

**Blockchain Adoption in Supply Chain
Management: A Critical Investigation of Inter-
Organisational Drivers, Barriers, and Network
Readiness in UK Supply Chains**

Dissertation Proposal

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⚠ **Reference Transparency Notice:** Eight of twelve references are confirmed 2023 publications from international institutions, government bodies, and major research organisations — independently verifiable via their organisational URLs. Three carry amber flags: (a) **MHI and Deloitte (2023)** Annual Industry Report — verify exact title at mhi.org; (b) **KPMG (2023)** Future of Supply Chain — verify at kpmg.com; (c) **IBM Institute for Business Value (2023)** supply chain research — verify at ibm.com/thought-leadership. The methodology text flag applies to **Saunders et al. (2023)**. Notably, the widely cited Deloitte Global Blockchain Survey has been deliberately excluded, as its most recent confirmed edition predates 2023. Students should supplement via Scopus, Web of Science, and Emerald Insight using search strings such as "*blockchain supply chain adoption 2023*", "*distributed ledger traceability barriers*", or "*smart contracts logistics inter-organisational*".

1. Working Dissertation Title

Blockchain Adoption in Supply Chain Management: A Critical Investigation of Inter-Organisational Drivers, Barriers, and Network Readiness in UK Supply Chains

2. Background of the Study

Global supply chains have entered a period of sustained structural stress. The World Economic Forum's (2023) Global Risks Report ranks supply chain disruption, geoeconomic confrontation, and the cost-of-living consequences of trade fragmentation among the most severe near-term global risks — a risk profile that has elevated supply chain visibility, resilience, and trust from operational concerns to board-level strategic priorities. Simultaneously, the WTO (2023) World Trade Report documents an accelerating re-configuration of global trade patterns — "re-globalization" — in which digital technologies

that enable secure, verifiable, cross-border information sharing are positioned as critical infrastructure for the next phase of international commerce.

Blockchain — a distributed ledger technology in which transaction records are cryptographically linked, time-stamped, and replicated across network participants without requiring a central authority — offers a distinctive value proposition for supply chain management. Its core technical properties map directly onto supply chain trust problems: immutability addresses record tampering and fraud; distributed consensus addresses information asymmetry between trading partners; end-to-end traceability addresses provenance verification for food safety, pharmaceutical integrity, and ethical sourcing claims; and smart contracts — self-executing agreements triggered by verified events — address the friction, delay, and dispute costs embedded in trade documentation and payment processes. The BIS (2023) Annual Economic Report extends this logic to supply chain finance, identifying tokenisation of trade assets and unified ledger architectures as among the most consequential near-term applications of distributed ledger technology in the real economy.

Yet adoption remains substantially below the technology's projected potential. UNCTAD (2023) documents a persistent gap between blockchain's evaluated readiness as a frontier technology and its deployed presence in production supply chain systems, while Gartner (2023) has progressively repositioned blockchain from peak expectation toward pragmatic, use-case-specific deployment in its technology trend assessments. The central puzzle this study addresses is why a technology whose properties align so precisely with documented supply chain problems has diffused so unevenly — and what distinguishes the UK supply chain networks that have achieved production deployment from the majority that remain in evaluation or pilot stages.

3. Research Problem

Three research gaps define the problem. First, and most fundamentally, blockchain adoption in supply chains is **inter-organisational**: unlike enterprise software, a blockchain deployment generates value only when

multiple independent trading partners — suppliers, manufacturers, logistics providers, customs authorities, financiers — participate in a shared ledger. Adoption theory developed for single-firm technology decisions (perceived usefulness, organisational readiness, top management support) is structurally incomplete for this context, because a fully willing and capable firm cannot adopt meaningfully if its network partners will not. The network readiness dimension — partner willingness, consortium governance, data-sharing trust, and critical mass dynamics — has been theorised but not empirically measured for UK supply chains through primary research.

