
<https://doi.org/10.5089/9781498375092.006>

FATF (2025) *FATF updates Standards on Recommendation 16 on payment transparency*. Paris: Financial Action Task Force. Available at: <https://www.fatf-gafi.org/en/publications/Fatfrecommendations/update-Recommendation-16-payment-transparency-june-2025.html> (Accessed: 26 March 2026).

Fetters, M.D., Curry, L.A. and Creswell, J.W. (2013) ‘Achieving integration in mixed methods designs: principles and practices’, *Health Services Research*, 48(6 Pt 2), pp. 2134–2156. <https://doi.org/10.1111/1475-6773.12117>

Financial Stability Board (2021) *Targets for addressing the four challenges of cross-border payments: final report*. Basel: Financial Stability Board. Available at: <https://www.fsb.org/uploads/P131021-2.pdf> (Accessed: 24 March 2026).

Financial Stability Board (2025) *G20 Roadmap for cross-border payments: consolidated progress report for 2025*. Basel: Financial Stability Board. Available at: <https://www.fsb.org/uploads/P091025-1.pdf> (Accessed: 24 March 2026).

Gorton, G. and Winton, A. (2003) ‘Financial intermediation’, in Constantinides, G.M., Harris, M. and Stulz, R.M. (eds.) *Handbook of the economics of finance*. Vol. 1A. Amsterdam: Elsevier, pp. 431–552. [https://doi.org/10.1016/S1574-0102\(03\)01012-4](https://doi.org/10.1016/S1574-0102(03)01012-4)

Haldane, A.G. (2009) *Rethinking the financial network*. Speech delivered at the Financial Student Association, Amsterdam, 28 April. London: Bank of England. Available at: <https://www.bankofengland.co.uk/-/media/boe/files/speech/2009/rethinking-the-financial-network.pdf> (Accessed: 24 March 2026).

Hsu, C.-C. and Sandford, B.A. (2007) ‘The Delphi technique: making sense of consensus’, *Practical Assessment, Research & Evaluation*, 12(10), pp. 1–8.  
<https://doi.org/10.7275/pdz9-th90>

Kahn, C.M. and Roberds, W. (2007) ‘Transferability, finality, and debt settlement’, *Journal of Monetary Economics*, 54(4), pp. 955–978.  
<https://doi.org/10.1016/j.jmoneco.2006.06.005>

- Kahn, C.M. and Roberds, W. (2009) ‘Why pay? An introduction to payments economics’, *Journal of Financial Intermediation*, 18(1), pp. 1–23.  
<https://doi.org/10.1016/j.jfi.2008.09.001>
- Katz, M.L. and Shapiro, C. (1985) ‘Network externalities, competition, and compatibility’, *The American Economic Review*, 75(3), pp. 424–440.
- Khan, S.N., Loukil, F., Ghedira-Guegan, C., Benkhelifa, E. and Bani-Hani, A. (2021) ‘Blockchain smart contracts: applications, challenges, and future trends’, *Peer-to-Peer Networking and Applications*, 14, pp. 2901–2925. <https://doi.org/10.1007/s12083-021-01127-0>
- Klages-Mundt, A., Harz, D., Gudgeon, L., Liu, J.-Y. and Minca, A. (2020) ‘Stablecoins 2.0: economic foundations and risk-based models’, *Proceedings of the 2nd ACM Conference on Advances in Financial Technologies*, pp. 59–79.  
<https://doi.org/10.1145/3419614.3423261>
- Liao, Z., Nan, Y., Liang, H., Hao, S., Zhai, J., Wu, J. and Zheng, Z. (2024) ‘SmartAxe: detecting cross-chain vulnerabilities in bridge smart contracts via fine-grained static analysis’, *Proceedings of the ACM on Software Engineering*, 1(FSE), pp. 249–270.  
<https://doi.org/10.1145/3643738>
- Lincoln, Y.S. and Guba, E.G. (1985) *Naturalistic inquiry*. Beverly Hills, CA: Sage.
- Linstone, H.A. and Turoff, M. (eds.) (1975) *The Delphi method: techniques and applications*. Reading, MA: Addison-Wesley.
- Lyons, R.K. and Viswanath-Natraj, G. (2023) ‘What keeps stablecoins stable?’, *Journal of International Money and Finance*, 131, 102777.  
<https://doi.org/10.1016/j.jimonfin.2022.102777>
- Malterud, K., Siersma, V.D. and Guassora, A.D. (2016) ‘Sample size in qualitative interview studies: guided by information power’, *Qualitative Health Research*, 26(13), pp. 1753–1760. <https://doi.org/10.1177/1049732315617444>
- Masten, S.E. (1993) ‘Transaction costs, mistakes, and performance: assessing the importance of governance’, *Managerial and Decision Economics*, 14(2), pp. 119–129.  
<https://doi.org/10.1002/mde.4090140205>
- McAndrews, J.J. and Roberds, W. (1995) ‘Banks, payments, and coordination’, *Journal of Financial Intermediation*, 4(4), pp. 305–327. <https://doi.org/10.1006/jfin.1995.1013>
- Miles, M.B., Huberman, A.M. and Saldaña, J. (2014) *Qualitative data analysis: a methods sourcebook*. 3rd edn. Thousand Oaks, CA: Sage.

