

From Blockchain Adoption to Supply Chain Performance: A Systematic Literature Review of Mechanisms, Capabilities, and Contextual Conditions

Dustin Favian Baihaqi¹, Tias Andarini Indarwati²
(dustin.23358@mhs.unesa.ac.id, tiasindarwati@unesa.ac.id)

¹Department of Management, Faculty of Economics and Business, Universitas Negeri Surabaya, Indonesia,

Abstract. This study examined how blockchain adoption influenced supply chain performance by synthesizing the mechanisms, organizational capabilities, and contextual conditions that shaped performance outcomes. A systematic literature review was conducted using 53 peer-reviewed journal articles retrieved from the Scopus database and published between 2021 and 2026. The study selection process followed the PRISMA framework, while the selected literature was analyzed through structured qualitative and thematic synthesis. The findings showed that blockchain adoption was predominantly associated with improved supply chain performance, although its effects were mechanism-dependent and context-sensitive. Blockchain generated performance benefits primarily through enhanced transparency, traceability, trust, transaction efficiency, integration, and supply chain resilience. Organizational capabilities, technological readiness, knowledge sharing, managerial resources, and institutional conditions shaped the extent to which blockchain capabilities were translated into measurable performance improvements. The evidence also indicated that operational improvements did not necessarily produce immediate financial returns, emphasizing the importance of complementary organizational processes. These findings implied that blockchain adoption functioned as an enabling capability rather than an independent performance solution and provided managerial guidance for aligning blockchain investments with organizational capabilities and supply chain processes.

Keywords: Blockchain adoption; Organizational capabilities; Supply chain management; Supply chain performance; Supply chain resilience

1 Introduction

Global supply chains are increasingly expected to operate with greater visibility, responsiveness, security, and accountability while facing persistent disruptions, sustainability pressures, regulatory complexity, and information asymmetry. Within this environment, blockchain has moved beyond its original financial applications and is increasingly examined as an infrastructure for decentralized information sharing, product authentication, traceability, transaction security, and interorganizational coordination.

Recent research associates blockchain with improvements in transparency, traceability, information integrity, transaction efficiency, resilience, and sustainability across manufacturing, logistics, agriculture, food, and other supply-chain settings [1], [2], [3], [4], [5], [6]. This development reflects a broader shift in supply-chain digitalization: the relevant managerial question is no longer simply whether blockchain can be implemented, but whether organizations can translate its technological properties into measurable supply chain performance. The reviewed evidence in the present study similarly indicates that blockchain is increasingly conceptualized within broader organizational and operational systems rather than as an isolated technological intervention.

Empirical evidence generally supports the potential value of blockchain, although the effects are far from uniform. Blockchain adoption has been shown to positively affect supply chain performance and transparency, while technology readiness, trading needs, and knowledge sharing contribute to successful adoption [2]. Blockchain-supported traceability has also been found to contribute to Indonesian food cold-chain performance, illustrating an indirect pathway from technological implementation to operational outcomes [1]. Other evidence links blockchain adoption with task–technology fit, transparency, supply chain agility, and small and medium-sized enterprise performance [4]. In sustainable agricultural supply chains, blockchain adoption is influenced by green and lean practices, supply chain integration, risk, environmental conditions, regulatory support, innovation capability, and cost, while adoption subsequently contributes to sustainable supply chain performance [3]. Collectively, these findings suggest that blockchain-generated value depends on the organizational processes through which the technology is adopted and utilized rather than on technological availability alone.

More recent studies have extended this discussion from operational efficiency toward resilience, sustainability, trust, and strategic capabilities. Blockchain-enabled transparency, traceability, real-time connectivity, value-chain integration, cybersecurity, and transaction-cost efficiency have been associated with different performance pathways, with supply chain resilience mediating only some of these relationships [6]. Organizational resources and green supply chain practices also influence whether blockchain contributes to corporate sustainability [7], while firm characteristics and contextual conditions can alter the strength of blockchain-related outcomes [8]. Technical studies further indicate that authentication, information integrity, security, scalability, system architecture, and implementation costs constrain the performance potential of blockchain applications [9], [10], [11], [12], [13], [14]. Thus, the available evidence supports a predominantly positive, but clearly mechanism-dependent and context-sensitive, relationship between blockchain adoption and supply chain performance.

The research problem arises from the fragmentation of this evidence. Existing studies employ markedly different theoretical lenses, including the Technology–Organization–Environment framework, Unified Theory of Acceptance and Use of Technology, Technology Acceptance Model, Task–Technology Fit, Dynamic Capabilities Theory, Resource-Based View, Transaction Cost Economics, and information-systems perspectives. Blockchain itself is variously conceptualized as an adoption outcome, technological capability, enabling infrastructure, traceability mechanism, or antecedent of performance [4], [6], [15], [16]. Likewise, performance is operationalized through efficiency, resilience, sustainability, export performance, financial performance, and

broader organizational outcomes. No single theoretical perspective therefore adequately explains the technological, organizational, behavioral, and interorganizational complexity identified across the literature.