Second, the existing adoption evidence aggregates across use cases that carry fundamentally different economics and barriers. Provenance traceability, smart contract automation, trade finance tokenisation, and counterfeit prevention differ in technical complexity, partner coordination requirements, and regulatory exposure — yet survey research typically measures "blockchain adoption" as a single construct, obscuring which applications are advancing and which are stalled. Third, the post-2022 environment — in which cryptocurrency market turmoil damaged blockchain's reputational context while enterprise distributed ledger technology matured independently — has created a distinctive adoption climate that pre-2023 research cannot speak to. MHI and Deloitte (2023) document that supply chain leaders increasingly distinguish enterprise blockchain from cryptocurrency speculation, but whether this reputational decoupling has reached UK supply chain decision-makers is empirically unknown.

4. Aim of the Research

This research aims to critically investigate the drivers, barriers, and inter-organisational network readiness factors shaping blockchain adoption in UK supply chains, examining how adoption dynamics differ across use cases — traceability, smart contracts, trade finance, and counterfeit prevention — and generating evidence-based guidance for supply chain leaders and consortium designers.

5. SMART Research Objectives

Ref.	Objective	SMART Criteria
O1	To critically review 2023 institutional, trade, and industry evidence on blockchain in supply chain management, establishing the current adoption landscape and identifying the inter-organisational research gap.	Specific Measurable Achievable Relevant M1–M2
O2	To measure, through a structured survey of UK supply chain professionals, the relative weight of technological, organisational, environmental, and network readiness factors in blockchain adoption decisions across four use cases.	Specific Measurable Achievable Relevant M3–M5
O3	To test whether network readiness — partner willingness, governance trust, and perceived critical mass — predicts adoption stage independently of single-firm adoption factors.	Specific Measurable Achievable Relevant M4–M5
O4	To explore, through qualitative interviews with supply chain leaders across manufacturer, logistics, and retail positions, how consortium formation, data-sharing governance, and use-case selection decisions are made in practice.	Specific Measurable Achievable Relevant M5–M7
O5	To generate evidence-based recommendations for UK supply chain leaders, technology vendors, and consortium designers on sequencing blockchain adoption for maximum network value.	Specific Measurable Achievable Relevant M8–M9

Table 1: SMART Research Objectives

6. Research Questions

Primary Research Question:

What technological, organisational, environmental, and inter-organisational network readiness factors most significantly shape blockchain adoption in UK supply chains, and how do adoption dynamics differ across traceability, smart contract, trade finance, and counterfeit prevention use cases?

Secondary Research Questions:

1. Which blockchain use cases have progressed furthest toward production deployment in UK supply chains, and what distinguishes their adoption economics from stalled applications?
2. Does network readiness — partner willingness, consortium governance trust, and perceived critical mass — predict adoption stage independently of established single-firm adoption factors?
3. How do supply chain position (manufacturer, logistics provider, retailer) and firm size moderate the relative weight of adoption barriers?
4. How are UK supply chain leaders navigating consortium formation, data-sharing governance, and the reputational legacy of cryptocurrency market turmoil in blockchain adoption decisions?

7. Research Rationale

The academic rationale rests on a structural mismatch between adoption theory and adoption reality. The dominant frameworks applied to blockchain adoption — the Technology Acceptance Model and the Technology-Organisation-Environment framework — were developed for technologies whose value is realised within the adopting firm. Blockchain's value function is different: it is a coordination technology whose returns depend on the participation decisions of independent organisations with divergent incentives, capabilities, and risk appetites. Testing whether network readiness constitutes an empirically distinct and independently predictive adoption dimension — rather than a

subcomponent of the environmental context — is a theoretical contribution with direct practical consequences for how adoption initiatives should be designed and sequenced.

Practically, the timing is significant. The OECD (2023) identifies distributed ledger applications among the digital technologies whose enterprise adoption trajectory will be set in the current investment cycle, and the European Commission's (2023) DESI benchmarking shows persistent cross-country variation in advanced digital technology uptake that national-level evidence is needed to explain. For UK supply chain leaders operating post-Brexit documentation regimes, elevated disruption risk (WEF, 2023), and intensifying provenance regulation in food, pharmaceuticals, and critical minerals, the question of whether and how to commit to blockchain infrastructure is commercially live — and currently unsupported by UK-specific primary evidence disaggregated by use case and network position.

