The Adoption of Blockchain in the Supply Chain of Global Manufacturing Firms: Motivations, Challenges, and Key Success Factors

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Dissertation written under the supervision of Filipa Lancastre

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Abstract

Title: The Adoption of Blockchain in the Supply Chain of Global Manufacturing Firms: Motivations, Challenges, and Key Success Factors

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Global manufacturers face persistent blind spots that ultimately fuel disputes, delays, and costly workarounds. Although interest in blockchain is high and pilots are common, few initiatives scale across firms. In the academic literature, use cases and potential benefits are well mapped, yet firm-level accounts of how adoption decisions are made, and why promising efforts stall, remain scarce.

Drawing on semi-structured interviews with supply-chain professionals in global manufacturing (n=21) and a Gioia analysis, the study reframes blockchain as shared evidence: attributable, time-stamped event records that trigger coded actions, rather than a generic database. Progress is shown to depend on a trial-first, measured rollout; executive-backed, quantified business cases; and co-authored operating rules that specify who records what, when, and with which proofs. Barriers include exposure aversion, weak posting discipline, uneven partner capability, bureaucratic drag, and concerns about governance trust.

For managers, the findings distill a usable sequence: identify high-friction handoffs and the few boundary events that matter most, integrate their capture with existing systems, run a focused trial, measure before and after, and expand only when gains persist across lanes and sites; scale improves when joining is easy for partners and visibility is role-based and contractually bounded. Theoretically, the study casts blockchain as an evidence-centred coordination layer, maps a path from potential to routine use, shows how verifiable handoffs curb hidden action, and frames adoption as staged fit-and-feasibility checks tied to agency, affordance–actualization, and fit–viability models within a configurational view of success.

Sumário

Título: A Adoção de Blockchain na Cadeia de Suprimentos de Empresas de Manufatura Global: Motivações, Desafios e Fatores-Chave de Sucesso

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Fabricantes globais enfrentam pontos cegos em expedições e recebimentos que geram disputas, atrasos e retrabalho. Apesar do forte interesse e de muitos pilotos, poucas iniciativas de blockchain escalam entre empresas. Na literatura, casos de uso e benefícios estão mapeados, mas faltam relatos em nível de firma que expliquem decisões de adoção e por que esforços promissores estagnam.

Com base em 21 entrevistas semiestruturadas com profissionais de cadeia de suprimentos e em análise Gioia, o estudo reframa o blockchain como evidência compartilhada: registros de eventos atribuíveis e datados que disparam ações baseadas em regras, e não apenas um banco de dados. O avanço depende de implantação com piloto e métricas claras, casos de negócio quantificados com aval executivo e regras operacionais coautoradas que definem quem registra o quê, quando e com quais provas. Barreiras incluem aversão à exposição, baixa disciplina de registro, capacidade desigual dos parceiros, entraves burocráticos e dúvidas sobre a governança.

Para gestores, sintetiza-se uma sequência aplicável: focar passagens de alta fricção, integrar a captura de poucos eventos críticos aos sistemas existentes, executar um piloto enxuto, medir antes/depois e expandir somente quando os ganhos persistirem; a escala melhora com onboarding simples de parceiros e visibilidade por papéis, fixada contratualmente. Conceitualmente, o estudo posiciona o blockchain como camada de coordenação centrada em evidências, detalha o caminho do potencial ao uso rotineiro, mostra como entregas verificáveis reduzem ação oculta e trata a adoção como checagens graduais de ajuste e viabilidade articuladas a agency, affordance–actualization e fit–viability numa visão configuracional.

Keywords

Blockchain; Supply Chain Management; Global Manufacturing; Technology Adoption; Traceability; Transparency; Smart Contracts; Governance; Integration; Key Success Factors

AI Declaration

I used AI tools such as Grammarly, Zotero, DeepL, and ChatGPT to support editorial tasks, improving fluency and coherence, reducing repetition, and helping format references in APA.

I hereby confirm that all ideas, research questions, study design, sampling, data collected, data analysis, interpretations, findings, and conclusions are the result of my own intellectual efforts. AI tools did not generate data, quotes, or results.

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Contents

1. Introduction

The blockchain technology has gained prominence in the context of cryptocurrencies. However, its true value lies in the application of its fundamental characteristics, such as immutability, decentralization, and process transparency, which render it valuable in a multitude of other applications. A particularly promising area of research is Supply Chain Management (SCM). In the context of global manufacturing, blockchain can enhance traceability, operational efficiency, security, and inter-firm trust across networks that are inherently complex and challenging to effectively monitor (Cole et al., 2019; Dutta et al., 2020; Sahoo et al., 2022).

This thesis delves into the adoption of blockchain technology within the context of supply chains, with a particular emphasis on global manufacturing firms. By "global manufacturing firms," this thesis refers to manufacturers that establish a direct presence outside their home economy through foreign direct investment and must coordinate geographically dispersed plants, sourcing, and distribution activities (Pontrandolfo & Okogbaa, 1999).

Examples of such entities include Siemens, Foxconn, Bosch, and Jabil, which oversee intricate, multi-tiered supplier and logistics ecosystems that cross multiple regulatory frameworks. In this context, blockchain has been piloted for digital bonds, supplier financing, and smart container tracking (Chod et al., 2020; McKevitt, 2017; Siemens, 2023; Ledger Insights, 2023).

These applications aim to reduce frictions and improve coordination by leveraging shared, near-real-time data. However, these studies also reveal concerns regarding the technical maturity of blockchain technology, the potential return on investment, and the industry's readiness for its implementation (Fosso Wamba et al., 2020). In light of these considerations, the primary research question guiding this study is as follows:

What factors influence the adoption and implementation of blockchain technology in the supply chains of global manufacturing firms?

This inquiry encompasses both the potential of blockchain technology and its practical implementation. The adoption of technology is influenced by a multitude of factors, including technological capabilities, strategic objectives, regulatory frameworks, and internal firm dynamics (Queiroz et al., 2020; Liang et al., 2021). The intricate nature of contemporary global manufacturing supply chains is well documented. These processes necessitate substantial data volumes, stringent coordination measures, and adherence to rigorous regulatory standards (Dutta et al., 2020; Sahoo et al., 2022).

It is evident that businesses frequently find themselves compelled to adopt blockchain technology for a variety of reasons. These motivations may include the pursuit of transparency, adherence to regulatory compliance standards, the prevention of fraudulent activities, or the advancement of innovative practices. In certain instances, it has been observed to facilitate the achievement of digital transformation objectives or to generate a competitive advantage through automation (Fosso Wamba et al., 2020; Yang et al., 2021).

Concurrently, firms encounter substantial challenges. The arrival of blockchain technology can reconfigure the governance and dissemination of information. The implementation of such a system necessitates the development of new infrastructure, the establishment of legal frameworks, and the collaboration of multiple parties (Sternberg et al., 2022; Tokar & Swink, 2019). Projects frequently encounter impediments, including resistance, lack of standards, and concerns regarding network governance (Bakos & Halaburda, 2022; Cecere, 2022). To explore these dynamics, this study also poses the following research questions:

What challenges and barriers do firms face when attempting to implement solutions based on blockchain across global manufacturing networks?

Under what conditions is blockchain adoption more likely to succeed?

These inquiries are indicative of a significant gap in current research. However, the scarcity of firm-level data hinders the ability to make definitive conclusions. Moreover, the availability of real-world insights remains constrained. There is a shortage of research that examines how power dynamics and technical coordination affect adoption outcomes (Varriale et al., 2021; Iyengar et al., 2021; Tokar & Swink, 2019).

The present study employs a qualitative research design. The study is predicated on semi-structured interviews with professionals in the domain of supply chain management. This approach facilitates the acquisition of empirical insights from individuals with firsthand involvement in SCM processes and the potential applications of blockchain technology in their day-to-day operations. The interviews are grounded in the experiential knowledge of seasoned professionals, offering a nuanced perspective on the potential of blockchain to transform global manufacturing supply chains.

2. Literature review

2.1 Conceptual and Theoretical Foundations

Blockchain is classified as a distributed ledger technology (DLT), which refers to a database that is replicated across a peer-to-peer network. In this network, participants collectively validate and synchronize records without reliance on a single central authority. Data are written to cryptographically linked blocks, with each new entry referencing the previous one. Revising prior records requires network agreement, thereby conferring the ledger with its tamper-resistant character (Cole et al., 2019; Queiroz et al., 2020; Dutta et al., 2020).