This fragmentation establishes a research gap beyond the mere absence of another review. Prior studies have investigated adoption drivers, barriers, technological applications, traceability, sustainability, and sector-specific outcomes, but the evidence remains insufficiently integrated around the central question of how blockchain adoption is translated into supply chain performance. In particular, transparency, traceability, trust, integration, resilience, transaction efficiency, organizational capabilities, and managerial support appear repeatedly, yet their theoretical roles vary across studies as antecedents, mediators, moderators, capabilities, or performance dimensions. The resulting literature therefore lacks an integrated adoption-to-performance explanation capable of distinguishing value-creation mechanisms from the contextual conditions that enable or constrain them.

Accordingly, the novelty of this study lies in synthesizing fragmented evidence into an adoption-to-performance architecture rather than treating blockchain adoption as an inherently performance-enhancing intervention. Through a systematic literature review, this study aims to (1) synthesize evidence concerning the relationship between blockchain adoption and supply chain performance; (2) identify the mechanisms and organizational capabilities through which adoption generates operational, strategic, and sustainability outcomes; and (3) determine the contextual conditions that strengthen, weaken, or reshape these relationships. This perspective is consistent with the study's central finding that blockchain functions as an enabling capability whose performance implications depend on organizational preparedness, complementary managerial resources, and effective integration into supply-chain processes.

2 Literature Review

2.1. Theoretical Framework and Background

Blockchain technology emerged as a distributed ledger architecture capable of recording transactions through decentralized, cryptographically secured, and tamper-resistant mechanisms. Although initially associated with cryptocurrency, its relevance to supply chain management became increasingly apparent because supply chains involve multiple independent organizations that must exchange information, verify transactions, coordinate activities, and manage uncertainty without necessarily sharing a common information infrastructure. Within supply chain research, blockchain has consequently been associated with reduced information asymmetry, improved data integrity, enhanced product traceability, and greater interorganizational visibility [15], [17]. These capabilities connect blockchain with broader supply chain objectives, including operational efficiency, transparency, resilience, sustainability, and performance [5], [15], [17].

This perspective has gradually shifted the literature from viewing blockchain merely as an information technology toward considering it an enabling infrastructure for

supply chain coordination. Blockchain can provide a shared and verifiable record of transactions across organizational boundaries and support more secure information exchange among supply chain actors. Consequently, its potential value has increasingly been associated with visibility, traceability, information security, authentication, transaction efficiency, and interorganizational integration [6], [9], [11], [13]. Empirical evidence further indicates that blockchain adoption can contribute to transparency and supply chain performance [2], while task–technology fit and supply chain agility influence the organizational value derived from blockchain applications [4]. These findings position blockchain within a broader organizational system rather than as an isolated technological intervention.

Sustainability and traceability have subsequently become important extensions of this discussion. Blockchain-enabled traceability can strengthen product visibility, information integrity, and accountability across supply chain networks [1], [6], [11], [13]. Within sustainable supply chains, adoption is also shaped by organizational, environmental, technological, and regulatory conditions [3], [5], while complementary organizational resources and supply chain practices influence whether blockchain implementation ultimately contributes to sustainability outcomes [7]. These studies establish an important conceptual foundation for examining blockchain not only in terms of technology adoption, but also in terms of the managerial and operational value generated after implementation.

2.2. Relevant Theories, Models, and Major Schools of Thought

The theoretical development of blockchain adoption research can be understood through several complementary schools of thought. At the organizational level, the Technology–Organization–Environment framework provides a useful foundation for explaining why firms adopt technological innovations. Organizational innovation is shaped by technological characteristics, organizational conditions, and the external environment [17]. Although developed long before blockchain, this framework is particularly relevant because blockchain adoption requires technological compatibility and infrastructure, organizational resources and managerial commitment, and external support from trading partners, regulators, and industry ecosystems. This logic corresponds with the theoretical diversity subsequently identified in the reviewed studies, where technological, organizational, and environmental conditions were repeatedly connected with blockchain adoption and supply chain performance.

At the behavioral level, the Technology Acceptance Model explains adoption through perceived usefulness and perceived ease of use [18], while the Unified Theory of Acceptance and Use of Technology emphasizes performance expectancy, effort expectancy, social influence, and facilitating conditions [19]. These perspectives became particularly relevant when blockchain research moved from conceptual applications toward examining actual acceptance by managers and supply chain professionals. Performance expectancy was found to influence blockchain adoption, while adoption behavior differed between supply chain professionals in India and the United States [20]. Evidence from the Indian supply-chain context similarly reinforced technology-adoption theory as an important stream within blockchain supply chain research [21].