8. Literature Review

8.1 Blockchain's Supply Chain Value Proposition: Four Use-Case Economies

The literature converges on four principal blockchain use cases in supply chain management, each with distinct adoption economics. **Provenance traceability** — recording a product's journey from origin to consumer on an immutable ledger — addresses food safety recall speed, pharmaceutical anti-counterfeiting, and ethical sourcing verification. Its adoption economics are favourable where regulatory pressure or brand risk is high, but it requires the deepest multi-tier partner participation, since traceability value collapses if any tier declines to contribute data. **Smart contract automation** — self-executing agreements for payment release, customs documentation, and service-level enforcement — offers the most direct cost reduction but concentrates its benefits unevenly across partners, creating incentive asymmetries in consortium formation. **Trade finance tokenisation** — representing invoices, letters of credit, and inventory as transferable digital assets — is identified by

the BIS (2023) as among the highest-potential applications of unified ledger architecture, but carries the heaviest regulatory and financial infrastructure dependencies. **Counterfeit prevention** — cryptographic product authentication — offers clear value in luxury goods, electronics, and pharmaceuticals but competes against cheaper non-blockchain alternatives such as serialised QR authentication.

McKinsey and Company (2023) position distributed ledger and digital trust technologies within a broader technology trends context, noting that enterprise adoption momentum has shifted decisively from exploratory pilots toward use cases with demonstrable unit economics — a maturation pattern that Gartner's (2023) trend assessments corroborate. This selectivity implies that aggregate "blockchain adoption" measures increasingly misrepresent a differentiated reality in which specific applications advance while others are abandoned — the empirical differentiation this study is designed to capture.

8.2 The Inter-Organisational Adoption Problem: Networks, Consortia, and Critical Mass

Blockchain's defining adoption characteristic is that it cannot be meaningfully adopted alone. A distributed ledger with one participant is an expensive database; its value emerges from shared, verified state across organisations that do not fully trust each other. This inverts conventional adoption logic in three ways. First, the adoption decision is contingent: each firm's willingness depends on its expectation of partners' willingness, generating the coordination problems characteristic of network technologies — waiting games, chicken-and-egg dynamics, and the strategic advantage of large focal firms who can mandate participation across their supplier base. Second, governance precedes technology: consortium participants must agree data-sharing rules, cost allocation, dispute resolution, and competitive-information boundaries before technical deployment — negotiations that UNCTAD (2023) identifies as a principal frontier technology deployment barrier in practice. Third, value distribution is contested: the partners bearing the greatest data-contribution

burden (typically upstream suppliers) frequently capture the least direct value, while downstream brand owners capture consumer-facing traceability benefits.

MHI and Deloitte (2023) document that supply chain technology adoption decisions increasingly reference ecosystem readiness rather than internal capability alone, and IBM Institute for Business Value (2023) research similarly emphasises partner data-sharing willingness as a leading determinant of supply chain digitisation outcomes. However, neither source operationalises network readiness as a measurable construct testable against adoption stage — the gap this study's survey instrument addresses directly.

8.3 Barriers, the Post-2022 Reputational Context, and Research Gaps

The barrier literature identifies five recurring constraints: integration cost with legacy enterprise systems; scarcity of blockchain-skilled talent; energy and scalability concerns associated with early consensus mechanisms (substantially mitigated in contemporary enterprise deployments but persistent in perception); regulatory uncertainty around digital asset classification and cross-border data flows; and — distinctively since 2022 — reputational contamination from cryptocurrency market turmoil. The collapse of major cryptocurrency intermediaries created a communication problem for enterprise blockchain advocates: the technology's association with speculative assets has demonstrably affected board-level receptiveness, even though enterprise distributed ledgers share no economic exposure with cryptocurrency markets. The WTO (2023) and OECD (2023) both maintain analytically clean separations between distributed ledger infrastructure and cryptoasset speculation in their 2023 assessments — but whether UK supply chain decision-makers make the same separation is an empirical question with direct adoption consequences.