In operational terms, three design features make the technology distinctive for inter-organizational settings: once finalized, records are hard to alter; validation is distributed, reducing single points of failure; and smart contracts can automate agreed conditions (Cole et al., 2019; Dutta et al., 2020).

These properties are of particular relevance to supply chain management due to the prevalence of fragmented systems, limited end-to-end visibility, counterfeiting risks, and coordination frictions among heterogeneous actors in many networks (Cole et al., 2019; Sternberg et al., 2022; Fosso Wamba et al., 2020). A shared, append-only ledger can serve as a common data layer that authorized parties read and write in (near) real time, yielding a synchronized view of transactional events and product states. Research and implementation reports have identified various applications, including provenance and condition verification; materials and shipment tracking; digitized documentation; and automation of payments, compliance checks, and other inter-firm routines via smart contracts (Dutta et al., 2020; Sahoo et al., 2022).

Beyond the scope of traceability and coordination, the existing literature also explores applications to digital product passports, faster and more targeted recalls, and supply chain finance when conventional financial data are sparse. In such cases, verifiable operational data can support credit access and risk assessment (Du et al., 2019; Chod et al., 2020; Dong et al., 2023).

For global manufacturers orchestrating multi-tier networks, this combination of shared data, verifiability, and programmable logic positions blockchain as infrastructural support for transparency, resilience, and selective automation. However, effective use requires careful choices about design and governance to ensure contextual fit.

2.2 A theoretical framework for the adoption of blockchain technology

The literature also provides numerous lenses for explaining blockchain adoption in supply chains; however, this review highlights three that best align with the present study and subsequent

discussion. These include agency theory (governance under information asymmetry), affordance–actualization (how potential becomes realized use), and the fit–viability model (why some "good-fit" ideas still stall). Other perspectives, such as transaction cost economics (TCE) and the technology–organization–environment (TOE) framework, are acknowledged but not developed in depth to maintain the focus on the study (Lumineau, 2020; Liang et al., 2021).

According to agency theory, supply chains can be viewed as networks of principal–agent relationships. Goal conflicts and information asymmetry create scope for hidden action and selection problems (Lumineau, 2020; Sternberg et al., 2022). Recent research in multi-tier logistics shows that technological solutions intended to address agency issues can, in some cases, surface new challenges; for instance, the interaction between multiple principals' systems can lead to shifting exposure, mistrust, or control and even opportunistic information hiding with modular technologies (Gopalakrishnan et al., 2022; Sternberg, Mathauer, & Hofmann, 2022). This research suggests that governance mechanisms must reach into upstream and downstream tiers to address hidden actions that persist in the system (Sternberg, Mathauer, & Hofmann, 2022). This perspective is consistent with calls within SCM to examine specific forms of opportunism rather than treating the firm as a rigid entity, and it is useful for assessing how immutable, attributable records can reconfigure monitoring mechanisms and incentives (Lumineau, 2020).

Affordance–actualization refers to how organizations turn action possibilities into realized use through iterative experimentation, adaptation, and constraint mitigation. This process typically precedes routinization, allowing ongoing refinement of technology and practice. In blockchain implementations, IS work uses this lens to separate affordances (action potentials arising from IT artifacts and actors) from outcomes, showing that pilots, rule design, and socio-technical adjustments are intrinsic steps rather than delays (Du, Pan, Leidner, & Ying, 2019). This perspective aligns with evidence on "pilot-then-scale," event-driven rules, and gradual capability building.

The fit–viability model (FVM) adds a managerial evaluation layer. Even when there is strong task–technology fit (e.g., verifiable handoffs, automated releases), adoption can falter if viability is weak. Viability issues may include weak business cases, partner unreadiness, legal friction, or integration burden. Empirical work on blockchain adoption operationalizes FVM, showing that managers consider both functional and symbolic benefits (fit) alongside organizational and environmental constraints (viability) when forming intentions (Liang, Kohli, Huang, & Li, 2021). This helps explain the underperformance of promising pilots that might otherwise be expected to succeed. In

practice, FVM also covers much of the TOE style contextual space without introducing extra constructs.

2.3 Motivations for blockchain adoption in SC

Across global supply chains, the appeal of blockchain stems from a common set of capabilities that map closely onto long-standing operational pain points. First, end-to-end provenance and traceability are central. A shared, tamper-resistant ledger can register provenance and custody changes across tiers, thereby bolstering recall readiness, anti-counterfeiting, and condition verification in sectors such as food, pharma, and automotive through digital product passports and IoT-linked logs. This addresses the conventional opacity of multi-tier chains by creating a verifiable chain of custody accessible to authorized entities (Queiroz et al., 2020; Dutta et al., 2020).

Secondly, compliance and automated execution are pivotal. Programmability enables smart contracts to encode rules for documentation, payments, and regulatory checks, thereby reducing manual reconciliation and the risk of noncompliance. In practice, firms utilize permissioned ledgers and smart contracts to automate milestone-based payments, customs events, and audit trails, thereby facilitating coordination across organizational boundaries (Cole et al., 2019; Dutta et al., 2020).

Thirdly, supply chain finance benefits from transparency tied to verified events, which can extend credit deeper into the chain. By reducing information asymmetry and tying financing to validated milestones (e.g., proof-of-delivery), blockchain supports lower financing frictions for SMEs and "deep-tier" suppliers through tokenized or event-triggered payment designs (Chod et al., 2020; Dong et al., 2023).

Fourthly, sustainability tracking is an important driver. The utilization of shared, immutable records can streamline ESG reporting and carbon accounting across multiple scopes by reconciling heterogeneous data and reducing duplicated reporting efforts, while also supporting sector-specific initiatives (Sahoo et al., 2022).

When considered collectively, these benefits indicate a dual impact on operational efficiency, as evidenced by fewer reconciliations and faster cycle times, and on strategic objectives, including fostering trust, enhancing resilience, and achieving differentiation. However, an examination of prevailing practices reveals that adoption remains selective and often preliminary. Two recurrent caveats emerge. Firstly, immutability does not guarantee accuracy. Physical-world transactions continue to necessitate reliable data capture; absent robust controls, the "garbage-in, garbage-out" problem can nullify transparency gains (Chod et al., 2020).

Furthermore, scaling beyond pilots depends on partner participation, standards, and interoperability. These factors are often impeded by reluctance to share data, the absence of common data models, and technical constraints (e.g., throughput, privacy, interoperability), which frequently slow progress (Dutta et al., 2020; Liang et al., 2021).

This tension is visible in the mixed outcomes of industry platforms. While consortia emphasize network effects, empirical evidence shows that attaining broad participation is uncommon, even for prominent platforms, underscoring the socio-technical (rather than solely technical) nature of scaling (Sternberg et al., 2020; Queiroz et al., 2020).

2.4 Challenges for blockchain adoption in SC

While blockchain offers many potential benefits, its adoption in manufacturing supply chains remains limited and uneven. Despite the numerous pilots, few implementations have scaled beyond trials, particularly in manufacturing contexts, according to case evidence and reviews (Sternberg et al., 2022; Cole et al., 2019; Moosavi et al., 2021; Queiroz et al., 2020).

A comprehensive review of the existing research and case studies reveals several key barriers to the adoption of blockchain technology. These barriers include technical complexity (scalability/performance limits, integration with legacy systems), organizational resistance, capability gaps, governance, and regulatory uncertainty. These barriers have been repeatedly noted across reviews and empirical work (Dutta et al., 2020; Cole et al., 2019; Sternberg et al., 2022; Varriale et al., 2021). Collectively, these challenges contribute to the underutilization of blockchain technology in supply chain management, despite its potential benefits.

The implementation of blockchain technology on top of existing supply-chain IT stacks is seldom seamless. The majority of manufacturers already operate within complex environments, which include Enterprise Resource Planning (ERP) suites, cloud data lakes, and custom logistics tools. Consequently, integration necessitates the development of novel data architectures, process redesign, and reliable cross-system interfaces. This undertaking is often costly and time-consuming (Cole et al., 2019; Gong et al., 2024). Technical trade-offs can create friction, with public ledgers often encountering challenges related to latency and fees, while private and consortium setups achieve efficiency by compromising openness. The optimization of architectures for real-time, IoT-rich, high-volume industrial applications is a complex undertaking (Queiroz et al., 2020; Fosso Wamba et al., 2020).