A second theoretical stream focuses on the strategic value of technological resources. The Resource-Based View proposes that competitive advantage depends on valuable, rare, difficult-to-imitate, and organizationally embedded resources [22]. From this perspective, blockchain itself should not automatically be considered a source of superior performance. Rather, its value depends on how effectively it is combined with complementary organizational resources, knowledge, routines, and managerial capabilities. This interpretation is strengthened by Dynamic Capabilities Theory, which explains how firms sense opportunities, seize them, and reconfigure resources in changing environments [23], [24]. Applied to blockchain-enabled supply chains, these theories imply that adoption represents only an initial technological investment; performance improvements depend on the organization's capacity to integrate blockchain-generated information into operational and strategic processes. This logic closely corresponds with the reviewed literature's broader finding that organizational capabilities and preparedness determine whether blockchain functionality becomes measurable performance improvement.

A third perspective originates from Transaction Cost Economics, which proposes that governance structures emerge partly to minimize transaction costs created by uncertainty, bounded rationality, and opportunism [25]. Blockchain is relevant to this perspective because shared and tamper-resistant records may reduce verification costs and improve confidence in transactions between parties. Transaction Cost Theory has also been explicitly applied to blockchain-enabled supply chain relationships, indicating that blockchain can alter governance arrangements by influencing transaction characteristics and interorganizational coordination [26]. The theoretical importance of this perspective lies in shifting attention from technological adoption itself toward the economic mechanisms through which blockchain may improve supply chain relationships.

Complementing these perspectives, Task–Technology Fit proposes that technology contributes to performance when its functionality corresponds with the tasks users must perform [27]. This is particularly relevant to blockchain because not every supply chain problem requires a distributed ledger. Blockchain should theoretically generate greater value where tasks involve multi-party verification, provenance, information sharing, authentication, or transactions among actors with limited mutual trust. Accordingly, adoption alone cannot guarantee performance; technological functionality must correspond with operational requirements.

2.3. Key Constructs and Conceptual Intersections

The first central construct is blockchain adoption, which represents organizational acceptance, implementation, or utilization of blockchain within supply chain activities. Early empirical evidence showed that adoption was influenced by a combination of technological perceptions, organizational preparedness, social influence, knowledge, and environmental conditions [20], [21]. Subsequent evidence directly connected blockchain adoption determinants with supply chain performance in India and the United States, showing that knowledge sharing and trading-partner pressure contributed to blockchain adoption and that transparency played an important role in translating blockchain-related capabilities into performance outcomes [28].

The second construct, supply chain performance, is multidimensional rather than a single operational outcome. It may encompass efficiency, cost, responsiveness, quality, flexibility, dependability, visibility, resilience, and sustainability. This multidimensionality is important because blockchain may influence particular dimensions of performance without generating equivalent improvements across all outcomes. Blockchain has been associated with several major supply chain objectives [29], while its potential implications have also been extended toward environmental, social, and economic sustainability [30]. Consequently, the relationship between adoption and performance should not be reduced to a simple technological-effect assumption.

Several constructs intersect between adoption and performance. Transparency concerns the availability and visibility of reliable supply chain information, while traceability refers to the ability to follow products, materials, or transactions across supply chain stages. Trust concerns confidence in information and exchange relationships, whereas transaction efficiency relates to reductions in verification, coordination, and processing burdens. Integration captures the extent to which information and activities are coordinated across organizational boundaries. These constructs are theoretically interconnected because blockchain's immutable and distributed architecture can strengthen information verifiability, which may improve transparency and traceability, reduce uncertainty, and facilitate coordination [29], [30], [31]. However, the literature does not support treating these mechanisms as interchangeable or assuming that they automatically emerge from blockchain implementation.

This distinction is central to the present review. Blockchain is conceptualized differently across the literature—as an adoption outcome, technological capability, enabling infrastructure, traceability mechanism, or antecedent of operational and sustainability outcomes. No single theoretical perspective fully explains the technological, organizational, behavioral, and interorganizational complexity of blockchain-enabled supply chains. Accordingly, the conceptual intersection between blockchain adoption and supply chain performance is better understood as a layered relationship. Technology-adoption theories explain why organizations adopt; Resource-Based View and Dynamic Capabilities Theory explain how complementary capabilities transform technology into organizational value; Transaction Cost Economics explains potential efficiency and governance benefits; and Task–Technology Fit explains why performance effects depend on alignment between blockchain functionality and supply chain requirements. This theoretical integration provides the foundation for examining transparency, traceability, trust, transaction efficiency, integration, and related capabilities as potential mechanisms rather than assuming a direct and universal adoption–performance effect.