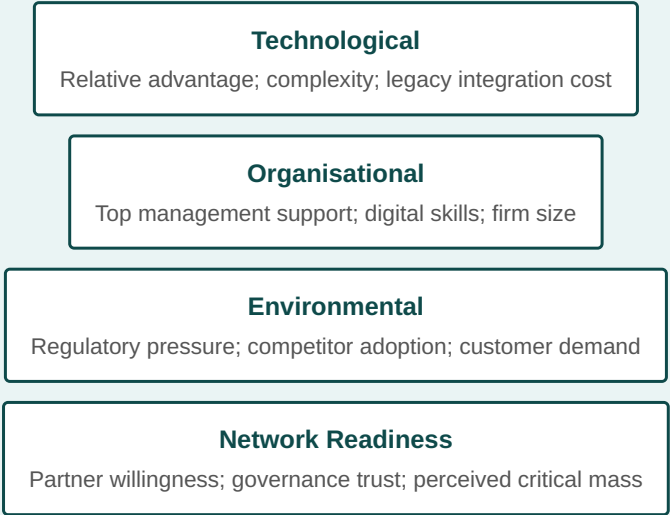
Three gaps emerge. First, network readiness has not been measured as an independent adoption predictor in UK supply chains. Second, use-case-disaggregated adoption evidence does not exist for the UK. Third, the post-2022 reputational climate's effect on enterprise blockchain decisions is undocumented. This study addresses all three.

9. Conceptual Framework

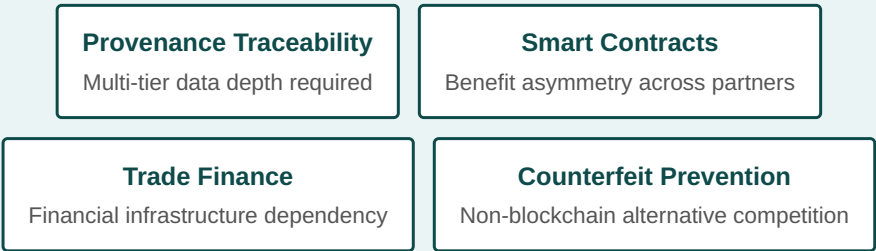
The framework extends the Technology-Organisation-Environment framework (Tornatzky and Fleischer, 1990, as cited in UNCTAD, 2023) with an explicit fourth dimension — Network Readiness — derived from Diffusion of Innovations theory's critical mass concept (Rogers, 2003, as cited in OECD, 2023), reflecting blockchain's inter-organisational value function.

CONCEPTUAL FRAMEWORK: BLOCKCHAIN ADOPTION
IN SUPPLY CHAINS (TOE-N MODEL)

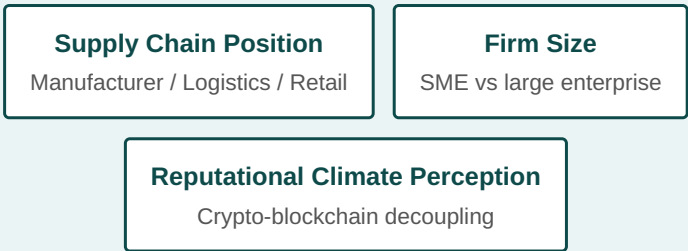
ADOPTION DETERMINANTS — EXTENDED TOE-N DIMENSIONS