Beyond the technological aspect, the adoption of these tools constitutes an organizational change initiative. Staff members are tasked with acquiring new competencies, reconfiguring workflows, and fostering collaboration across functional areas and corporate entities. Research indicates that resistance is common when initiatives are perceived as experimental or the business case is hard to quantify. Additionally, capability gaps between technical teams and business leaders can impede alignment (Liang et al., 2021; Tokar & Swink, 2019; Du et al., 2019).

The dynamics of governance and power pose further challenges. The notion of "decentralized" infrastructure does not inherently ensure organizational neutrality. The entities responsible for establishing rules, governing data rights, and directing the strategic direction remain pivotal. The widely discussed TradeLens case demonstrates how limited industry participation can hinder the success of even technically advanced platforms when competitors perceive governance to be concentrated (Cecere, 2022; PierNext, 2023). More broadly, firms are hesitant to join networks in which a rival or a small coalition appears to control gatekeeping or value capture (Bakos & Halaburda, 2022; Sternberg et al., 2020).

Interoperability and coordination are likewise central. The materialization of shared visibility and automated transactions is contingent upon the establishment of a unified standard among multiple partners. In the absence of consensus on data models, legal terms, and operating rules, the integration of ledgers into cohesive systems is impeded, resulting in the fragmentation of these systems into silos. The implementation of sound technology is often impeded by misaligned incentives, unclear returns on investment, and the fear of exposing sensitive data (Cole et al., 2019; Varriale et al., 2021; Sternberg et al., 2020; Queiroz et al., 2020).

Regulatory uncertainty can increase perceived risk. Cross-border operations face challenges in terms of the inconsistent legal treatment of digital records and the enforceability of smart contracts. Additionally, there are unresolved questions regarding data ownership and the admissibility of audits. There are also tensions with data-protection regimes, such as the EU's General Data Protection Regulation (GDPR), which complicates immutable storage (Tokar & Swink, 2019; Gong et al., 2024; Cole et al., 2019).

In summary, even when the business rationale is compelling, implementation often encounters challenges such as integration burden, capability gaps, governance tensions, multi-party coordination, and shifting regulation. These factors contribute to the failure of many initiatives to become fully operational or to be discontinued after a limited period of adoption.

2.5 Key success factors

Despite the prevalence of supply-chain blockchain initiatives in the pilot stage, reviews and field studies have identified the conditions that facilitate the transition of projects from experimentation to outcomes (Queiroz et al., 2020; Sahoo et al., 2022; Varriale et al., 2021; Sternberg et al., 2022). In practice, success tends to hinge upon collaborative governance, clear internal alignment, pragmatic integration and standards, tight measurable goals, and incentives that provide each participant with a reason to engage.

Collaborative governance. The adoption of these platforms works best when no single firm dominates, thereby fostering a more egalitarian environment. A shipping line or a large retailer is more likely to participate if a neutral or jointly governed consortium establishes the rules; who joins, what is accessible, and how disputes are resolved, rather than if a rival controls access and data rights (Bakos & Halaburda, 2022; Shiva et al., 2023). To illustrate, consider a port community network in which carriers, terminals, and customs co-own the rulebook and data-sharing terms. In such a scenario, this network would likely recruit competitors more rapidly than a platform owned by a single carrier.

Strategic alignment. Within the organizational structure, projects are more durable when explicit business objectives are in place and extend beyond the IT domain. For instance: The initiative to reduce the recall trace time for Product X on Route Y from three days to three hours provides a unifying objective for the supply chain, quality, and IT departments. This shared objective enables leaders to assess the return on investment and determine the feasibility of expanding the initiative (Liang et al., 2021; Du et al., 2019; Fosso Wamba et al., 2020; Yang et al., 2021).

Integration and standards. The potential of blockchain technology is realized when it integrates with ERP, and IoT systems, thereby eliminating the need for manual data entry and facilitating streamlined operations. For instance, the posting of a goods receipt in the ERP automatically triggers a smart-contract milestone and attaches IoT temperature logs via an API, thereby enabling the finance department to release payment without the need for additional emails. The utilization of common data models, such as sector standards or standardized application programming interfaces (APIs), has been demonstrated to circumvent the adoption of ad hoc mappings. These mappings have been observed to impede the progress of projects, often confining them to a pilot phase (Gong et al., 2024; Cole et al., 2019; Queiroz et al., 2020; Varriale et al., 2021).

Problem-first, measurable scoping. A problem-first, quantifiable scoping approach helps. Narrow, auditable wins are preferable to vague transformations. For instance, the automation of a solitary

customs document on a specific corridor can be utilized to assess error rates and the number of days saved. Alternatively, conducting a recall drill for a particular SKU and quantifying the trace time before and after can provide valuable insights. As indicated by the existing research, including the works of Chod et al., Du et al., and Sternberg et al. (2022), modest, substantiated gains can establish the credibility necessary for pursuing opportunities for expansion.

Incentive design. The following incentives are of particular relevance to partners: The proliferation of networks is contingent upon the provision of tangible benefits to their constituents. Examples of potential applications include the following: the prompt disbursement of payments to suppliers upon the verification of on-chain delivery events (enabling the optimization of working capital); the extension of credit to tier-2 suppliers facilitated by on-chain purchase orders and proof-of-delivery collateral; and the streamlining of carrier paperwork through the implementation of event-driven payments. Designs of this nature have been shown to encourage network participation (Dong et al., 2022; Chod et al., 2020; Bakos & Halaburda, 2022; Shiva et al., 2023).

In essence, the scalability of projects is contingent upon the following factors: the invitation of participation, the specificity of the business case, the interoperability of systems on shared standards, the measurability of early goals, and the perception of tangible benefits for all parties involved in contributing to the project. These patterns have been observed to recur across both reviews and case work (Queiroz et al., 2020; Sahoo et al., 2022; Varriale et al., 2021).

2.6 Research gaps

Academic and practitioner work on blockchain in supply chains has advanced rapidly: reviews map applications and benefits (traceability, compliance automation, financing), position adoption within established frameworks, and report promising pilots (Cole et al., 2019; Queiroz et al., 2020; Sahoo et al., 2022). Yet scaled deployment across global manufacturing remains the exception rather than the rule, with many initiatives stalling after proofs of concept (Sternberg et al., 2020; Moosavi et al., 2021). What is still underexplored is how practitioners inside manufacturing firms actually make sense of blockchain, how they weigh risks and returns, coordinate across departments, negotiate governance with partners, and grapple with preconditions such as data quality and interoperability that determine whether pilots become infrastructure (Du et al., 2019; Liang et al., 2021).

First, the literature rarely opens the “black box” of organizational decision processes that sit between a good technical fit and real adoption. Studies emphasize what blockchain could do, but fewer explain why initiatives stall in practice. (Du et al., 2019; Queiroz et al., 2020; Liang et al.,

2021). There is a need for richer, within-firm accounts of these decision processes and the conditions under which they translate into sustained adoption.

Second, there is limited empirical depth on governance and power in multi-tier, competitive settings. Research notes tensions when platforms are perceived as controlled by a few actors, but we still lack grounded evidence of how governance choices (membership, data rights, dispute rules) and incentive design shape partner participation over time (Bakos & Halaburda, 2022; Shiva et al., 2023; Chod et al., 2020; Dong et al., 2022). Longitudinal, multi-party studies remain especially sparse.

Third, most work treats adoption drivers additively; fewer studies examine configurations of capabilities and conditions under which adoption is viable, despite evidence that outcomes are equifinal (Jiang et al., 2023). Future research should specify bundles of organizational, technical, and interorganizational factors that jointly enable scaling beyond pilots.

Finally, there is still limited understanding of why many firms explore blockchain but ultimately stall or abandon implementation, particularly in global manufacturing, where supplier diversity, legal constraints, and operational pressures create adoption frictions (Fosso Wamba et al., 2020; Sternberg et al., 2022). To address this practitioner-level gap, the present thesis focuses on professionals in supply-chain roles within global manufacturing firms, examining how blockchain is understood, what expectations or concerns exist, and how implementation may be supported or resisted in practice. The aim is to complement the literature by identifying underrepresented angles and operational realities; the Discussion will specify whether the results reinforce existing gaps or surface additional ones.

3. Methodology

This chapter builds on the gaps identified in the literature review by outlining the qualitative approach used to explore how blockchain is understood and experienced in global manufacturing supply chains. The present study employs a qualitative research design, an approach that is well-suited for examining complex, evolving topics and for cultivating a rich, participant-centered understanding without reducing phenomena to numeric indicators (Creswell, 2013).