- Morgan, D.L. (2007) 'Paradigms lost and pragmatism regained: methodological implications of combining qualitative and quantitative methods', *Journal of Mixed Methods Research*, 1(1), pp. 48–76. <https://doi.org/10.1177/2345678906292462>
- Narayanan, A., Bonneau, J., Felten, E., Miller, A. and Goldfeder, S. (2016) *Bitcoin and cryptocurrency technologies: a comprehensive introduction*. Princeton, NJ: Princeton University Press.
- Naughton, T. and Chan, L.S.L. (1998) 'Strategic dimensions of correspondent banking', *International Journal of Bank Marketing*, 16(4), pp. 153–160. <https://doi.org/10.1108/02652329810220701>
- North, D.C. (1990) *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.
- Patton, M.Q. (2015) *Qualitative research and evaluation methods*. 4th edn. Thousand Oaks, CA: Sage.
- Rahman, S. (2025) 'Standardizing smart contracts for regulatory compliance in cross-border payments', *International Journal of Law, Social Science, and Humanities*, 2(3), pp. 295–306. <https://doi.org/10.70193/ijlsh.v2i3.260>
- Regulated Liability Network (2022) *The Regulated Liability Network white paper*. Available at: <https://regulatedliabilitynetwork.org/wp-content/uploads/2022/11/The-Regulated-Liability-Network-Whitepaper.pdf> (Accessed: 27 March 2026).
- Rella, L. (2019) 'Blockchain technologies and remittances: from financial inclusion to correspondent banking', *Frontiers in Blockchain*, 2, Article 14. <https://doi.org/10.3389/fbloc.2019.00014>
- Remolina, N. (2019) *Open banking: regulatory challenges for a new form of financial intermediation in a data-driven world*. SMU Centre for AI & Data Governance Research Paper No. 2019/05. <https://doi.org/10.2139/ssrn.3475019>
- Remolina Leon, N. (2023) 'Open finance: regulatory challenges of the evolution of data sharing arrangements in the financial sector', *Banking and Finance Law Review*, 40(1), pp. 35–66.
- Rochet, J.-C. and Tirole, J. (2003) 'Platform competition in two-sided markets', *Journal of the European Economic Association*, 1(4), pp. 990–1029. <https://doi.org/10.1162/154247603322493212>
- Rogers, E.M. (2003) *Diffusion of innovations*. 5th edn. New York: Free Press.

Scholtens, B. and van Wensveen, D. (2003) ‘The theory of financial intermediation: an essay on what it does (not) explain’, *SUERF Studies*, 2003/5, pp. 1–31.

Scott, S.V. and Zachariadis, M. (2014) *The Society for Worldwide Interbank Financial Telecommunication (SWIFT): cooperative governance for network innovation, standards, and community*. London: Routledge. <https://doi.org/10.4324/9781315849324>

Swift (2025) *Swift to add blockchain-based ledger to its infrastructure stack in groundbreaking move to accelerate and scale benefits of digital finance across more than 200 countries and territories worldwide*. Press release, 29 September. Brussels: Swift. Available at: <https://www.swift.com/news-events/press-releases/swift-add-blockchain-based-ledger-its-infrastructure-stack-groundbreaking-move-accelerate-and-scale-benefits-digital-finance> (Accessed: 24 March 2026).

Swift (2026) *Swift accelerates transformation of consumer payments as banks roll out new framework for retail transactions*. Press release, 5 March. Brussels: Swift. Available at: <https://www.swift.com/news-events/press-releases/swift-accelerates-transformation-consumer-payments-banks-roll-out-new-framework-retail-transactions> (Accessed: 24 March 2026).

UK Finance (2024) *Regulated Liability Network (RLN) experimentation phase: summary report*. London: UK Finance. Available at: <https://www.ukfinance.org.uk/system/files/2024-09/UK%20Finance%20RLN%20Summary%20Report.pdf> (Accessed: 27 March 2026).

UK Finance (2025) *Annual fraud report 2025*. London: UK Finance. Available at: <https://www.ukfinance.org.uk/system/files/2025-05/UK%20Finance%20Annual%20Fraud%20report%202025.pdf> (Accessed: 24 March 2026).

Verifone (2025) *Verifone and PagBrasil launch exclusive international Pix payment solution for Brazilian shoppers in the U.S.* Press release, 22 July. Available at: <https://www.verifone.com/resources/press-room-article-verifone-pagbrasil-launch-international-pix-payment> (Accessed: 27 March 2026).

Werbach, K. and Cornell, N. (2017) ‘Contracts ex machina’, *Duke Law Journal*, 67(2), pp. 313–382. Available at: <https://scholarship.law.duke.edu/dlj/vol67/iss2/2/> (Accessed: 24 March 2026).

Williamson, O.E. (1985) *The economic institutions of capitalism*. New York: Free Press.

World Bank (2024) *Interoperability between central bank digital currency systems and fast payment systems: a technical perspective*. Washington, DC: World Bank. Available

at: <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099607406262426195> (Accessed: 27 March 2026).

World Bank (2025) *Remittance prices worldwide: issue 53, Q1 2025*. Washington, DC: World Bank. Available at: [https://remittanceprices.worldbank.org/sites/default/files/rpw\\_main\\_report\\_and\\_annex\\_q125\\_1\\_0.pdf](https://remittanceprices.worldbank.org/sites/default/files/rpw_main_report_and_annex_q125_1_0.pdf) (Accessed: 24 March 2026).

Zachariadis, M. and Ozcan, P. (2022) ‘Open banking: how platforms and the API economy change competition in financial services’, in Shrier, D.L. and Pentland, A. (eds.) *Global fintech: financial innovation in the connected world*. Cambridge, MA: MIT Press, pp. 57–72. <https://doi.org/10.7551/mitpress/13673.003.0007>

Zetsche, D.A., Arner, D.W. and Buckley, R.P. (2020) ‘Decentralized finance’, *Journal of Financial Regulation*, 6(2), pp. 172–203. <https://doi.org/10.1093/jfr/fjaa010>