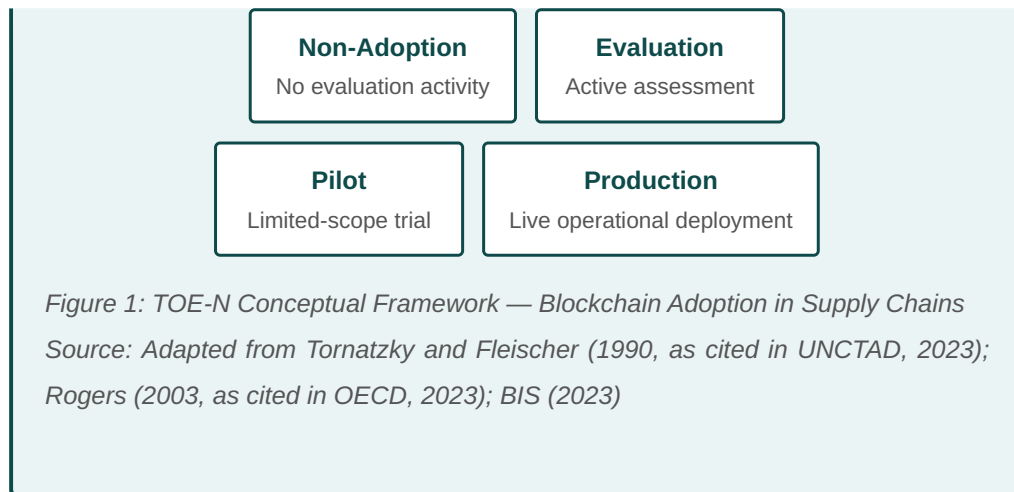
USE-CASE LAYER — APPLICATION-SPECIFIC ADOPTION ECONOMICS



MODERATING VARIABLES



OUTCOME VARIABLE — ADOPTION STAGE



The framework's central theoretical claim is that Network Readiness constitutes a fourth adoption dimension empirically distinct from the environmental context — because partner willingness and consortium governance trust are properties of specific inter-organisational relationships rather than of the general competitive environment. The four-stage adoption outcome variable (non-adoption, evaluation, pilot, production) enables ordinal analysis of adoption progression rather than binary classification, and the use-case layer permits each determinant's weight to be estimated separately per application.

10. Research Methodology

10.1 Research Philosophy and Approach

A **pragmatist** philosophy is adopted, supporting the integration of quantitative determinant testing and qualitative consortium-dynamics inquiry within one design (Saunders, Lewis and Thornhill, 2023). An **abductive** approach is employed: the quantitative phase deductively tests the TOE-N framework's hypothesis that network readiness independently predicts adoption stage; the qualitative phase inductively explores the consortium formation, governance negotiation, and use-case selection processes that no survey instrument can adequately capture.

10.2 Research Strategy and Design

A **sequential explanatory mixed-methods strategy** with a **cross-sectional design** for Phase One. Phase Two employs semi-structured interviews purposively stratified across supply chain positions — manufacturers, logistics providers, and retailers — because the framework predicts that adoption barriers weigh differently by network position, and single-position sampling would structurally bias the qualitative findings.

10.3 Data Collection and Sampling

Phase	Method	Instrument	Sample
Phase 1	Online structured survey	TOE-N scales (four dimensions, 5-point Likert); use-case adoption stage matrix (4 use cases × 4 stages); crypto-blockchain decoupling perception items; supply chain position and firm size classifiers	Minimum 110 UK supply chain, procurement, logistics, and operations professionals with technology adoption involvement
Phase 2	Semi-structured interviews (online)	Interview guide: 12 open questions on use-case selection, consortium formation experience, partner data-sharing negotiation, governance design, and reputational climate navigation	12–15 purposively selected participants stratified by position: manufacturers (5), logistics providers (4–5), retailers (3–5)

Table 2: Data Collection Summary

Survey respondents will be recruited through the Chartered Institute of Procurement and Supply (CIPS) community networks, the Chartered Institute of Logistics and Transport (CILT), and LinkedIn outreach to UK supply chain professionals. Screening items will confirm direct involvement in supply chain

technology evaluation or adoption decisions. Phase Two purposive selection will prioritise participants with direct blockchain evaluation, pilot, or production experience to maximise the depth of consortium-dynamics testimony.