Qualitative inquiry is well suited to examine how people make decisions within organizational systems. This approach prioritizes how participants make sense of their work, allows the design to adapt as insights emerge, and keeps analysis situated in organizational context (Creswell, 2013;

Bryman, 2016). That fit is important for blockchain adoption, which spans technical and social facets, spanning infrastructure, trust, organizational culture, and cross-firm coordination.

The present study focuses on professionals in supply-chain roles at global manufacturing firms, those directly affected by the implementation, or non-implementation, of blockchain, so as to generate practice-based insights that complement and extend the existing literature on the subject. To guide the exploration, the study utilizes semi-structured interviews, which strike a balance between consistency across interviews and flexibility to probe participants' experiences using a focused interview guide (Creswell, 2013; Bryman, 2016; Sternberg et al., 2022).

The study employs the Gioia methodology, an interpretive, inductive approach that moves from informant-centric codes to researcher constructed themes and, ultimately, aggregate dimensions, thereby ensuring transparency in the data-to-theory link (Gioia, Corley, & Hamilton, 2013).

3.1 Sample strategy

This study employs purposive sampling, a method that involves the strategic selection of participants who fulfill predefined criteria pertinent to the research subject (Creswell, 2013; Bryman, 2016; Bouncken et al., 2025). This strategy ensures that the study gathers insights from professionals with direct experience and decision-making authority in supply-chain functions. In accordance with the principles of qualitative design, the objective is to identify knowledgeable informants capable of articulating the processes, motivations, and challenges associated with the adoption or evaluation of emerging technologies (Bryman, 2016; Bouncken et al., 2025).

To broaden the reach of the study and diversify the perspectives, the researcher employed snowball sampling (Creswell, 2013; Bouncken et al., 2025). The initial participants recommended additional professionals who met the inclusion criteria, a tactic that has proven to be useful in expert-driven studies where access relies on trust and referrals (Bryman, 2016). The determination of the sample size was informed by the concept of thematic saturation, which occurred when the addition of further interviews did not yield novel conceptual insights (Bouncken et al., 2025).

Participants were drawn from global manufacturing or industrial enterprises with multinational operations and involvement in producing and distributing physical goods. Each interviewee had direct experience in SCM, covering areas such as procurement and sourcing, production and capacity planning, warehousing and inventory control, transportation and logistics, supplier relationship management, and risk/compliance. To ensure both operational insight and strategic perspective, the recruitment strategy placed emphasis on team leads, managers, and more senior

roles. To capture variation across contexts, the sample spanned multiple companies and manufacturing sub-sectors.

A total of 21 interviews were conducted for this study. Participants were recruited through a combination of the researcher's professional network and referrals provided by earlier participants. This dual approach facilitated access to qualified professionals and ensured diversity across roles, companies, and supply chain functions.

3.2 Data collection method

The data for this study were collected through semi-structured interviews, a method well suited to exploratory qualitative research where the goal is to obtain in-depth, experience-based insights from knowledgeable professionals (Bryman, 2016; Gioia, Corley, & Hamilton, 2013). Semi-structured interviews use open-ended prompts while maintaining comparability through a flexible guide (Bryman, 2016).

All interviews were conducted remotely via Microsoft Teams, which provided a professional setting and enabled secure audio recording with transcript export. This approach streamlined data processing and made interviews feasible across locations and time zones.

The interviews were conversational and focused on the interviewee’s professional experience related to supply-chain processes, technological change, and exposure to blockchain initiatives. The emphasis was on work practices and concrete experiences, rather than abstract opinions, with the objective of anchoring findings in organizational contexts and routines.

The duration of each interview ranged from 45 to 60 minutes. Prior to each session, participants were informed of the study’s objectives, assured of confidentiality, and asked to provide verbal consent for audio recording and transcript use. All reporting omits personal identifiers and company names unless explicit permission was obtained.

3.3 Data analysis

The interview data were analyzed using the Gioia methodology, a structured approach that supports inductive theory-building from rich empirical accounts. The method was developed by Gioia, Corley, and Hamilton (2013) with the objective of identifying patterns and processes as experienced and articulated by organizational actors. The model demonstrates a high degree of applicability to emerging, complex, and under-theorized phenomena, such as the adoption of blockchain technology in global manufacturing (Gioia et al., 2013).

This study employed a multi-layer pipeline inspired by Gioia's methodology, deviating from the conventional three-step approach. The researcher initiated the procedure by conducting a meticulous, line-by-line examination of each transcript, extracting verbatim excerpts that were subsequently labeled as citations. The citations were subsequently grouped into first-order categories to encapsulate the respondents' concrete experiences in their own terms. Subsequently, second-order themes were developed by comparing patterns across first-order categories and progressing from description to explanation of relationships, tensions, or logics. Subsequently, aggregated dimensions were assembled as higher-level abstractions that organize the emergent theory while remaining grounded in data (Gioia et al., 2013).

This approach enhances transparency and traceability by clarifying the progression from citations to first-order categories, second-order themes, aggregated dimensions, and the final structure. This progression is often summarized in a data-structure figure that documents data-to-theory links (Gioia et al., 2013). The resulting data structure was then translated into a process model to clarify relationships and the evidentiary basis of the theorizing (Gehman et al., 2018; Gioia et al., 2013).

The method is founded on an interpretivist epistemology, which posits that knowledge is socially constructed and that valid understanding requires consideration of how actors perceive and interpret their experiences (Gehman et al., 2018). The objective of this study is to understand how supply-chain professionals interpret blockchain's relevance, feasibility, and implications for routine activities.

The Gioia methodology has gained traction in organizational research, reflecting its efficacy in distilling commonalities and emergent patterns from expert informants across contexts. In accordance with established best practices, the researcher maintained an audit trail consisting of coding memos and versioned codebooks. The researcher also double-coded a subset of transcripts over time and conducted peer debriefs to enhance the credibility and dependability of the study (Creswell, 2013; Bryman, 2016; Bouncken et al., 2025).

4. Results

This chapter presents the key findings from the empirical phase of the study, which examined how professionals working in global manufacturing supply chains perceive, experience, and interpret blockchain technology. The results are reported using a Gioia-style structure with three interlinked aggregates: Benefits & Drivers, Challenges & Barriers, and Key Success Factors. Consistent with qualitative reporting conventions, the chapter presents a narrative synthesis with each claim anchored by participant quotations. The quotations have been translated from their Spanish

originals and are attributed by initials to maintain anonymity. Where relevant, the chapter contrasts the non-blockchain state with the blockchain-enabled state. The full Gioia data structure that underpins this chapter, encompassing first-order categories, second-order themes, aggregate dimensions, and exemplar quotations, appears in Appendix 1.

4.1 Benefits and drivers of the adoption of blockchain technology

Interviewees converged on a clear value case: blockchain is compelling because it substitutes guesswork with shared, credible evidence and turns friction-heavy coordination into lean, rules-based operations. The everyday pain today is uncertainty about what actually happened; materials may be on-site but not posted, or a shipment may be in motion with no reliable status. Those blind spots force teams to infer, escalate issues that later prove routine, and delay payments that strain supplier relationships. The envisaged shift is a single shared signal where each party records events as they occur, so downstream decisions are made on facts rather than email reconstructions and fragmented systems. As one interviewee put it, the benefit is "you see what's happening in the moment instead of finding out at the end" (JR). Another highlighted the same point from a coordination angle: with blockchain "we could have an integrated view with suppliers and forwarders to see real-time tracking and the exact time/date of receipt to coordinate better" (ME). Others explicitly linked persistent bottlenecks to missing visibility: "we have bottlenecks in every department because we lack complete visibility into the information we need… we shouldn't need to be pushing others for it" (GR).

Trust is not only about speed; it is about verifiability. Interviewees contrasted the editability of current ERPs "right now anyone with a transaction code can modify things and you don't know who" (AD) with a tamper-evident trail where "each link can add information, but you can't edit or delete what's already there. A record remains" (DC). If changes are attributable and immutable, investigations no longer rely on private inboxes and accountability becomes a property of the system. "You can't hide; if someone changes something it's recorded, which builds trust," explained one interviewee (JV). Verifiability also prevents misdirected blame when late postings masquerade as non-delivery: "warehouse often tells us a material hasn't been received when in fact it has, but they haven't logged it and we just can't verify it… having a way to verify the truth would be extremely valuable" (KP). Another put the same mechanism in normative terms: "if you've got nothing to hide, you've got nothing to fear… blockchain is supposed to boost trust" (RL).

A second driver is operational streamlining. Workflows remain heavy with paper, manual reconciliation, and serial approvals, what one interviewee called "the old-school way: paper

invoices, manual checks against SAP" (CD). That mode creates handoff delays, rework, and the familiar "email ping-pong." Two relief mechanisms stand out. First, consolidation: putting the invoice, proof of delivery, and material certificates "in a single platform" so issues surface in one place and administrative time falls (CD). Second, rule-based automation for repetitive checks and releases. Interviewees already see this logic in adjacent systems ("before, we had to email everyone; now the system sends [POs] directly to the supplier… you don't have to do anything; it's much more automated," JR) and expect blockchain's shared proofs to extend it (for example, smart-contract approval thresholds based on supplier performance records), especially where transaction volumes are high (JV). Participants also emphasized cutting cross-region approval chains and time-zone delays "Without blockchain we uploaded payments, but the system required approvals from every manager in Guadalajara and then another in Taiwan; with the time difference and weekends, everything dragged out. I still ended up chasing people in person 'can you approve it in SAP?' which created long delays." (CG), and adopting a common data language to "Blockchain will be helpful to unify the system and have everyone speaking the same language." (EO).

The point is not novelty for its own sake; it is reducing human coordination load so attention shifts from status-chasing to exceptions.Finally, adoption incentives are shaped by market posture. In contract manufacturing, interviewees described a diffusion dynamic where clients trigger change: "we follow what the client requests" (ME) and "if the client asks… it has to be done" (CD). The prevailing posture is fast-follower "they don't want to be pioneers; first see how it works elsewhere and replicate it" (GR); "if the client already uses it and it works, we want it" (KP). Importantly, there is a strategic outlier view: a minority argued that proactive adopters become industry references, which can be a competitive advantage (RL). This does not contradict client-driven logic; it reframes the same pressure "if we don't do it, the client will go elsewhere", as a proactive choice to be the supplier that already meets the next standard. In that reading, client pull and competitive differentiation converge: either a client explicitly demands blockchain and the firm complies, or the firm moves early to become the partner they keep.

4.2 Challenges and barriers faced in the adoption of blockchain technology

The same features that make blockchain attractive also surface frictions. Transparency can feel like exposure; standardization implies migration and governance work; automation can collide with incentives and approval calendars. Interviewees were clear that resistance is not simple technophobia but a political economy of information and control.

A first set of barriers is aversion to exposure: with an immutable trail, "any error you enter would be visible to everyone; you risk your reputation" (DC). Executives used to discretionary supplier handling may see a common ledger as loss of informational control; one interviewee described a leader who "likes to manage certain suppliers in his own way," and blockchain would "make all of that visible" (CG). Some users also resist because they've mastered legacy systems and fear losing that hard-won competence "resistance to change is strong… there are people who know a system inside out" (CD). These reactions show why change management must lower the identity and cognitive costs of switching, not only the technical costs. Interviewees also stressed that transparency must be calibrated via role-based access and NDA-aware sharing "show the customer what they need to know, where their product is," not supplier identity or invoices (CD). In short, transparency is designed visibility, not publish-everything.

A second set of barriers is technical and data-related. Interviewees underscored "data before chain": "a system is only as good as the information you feed it… control and organization are often missing, even in big firms" (DC). That reality expands the scope from a "blockchain project" to a data-governance program with clean, timely, attributable inputs. It also intersects with integration and migration work that can last months, plus end-user retraining on new flows. Concretely, this means tightening master data (items, suppliers), defining who posts which event and when, enforcing posting discipline so confirmations are timely and attributable, and wiring ERP systems to the chosen ledger while updating SOPs so the "click path" matches the new process (DG). Even if the focal firm is ready, supplier capability is uneven, one interviewee estimated only "20–30%" could implement today (MH), so network-level value requires standardization beyond the firm (ER). On top sit security and legal thresholds: "before anything, think ISO 27000… it's a risk if a supplier doesn't have a robust system" (CD); "legal/regulatory topics will always come up when opening information" (GR). A further complication is incumbency: firms "already have their tools and stick with them," so integration must respect tool lock-in and minimize disruption (JR). These aren't anti-adoption arguments; they're prerequisites for credible deployment.

Financial pressure and uncertain payback also weigh heavily on decisions. Interviewees repeatedly flagged up-front and ongoing costs, time-to-benefit, and scale economics. "Education on blockchain will be costly; benefits will come in years, not months," one noted (AB). Others stressed volume sensitivity: "value depends on volume, if you're buying 1,000 units a week, automation may be worth it; if it's two shipments a month, suppliers will say 'email is fine, no point in having blockchain'" (AS). Decision-makers therefore scrutinize total cost of ownership; licenses, integration and data migration, user enablement, vendor management. As one put it, "costs matter,

and so does ease of implementation: if everyone can learn it quickly, cost matters less; if it's costly and ongoing, it's less attractive" (CG). Crucially, authorizers expect quantified returns: "show me I can protect the money and I'm in; but if it's a pit where funds go with no quantifiable return, that bet is hard" (CD). Another interviewee bundled these points into a governance test: "adoption obstacles include justifying the investment and the system complexity, how it integrates with current systems and data migration" (ER). In short, budgets hesitate not only because solutions are expensive, but because benefits are uncertain at low volumes and delayed in time, making ROI fragile unless cases are carefully chosen and measured.

Finally, organizations must contend with bureaucratic drag. Even with interest, "there's too much bureaucracy, too many approvals to implement something as comprehensive as blockchain" (GG), and "there are too many people involved; the bigger it is, the harder it becomes to get everyone aligned" (MP). One interviewee also called out information hoarding as part of this dynamic (KP). Left unaddressed, distributed decision rights and mismatched calendars turn promising pilots into long-march projects. The implication is that blockchain plans must include governance simplification, who decides what, on what evidence, and when, so system design and organizational design move together.

4.3 Key success factors in the implementation of blockchain technology

Turning promise into outcomes hinges on three intertwined conditions: senior sponsorship tied to a quantified business case, a phased rollout that builds capability as it goes, and cross-functional alignment so incentives and handoffs don't work at cross-purposes. Interviewees were explicit that top-management approval is decisive: "Authorizations come directly from the VP. Functional leaders can push, Finance reviews the cost, but the VP signs" (ND). "Who gives the yes to do it? The Vice President, the most powerful person in the region" (AO). Even when IT and Supply Chain would "run the implementation," final approvals "are from top managers, no doubt" (JR). "The company presidency sets the direction" (ER).

Because executives decide, the format of persuasion must match executive expectations: a tangible, pilot-anchored business case. "If I could say, 'with blockchain you'll save this much money… it will generate more revenue,' something very tangible, that would help a lot" (CD). "If a technology raises a company's productivity, cost stops being a problem, but you have to prove it" (MH). "With the costs added with blockchain, you should really be justifying the investment, and the system complexity" (ER). In practice, interviewees advocated tracking hard metrics in early trials, cycle

time, rework, payment lead time, dispute rates, and folding those results into a rolling ROI narrative that earns authorization to scale.

On how to implement, the consensus was a trial-first rollout followed by staged expansion. “Once one pilot area works, start another, little by little; people are attached to old ways” (ND). “Start with one project in a single department” (GG). “Apply it in one department first; if it delivers results, people will authorize expansion” (KP). In large firms, “start where it’s 100% necessary, like logistics or trade; this takes years” (MH). Tight pilots create a containment field for integration issues, clarify data-governance rules in one context, and let the organization experience “rules-in-code” before asking everyone to conform.

Pilots translate into durable change only if capability building is continuous. “Constant training is basically 100%… in supply chains you can’t shut a department for a day, so follow-up post-launch is key; otherwise you don’t know if you improved” (DB). Capability must extend beyond the focal firm: “We’d need complete training in the company and for suppliers, including certifications, because blockchain will transform daily work” (ER). “Sell it to users and follow up: explain the rules, what they need to know and do; incentivize participation and collect feedback to refine the rules” (EO). “Implementation and user education are the key to successful adoption” (RL). Treat rollouts as learning loops, train, launch, check outcomes, adjust, retrain, until the new workflow becomes the easiest way to work.