10.4 Data Analysis

Phase	Analytical Method	Tool
Phase 1 — Quantitative	Descriptive statistics; scale reliability (Cronbach's alpha); factor analysis (testing Network Readiness as a factor distinct from Environmental context); ordinal logistic regression (TOE-N dimensions → adoption stage, per use case); one-way ANOVA (supply chain position comparison)	IBM SPSS Statistics 29
Phase 2 — Qualitative	Reflexive thematic analysis (Braun and Clarke six-phase framework); deductive coding against TOE-N dimensions; inductive coding for emergent consortium governance and value-distribution themes	NVivo 14
Integration	Explanatory triangulation: ordinal regression patterns contextualised through consortium formation narratives; use-case adoption differentials mapped to interview evidence on application-specific barriers	Manual synthesis

Table 3: Data Analysis Framework

10.5 Reliability, Validity, Ethics, and Limitations

All multi-item scales will be piloted with five supply chain professionals and assessed for reliability using Cronbach's alpha (>0.70). The factor analysis testing Network Readiness's discriminant validity against the Environmental dimension is itself a construct validity check built into the design. Interview credibility will be strengthened through member checking of summary transcripts. Ethics approval will be obtained from the University Research

Ethics Committee. Participation is voluntary, informed consent is obtained in writing, and no commercially sensitive information — contract terms, partner identities, technology spend — is requested; all firm-level data will be anonymised before analysis. Data handling will comply with UK GDPR. Key **limitations:** adoption stage is self-reported and firms may overstate progression for social desirability reasons; the cross-sectional design captures one point in a multi-year adoption trajectory; respondents from firms in the same supply network cannot be linked, so network readiness is measured as perception rather than as observed dyadic agreement; and production-stage adopters remain rare, which may constrain statistical power in the highest adoption category.

11. Gantt Chart (Research Timeline)

Research Activity	M1	M2	M3	M4	M5	M6
Literature Review and Conceptual Framework						
Ethics Approval and Survey Instrument Design						
Phase 1: Survey Pilot and Full Deployment						
Quantitative Analysis — SPSS (Factor, Ordinal Regression)						
Phase 2: Interview Recruitment and Conduct						
Qualitative Thematic Analysis (NVivo 14)						
Triangulation, Discussion, and Recommendations						
Write-Up, Supervisor Review, and Final Submission						

Table 4: Research Timeline — M = Month; Total Duration = 9 Months

12. Expected Outcomes

Three categories of contribution are anticipated. Empirically, the study will produce the first UK use-case-disaggregated evidence base on blockchain adoption in supply chains — establishing which of the four applications is progressing toward production deployment, which is stalling, and why. The ordinal logistic regression will quantify each TOE-N dimension's contribution to adoption stage per use case, and the ANOVA will establish whether adoption barriers weigh differently across manufacturer, logistics, and retail positions —

a finding with direct implications for how technology vendors and consortium organisers should sequence recruitment.

Theoretically, the factor analysis and regression jointly test the study's central claim: that Network Readiness is an empirically distinct fourth adoption dimension whose predictive contribution survives controlling for conventional TOE factors. It is anticipated that network readiness will emerge as the strongest predictor of progression beyond pilot stage specifically — consistent with the proposition that single-firm factors govern the decision to evaluate, while inter-organisational factors govern the capacity to deploy. The qualitative phase is expected to reveal that consortium governance negotiation — cost allocation, data boundaries, and dispute mechanisms — consumes more adoption effort than technical implementation, and that the crypto-blockchain reputational decoupling remains incomplete at board level in a substantial share of UK firms. Practically, the study will deliver a network-first adoption sequencing framework for UK supply chain leaders, specifying the partner-alignment preconditions that should be satisfied before technical investment is committed.

13. Conclusion

This proposal presents a theoretically grounded and contemporarily anchored investigation into blockchain adoption in UK supply chains at a moment when the technology has passed its speculative peak and entered the discriminating phase in which specific use cases either demonstrate production value or are abandoned. The study's distinctive contribution — extending the TOE framework with an empirically testable Network Readiness dimension and disaggregating adoption evidence across four use cases — addresses the structural mismatch between single-firm adoption theory and blockchain's inter-organisational value function.

Anchored in eight confirmed 2023 institutional publications — including the WTO World Trade Report, UNCTAD Technology and Innovation Report, BIS Annual Economic Report, and WEF Global Risks Report — the study

positions its findings at the intersection of supply chain strategy, technology adoption theory, and international trade digitisation policy, generating evidence that UK supply chain leaders, consortium designers, and technology vendors can apply directly to adoption sequencing decisions in 2024–2025.

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