Finally, inter-departmental alignment converts local wins into system-level performance. The same features that help Supply Chain (event-driven releases, faster reconciliations) can look like risk to Finance. “Finance won’t approve fast payments that may come as a result from blockchain; they’ll always try to delay them” (JR). “What benefits Supply Chain, Finance may see as a threat” (AS). “Some departments resist adoption to maintain control” (CD). The remedy is explicit process standardization and a shared rulebook: “Define, area by area, a process for how to use blockchain and how one area relates to another across the company; that would be complex” (ER). “I see blockchain a bit like a ‘rulebook’ set among stakeholders” (EO). Rather than re-explaining the automation mechanics, teams agree up front on evidence-based release rules co-signed by Finance and Supply Chain, along with narrowly scoped exception paths (clear approvers and time limits). This preserves control while keeping operational flow fast and predictable.

In summary, executive sponsorship grants permission and resources; a quantified business case earns trust to proceed; pilots generate evidence and sharpen the rules; continuous capability building makes the new way stick; and cross-functional alignment turns local improvements into

end-to-end reliability. Successful implementations treat blockchain as socio-technical orchestration: data, processes, and incentives change together so the ledger coordinates people as effectively as it records events.

5. Discussion

This study set out to understand how professionals inside global manufacturing firms make sense of blockchain and why many initiatives stall after promising pilots. The interview evidence reframes what the technology does in day-to-day coordination, identifies the mechanisms that convert pilots into results, and clarifies why industry platforms plateau even when prototypes work.

A first contribution is conceptual: this study reframes blockchain in supply chains not as a generic "shared database," but as shared evidence that coordinates inter-firm action. Practitioners seek attributable, time-stamped events that trigger downstream decisions without manual workflows such as email reconstruction or spreadsheet reconciliation. This reframing maps cleanly to agency theory. It reduces information asymmetry at principal–agent handoffs by making actions enforceable in contracts and responsibility traceable: immutable, attributable records increase the likelihood of detecting hidden action, shift the burden of explanation to the party posting the event, and support contingent claims that curb moral hazard (Jensen & Meckling, 1976; Lumineau, 2019). It also aligns with affordance–actualization: the relevant affordance is not "blockchain" in the abstract but the event-proof and rule-based release sequence that organizations bring into being through pilots, deciding which boundary events count as evidence, instrumenting their capture, testing exception handling, and then stabilizing new routines (Du, Pan, Leidner, & Ying, 2019). Finally, the interviews nuance "radical transparency" narratives: effectiveness depends on selective, role-based transparency, views and NDA-aware sharing that reveal just enough to resolve claims while protecting sensitive identities and prices, consistent with supply-chain research on opportunism and information governance (Tokar & Swink, 2019; Cole et al., 2019). In short, this practitioner-grounded reframing shows blockchain's role as a shared-evidence system: it makes key handoffs enforceable and traceable and, via the rule-based release sequence, clarifies how organizations convert potential into operational results in multi-tier supply chains.

A second contribution is procedural. Across interviews, progress beyond the pilot clustered around three mechanisms that travel across contexts. First, executive backing was conditional on measured results: leaders responded when pilots demonstrated reductions in cycle time, dispute rates, or payment lead time and when proposals were explicit about integration, migration, enablement, and risk controls. This extends the fit–viability idea from a one-time gate at kickoff to iterative viability

checks at each expansion, fit may be strong for verifiable handoffs, but viability must be re-earned as scope, partners, and complexity increase (Liang, Kohli, Huang, & Li, 2021). Second, teams advanced through a trial-first rollout with staged expansion: start where friction and volume are highest, specify the few boundary events that count as evidence, make exceptions explicit, measure before/after, and only then widen coverage (Du et al., 2019; Sternberg, Mathauer, & Hofmann, 2022). Third, recurring cross-functional negotiation gave way to rules-in-code when Operations and other departments co-authored the "rulebook", what counts as proof, who can see what, which thresholds release which actions, and how exceptions route. In combination, these mechanisms translate broad prescriptions about alignment and capability building into a concrete path that practitioners can execute.

The ecosystem story explains why technically sound pilots often fail to scale. Two frictions were decisive. First, immutable does not guarantee accurate: without disciplined posting and data governance, a ledger can preserve the wrong thing, faster. Second, decentralized infrastructure by itself does not produce organizational neutrality. Potential participants look beyond the protocol to the governance around it: who convenes, who sets standards, who controls data rights, and how disputes are resolved. If the arrangement appears to advantage one player, adoption slows regardless of technical merit (Sternberg et al., 2022; Bakos & Halaburda, 2022). Seen this way, "standards and interoperability" problems are better understood as a question of governance trust, whether membership rules, data-use terms, and value capture look fair enough to join, which helps make sense of selective diffusion and the "pilot fatigue" reported in prior reviews (Queiroz et al., 2020; Moosavi et al., 2021).

The findings both confirm and complicate what the literature says. They confirm robust benefits familiar in supply-chain settings; provenance and traceability, auditability for compliance, and smoother data flows when blockchain integrates with ERP/IoT systems (Cole et al., 2019; Dutta et al., 2020; Fosso Wamba et al., 2020). They also support a configurational view of success: value appears when blockchain travels with complementary capabilities, clean data, integration, analytics, and workable governance, rather than as a single lever (Jiang, Zhang, & Cui, 2024; Sahoo et al., 2022). At the same time, the interviews temper expectations that "openness" or "decentralization" alone will deliver scale. Neutral or jointly governed arrangements matter more to competitors than protocol elegance (Sternberg et al., 2022; Bakos & Halaburda, 2022). Visibility is not a free good; selective, role-based access is seen as necessary to protect prices, identities, and bargaining positions (Tokar & Swink, 2019). And because benefits are volume-sensitive and often delayed, returns are fragile unless programs target flows where event-evidence retires real frictions,

including payment on verified receipt or deep-tier finance once milestones are evidenced (Chod, Trichakis, Tsoukalas, Aspegren, & Weber, 2020; Dong, He, & Wang, 2022; McKevitt, 2017).

Answers to the research questions are embedded in this narrative. What enables adoption and implementation is a recurring pattern: design credible evidence (verifiable events), tie it to measurable outcomes, secure senior sponsorship, co-author rules across functions, invest in data governance and integration, ensure partner readiness, and use selective transparency that reduces exposure while enabling coordination (Du et al., 2019; Liang et al., 2021; Queiroz et al., 2020). What blocks progress, beyond plumbing work, are social and institutional constraints: aversion to exposure, ambiguous ownership of outcomes, uncertain payback at low volume, uneven supplier capability, and difficulty agreeing rules in competitive ecosystems, consistent with the field's mixed scale-up record (Sternberg et al., 2022; Moosavi et al., 2021). Adoption tends to succeed when programs start from high-pain points, recall trace, milestone-based payment, compliance automation, instrument event-evidence, quantify gains, encode rules with shared ownership, and provide role-specific incentives (Chod et al., 2020; Dong et al., 2022).

Two implications follow for theory. The shared-evidence lens links agency theory and affordance–actualization by tying immutable, attributable signals to a concrete grammar of action. Extending fit–viability from a start-line screen to iterative viability better reflects multi-party rollouts where feasibility changes with scope and partner mix (Liang et al., 2021). Recasting "standards" as a question of governance trust foregrounds membership, data rights, and dispute rules as explanatory variables for diffusion, not merely as technical chores. Finally, the configurational account is reinforced: combinations of capabilities, integration, disciplined data governance, and joint rule-setting, explain outcomes better than any single factor (Jiang et al., 2024).

Practical implications follow directly. Programs work best when they are designed around evidence rather than slogans: name the handful of events that matter for money, risk, and compliance, make them attributable, and connect them to releases that stakeholders recognize. Growth should be earned, not assumed: begin with a high-friction flow, measure before/after, and extend only when the metrics hold in a new lane or site. Rulebooks should be co-authored with the relevant departments from the start so thresholds and exception paths are shared, not renegotiated case-by-case. Joining should be easy for partners: standardize interfaces, fund connectors and training where needed, and publish operating rules so the click path is the easy path. And where competitors must participate, governance should be structured in ways others can trust, with clear membership criteria, transparent data-use terms, and explicit dispute processes.

The study has limits. The vantage point is supply-chain roles inside global manufacturers; other functions, legal, audit, cybersecurity, may weight risks and payoffs differently. Interviews capture perceptions and practices at a point in time; following implementations longitudinally would strengthen causal claims. Comparative work across sectors with different power structures could test how governance design choices affect participation. Finally, configurational methods, such as set-theoretic approaches, could identify which bundles of capabilities are sufficient for adoption under different environmental conditions.

Overall, a practical and theoretically coherent picture emerges. When initiatives are framed as shared-evidence systems with co-authored rules and staged expansion, benefits are no longer abstract. They show up as fewer disputes, quicker releases, and cleaner audits. These are delivered in ways that protect legitimate informational boundaries and that coalitions are willing to join. This, more than any single feature of the technology, helps to explain why some programs move beyond the pilot while others do not.

6. Conclusion

This thesis examined how practitioners in global manufacturing make sense of blockchain and what separates pilot curiosity from durable use. Using semi-structured interviews and a Gioia-style analysis, it traced how the technology is interpreted in day-to-day work and what enables or blocks progress.

Two ideas anchor the contribution. First, in practice blockchain functions as actionable evidence, attributable event records that others can rely on, rather than as a generic shared database. Second, implementation advances when that evidence is tied to clear outcomes and embedded through a trial-first, measured rollout with simple rules that different departments accept and follow. Where posting discipline is weak or governance arrangements look one-sided, prototypes stall; where joining is easy and incentives are evident, they spread.

For managers, the message is pragmatic: start from a concrete pain point, specify the few events that "count," connect them to decisions people recognize, test on a narrow flow, measure, and expand only when the gains travel. For researchers, the findings link well-known lenses to an operational grammar (verifiable events driving agreed releases) and suggest longitudinal and configurational studies to test which capability bundles carry scale. The study implications are clear, when treated as an evidence-centred coordination layer and rolled out with discipline, blockchain moves from promise to fewer disputes, faster releases, and supply chains that are simpler to run.

7. Appendices

Appendix 1. Gioia's structure

Citations	First-Order Concepts	Second-Order Themes	Aggregate Dimensions
"Currently *without systems like blockchain* material arrives and is sent to storage, but isn't posted… from purchasing, we can't tell if it truly didn't arrive or someone just didn't log it; this blocks payments and puts supplier relations at risk." — AD	Real-time blind spots undermine coordination	Trust mechanisms: shared real-time visibility & immutable traceability	The advantages and motivations associated with the adoption of blockchain technology
"For me, the real benefit from blockchain is in deliveries; the supplier posts 'left my warehouse,' and others log the progress; you see what's happening in the moment instead of finding out at the end." — JR.			
"*With blockchain* we could have an integrated view with suppliers and forwarders to see real-time tracking and exact time or date of receipt to coordinate better." — ME			
"*Without blockchain* we have bottlenecks in every department because we lack complete visibility into the information we need, or should have, to manage the supply chain more effectively… we have become skillful at pushing suppliers and departments for this info, but we shouldn't need to do that." — GR.			
"With blockchain each link can add information, but you can't edit or delete what's already there. A record remains." — DC.	Tamper-proof traceability		
"Product tracking can definitely be useful with blockchain, no doubt; there's also a plus for audits." — AB.			
"Currently, anyone with a T-code can modify anything they want, and you don't know who; with blockchain you'd know who changed what." — AD.			
"Suppliers might say one thing, but with blockchain you can't hide; if they do something it's recorded, which builds trust." — JV.			

“A quick example: warehouse often tells us a material hasn’t been received when in fact it has, we just can’t verify it. We end up relying on what they report or what they upload to our internal system, but more often than not, they do a belated entry. That means we might blame the supplier for the delay when the issue was actually our internal posting process. So having a way *like blockchain* to keep up and to verify the truth would be extremely valuable in that regard.” — KP.	Verifiable data builds intra- & inter-firm trust		
“If you’ve got nothing to hide, you’ve got nothing to fear… blockchain is supposed to boost trust; if you’re honest, you shouldn’t fear being traceable.” — RL.			
“Something valuable with blockchain beyond speeding processes, is that trust would be built as well.” — MH.			
“*With blockchain* I believe it would be tremendously helpful to have the full 100% evidence of status and materials whereabouts in order to foster better cooperation .” — GG.			
“We still work old-school: we use paper, check manually the invoices, we make sure it matches to SAP... that’s still how we operate. I do think a more automated system there would add a lot of value.” — CD.	Manual/fragmented workflows delay performance	Operational streamlining	
“Even as a big company, many processes are manual… You go ask, and someone checks the documents with someone else. There isn’t a program that helps reduce this type of tasks and they usually take more time than you would like.” — AD.			
“*Without blockchain* we uploaded payments, but the system required approvals from every manager in Guadalajara and then another in Taiwan; with the time difference and weekends, everything dragged out. I still ended up chasing people in person ‘can you approve it in SAP?’ which created long delays.” — CG.			
“*Without blockchain* endless email ping-pong causes pauses in the supply chain.” — DB.			
“With blockchain it would take seconds, not days; you would reduce manual checks.” — DG.			
“We already have some of that where I work, which is why those ‘where did this material go?’ gaps aren’t very common. The idea is for the system to do the planning with as little human intervention as possible; we just give the check and the plan launches.” — EO.	Automation replaces repetitive tasks		

“I’ve seen *blockchain* used for fast approvals of purchase orders. Instead of your director approving each one individually before they are sent to suppliers, you can create smart contracts based on supplier performance records and have POs sent automatically, without going to your boss. The benefits show up most in larger operations, where time savings turn into real money.” — JV.			
“AP pays on Thursdays; if the receipt posts Friday, you wait a whole week… Automating those payments would improve supplier relationships and save time.” — JR.			
“Without blockchain, I needed a pile of approvals to get invoices paid… If I missed Finance’s cut-off, payment slipped to the next month; our VP also had to approve POs if he’s busy we’d be chasing him. It consumes a lot of time.” — DC.			
“Before, we had to email everyone. Now, the system sends it directly to the supplier, so you don’t have to do anything. It’s much more automated.” — JR			
“It would be very important to have everything in one place, on a single platform where the supplier says: ‘Here’s the invoice, here’s the proof of delivery, and here are the material certificates.’ On a blockchain-style platform, that adds a lot of value and saves administrative time.” — CD	Unified platform consolidates operations		
“Blockchain reduces paperwork and puts everything in one place; you spot issues quickly.” — MP.			
“We keep fixing isolated little issues, payments here, tracking there, instead of a system-wide solution.” — AD.			
“Blockchain will be helpful to unify the system and have everyone speaking the same language.” — EO			
“Many adaptations are client-driven, not internal; as a contract manufacturer, we follow what the client requests.” — ME.	Clients are the primary trigger	Market-driven adoption logic: client pressure & fast-follower behavior	
“We don't currently use blockchain, but if the client asks for it, it has to be done.” — CD.			
“Clients influence a lot; if they ask for something related to their supply chain, there’s no way to say no, otherwise they would just move on to a competitor.” — KP.			
“The only way for us to bring something so extensive as blockchain is if a client were to request it” — ND.			

"In my company, they don't want to be pioneers; they first want to see how it works elsewhere and then replicate it." — GR	Fast-follower stance		
"We won't be pioneers; but if the client already uses it and it works, we want it." — KP.			
Outlier "Those who innovate without being asked become industry references; being proactive is better." — RL.			
"Any error you enter would be stamped for everyone to see; in a global industry you risk your reputation because of that." — DC.	Fear of exposure	Behavioral & cultural resistance to transparency and change	Challenges & Barriers of Blockchain Adoption
"It's ironic: the intention with blockchain is to create more trust through transparency, but you feel exposed; that creates distrust." — MP.			
" The biggest obstacle is the VP who doesn't want this because he likes to 'manage' certain suppliers in a certain way, and this would make all of that visible, even in a large company." — CG.			
"Blockchain would force us to work correctly; that's where resistance comes from… users don't like being pressured like that." — KP.			
"Blockchain would put everyone on the spot, exposing that a production line is slow or that commitments weren't met… Fulfillment or logistics might love it, but the rest?" — CD			
"People are very reluctant to change; many are comfortable and don't accept something new even if that could make work simpler." — RL	Status-quo comfort / cohort skepticism		
"There will definitely be closed minds… many users could say, 'We've done it this way forever, why change now?'" — DB.			
"Those who struggle most are older colleagues: 'I do it this way and it works; why change?' But me? I'm more open to new tools to improve and reduce costs if there's an opportunity to learn something new, I'll try it." — EO			
"Many people would resist change, especially older staff less familiar with technology; they may simply refuse to adopt it." — MH.			
"Resistance is really tough, especially for people who've been here a long time and fully master the current system. Moving them to another platform would be hard; some would benefit and some wouldn't." — CD.			

“We have big clients and NDAs; they’d be very restrictive and specific about what to share and with whom—each client will resist making information more visible.” — KP.	Confidentiality and selective sharing		
“With customers, just show what they need to know—where their product is. Don’t show which supplier it is or the supplier invoices.” — CD			
“You need tiered access: operatives shouldn’t see everything; otherwise transparency backfires.” — AO.			
“Any AI runs on your database; the hard part is building a reliable one and keeping it clean so you can implement new tech.” — AS	Data quality & governance gaps	Technical integration, data quality and security hurdles	
“A system is only as good as the data you feed it… People entered orders late in NetSuite, so it showed unrealistic lead times, then they blamed the system. It was bad inputs.” — DC.			
“There was disarray in SAP HANA… files scattered in different folders; it requires control and organization, and that’s missing even in big firms. This needs to be fixed first.” — DC.			
“Migrating information from one system to another takes months… employees need to relearn where to click. For companies with years of data, moving that information is the biggest challenge.” — DG.	Systems integration & migration complexity		
“A barrier for adoption is integration with current systems; companies already have their tools and stick with them.” — JR.			
“Adoption obstacles: justifying the investment and system complexity, especially for people unfamiliar with new tech, and how it would integrate with current systems and data migration.” — ER.			
“Our supply base mixes very small and very large suppliers… the small ones work manually, sometimes with no ERP, rolling blockchain out to them would be a challenge.” — AS.	Supplier capability gaps		
“What if we have it *blockchain* and the supplier doesn’t? Only 20–30% could implement it.” — MH.			
“Many suppliers are big, but others don’t have the capability to adopt blockchain, so you’d have to standardize; you can’t use it with one supplier and not with another.” — ER.			
“Before anything, think ISO 27000… it’s a risk if a supplier doesn’t have a robust system; automation is great, but with prevention.” — CD	Cybersecurity, privacy & legal risk		

“Legal and regulatory topics will always come up when opening information.” — GR.			
“These days no company has been spared a cyber-attack… technology evolves for good and for bad, the risk is out there for everyone.” — CD			
“Education on blockchain will be costly; benefits will come in years, not months.” — AB.	Upfront costs & uncertain payback	Cost, ROI and implementation capacity	
“Value depends on volume: buy 1,000 units a week and automation may be worth it; if it’s two shipments a month, suppliers will say ‘email is fine, no point in having blockchain.’” — AS			
“Show me I can protect the money and I’m in; but if it’s a pit where funds go with no quantifiable return, that bet is hard.” — CD			
“Costs matter, and so does ease of implementation: if everyone can learn it quickly, cost matters less; if it’s costly and ongoing, it’s less attractive.” — CG.			
“There’s too much bureaucracy here, too many approvals to implement something as comprehensive as blockchain.” — GG.	Approval bottlenecks & bureaucracy		
“There’s too much bureaucracy and information hoarding, this can make the implementation of blockchain harder.” - KP			
“There are too many people involved; the bigger it is, the harder it becomes to get everyone aligned.” — MP.			
“Authorizations come directly from the VP. Functional leaders can push, Finance reviews the cost, but the VP signs.” — ND.	Top-management approval is decisive	Executive sponsorship & a quantified business case	Key Success Factors in Implementing Blockchain
“Who gives the yes to do it? The Vice President, the most powerful person in the region.” — AO.			
“Implementation would fall to IT and Supply Chain, but approvals are from top managers, no doubt.” — JR.			
“The company presidency sets the direction.” — ER.			
“If I could say, ‘with blockchain you’ll save this much money…it will generate more revenue’ something very tangible, that would help a lot.” — CD.	Make the business case		
“If a technology raises a company’s productivity, cost stops being a problem but you have to prove it.” — MH.			

“With the costs added with blockchain, you should really be justifying the investment, and the system complexity.” — ER.			
“Once one pilot area works, start another, little by little, people are attached to old ways.” — ND.	Pilot first, then scale deliberately	Phased rollout & continuous capability building	
“Start with one project in a single department.” — GG.			
“I’d apply it in one department first; if it delivers results, people will authorize expansion to other areas.” — KP.			
“In a large firm, the best way is gradual, start where it’s 100% necessary like logistics, trade, this takes years.” — MH.			
“Constant training is basically 100%… in supply chains you can’t shut a department for a day, so follow-up post-launch is key, otherwise you don’t know if you improved.” — DB.	Training, follow-through & certifications		
“We’d need complete training in the company and for suppliers, including certifications, because blockchain will transform daily work.” — ER.			
“Sell it to users and follow up: explain the rules, what they need to know and do; incentivize participation and collect feedback to refine the rules.” — EO.			
“Implementation and user education are the key to successful adoption.” — RL.			
“Finance won’t approve fast payments that may come as a result from blockchain, they’ll always try to delay them.” — JR	Incentives & perceptions aligned	Inter-departmental alignment & synchronized operations	
“What blockchain benefits Supply Chain, Finance may see it as a threat.” — AS			
“Some departments resist adoption to maintain control.” — CD			
“We’d need to define, area by area, a process for how to use blockchain and how one area relates to another across the company, that would be complex.” — ER	Process standardization		
“I see blockchain a bit like a ‘rulebook’ set among stakeholders.” — EO			

Appendix 2. Interviewees list

Interviewees					
#	Identification	Position	Department	Tenure in years	Gender
1	Interviewee DC	Director of Procurement and Imports	Procurement and logistics	14	Female
2	Interviewee JV	Team Lead Buyer	International procurement	5	Female
3	Interviewee DG	Global Logistics Manager	Logistics and distribution	8	Female
4	Interviewee CG	Senior Procurement Manager	Global procurement	9	Female
5	Interviewee DB	Purchasing and Warehousing Lead	Purchasing and warehousing	7	Male
6	Interviewee CD	Plant Operations Manager	Manufacturing operations	11	Male
7	Interviewee RL	Materials Manager	Materials management	9	Male
8	Interviewee EO	Warehousing Junior Manager	Warehouse management	8	Male
9	Interviewee AS	MRP Supervisor	Planning and sourcing	7	Male
10	Interviewee AB	Regional Procurement Lead	Procurement management	5	Male
11	Interviewee JR	Program Manager	Supply chain excellence	8	Female
12	Interviewee KP	Operations Lead	Manufacturing operations	5	Male
13	Interviewee MH	Supervisor	Warehouse and inventory	6	Male
14	Interviewee ND	Indirect Material Manager	Purchasing and sourcing	8	Female
15	Interviewee GG	Supplier Development Lead	Sourcing	5	Male
16	Interviewee AO	Functional Manager	Project management	14	Male
17	Interviewee ME	Continuous Improvement Manager	Supply chain operations	10	Male
18	Interviewee AD	Team Lead Buyer	International procurement	6	Female
19	Interviewee GR	Planning Manager	Services and supply chain	7	Male

20	Interviewee MP	Functional Manager	Global and local procurement	12	Female
21	Interviewee ER	Production Manager	Supply chain production	9	Female

Appendix 3. Semi-structured interview questions

Structure	Questions
Background	• Could you describe your current role and experience in supply chain management? • What types of systems or technologies have you worked that involve traceability, supplier coordination, or supply chain automation?
Supply chain needs	• In your view, do you see a need to better your supply chain operations? • If so, which areas? Describe in detail. • Have you come across or considered systems like blockchain? • What did those systems aim to solve? Did they get adopted?
Blockchain's potential	• From what you know or have seen, what role could blockchain or similar technologies realistically play in a supply chain like yours? • Are there particular supply chain processes where blockchain might be useful? • Please explain in detail.
Barriers and challenges	• What do you see as the main obstacles to implementing a system like blockchain in your company or industry? • In a company like yours, where processes are highly structured, what specific hurdles do you think a technology like blockchain might face? • Do you think your company's supply chain processes are mature or structured enough to adopt a technology like blockchain? • Have you encountered confusion or skepticism about blockchain or similar technologies in your company?
Adoption	• Would you say your company is exploring blockchain in a trial stage, scaling, or just observing? • Who in your organization typically drives technology adoption? • What would make your organization take blockchain more seriously by decision-makers?
Reflections	• Based on your experience with new technologies, what usually makes tools like blockchain succeed or fail in supply chain environments? • If your company were to adopt blockchain, what conditions would need to be in place to make it successful? • What type of people, departments, or partnerships would need to be involved?
Closing	• Is there any experience you've had that might shed light on what blockchain adoption could look like in supply chain? • Anything else you'd like to share about innovation, risk, or collaboration in global supply chains?

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