3 Research Method

3.1. Research Approach

This study employed a Systematic Literature Review (SLR) to examine and synthesize existing evidence concerning the relationship between blockchain adoption and supply chain performance. The SLR approach was selected because research in this domain

spans supply chain management, information systems, operations, sustainability, and technology adoption, resulting in conceptually and methodologically heterogeneous evidence. Compared with a conventional narrative review, an SLR provides a more transparent, structured, and reproducible procedure for identifying, evaluating, and synthesizing relevant studies [32], [33]. Accordingly, the review was designed to move beyond a descriptive summary of blockchain applications and to identify the mechanisms, capabilities, and contextual conditions through which blockchain adoption was associated with supply chain performance.

3.2. Data Sources and Types

The study used secondary data obtained exclusively from the Scopus database, resulting in a final sample of 53 peer-reviewed journal articles. Scopus was selected because of its extensive coverage of multidisciplinary scholarly literature and its structured indexing system, which enables systematic filtering according to publication year, document type, language, source type, and accessibility. Restricting the search to a single well-established bibliographic database also enabled the review to apply consistent eligibility criteria throughout the identification and screening process. The reviewed studies covered publications from 2021 to 2026, thereby capturing recent developments in blockchain-enabled supply chains and contemporary discussions surrounding performance, transparency, traceability, resilience, and organizational capabilities.

3.3. Data Collection Process

The literature search was conducted using a Boolean search strategy designed around the two principal concepts of the study: blockchain adoption and supply chain performance. The search expression applied in Scopus was: TITLE-ABS-KEY (blockchain adoption) AND TITLE-ABS-KEY (supply chain performance). The search was subsequently refined using the following restrictions: DOCTYPE ("ar"), LANGUAGE ("English"), SRCTYPE ("j"), OA ("all"), PUBYEAR > 2020, and PUBYEAR < 2027. Searching the title, abstract, and keywords was considered appropriate because these fields capture the substantive focus of publications while reducing the inclusion of studies in which the focal concepts are only mentioned incidentally. Bibliographic and substantive information from eligible studies was subsequently organized to facilitate systematic comparison across the literature.

3.4. Data Selection Process (PRISMA)

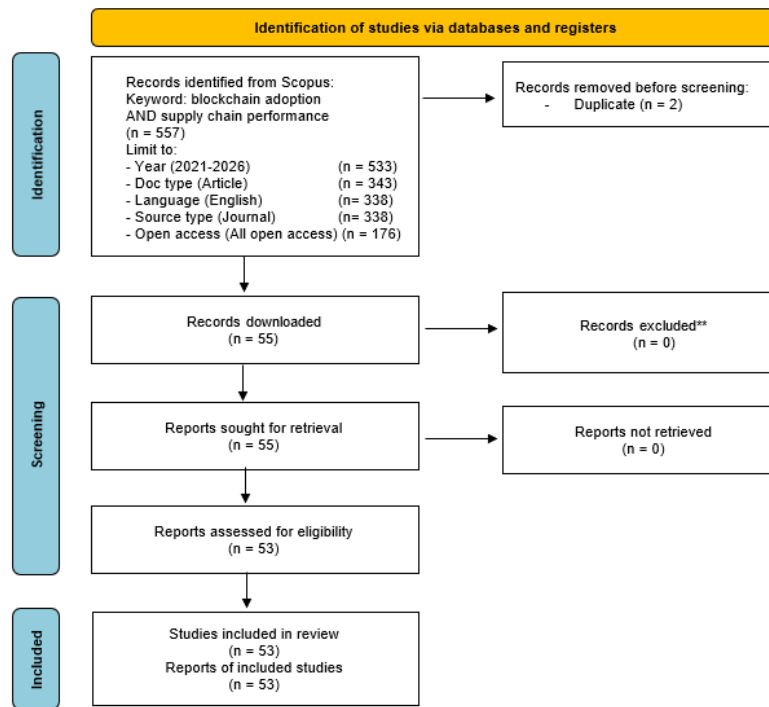


Fig. 1. Stage of Systematic Literature Review - PRISMA Method

Study selection followed the PRISMA 2020 framework, which provides standardized guidance for reporting the identification, screening, eligibility assessment, and final inclusion of studies in systematic reviews [34]. PRISMA was selected because its transparent reporting structure strengthens the reproducibility of literature selection and provides an auditable pathway from database retrieval to the final analytical sample. Records retrieved from Scopus were progressively filtered according to the predetermined search restrictions, after which potentially eligible articles were assessed for relevance and accessibility. Duplicate records and articles failing to satisfy the eligibility requirements were removed during screening. Following this procedure, 53 articles were retained as the final evidence base for the systematic review.

The inclusion criteria required studies to be journal articles, written in English, published between 2021 and 2026, indexed as journal sources in Scopus, available through open access, and substantively related to blockchain adoption and supply chain performance. These criteria were established to ensure that the final sample consisted of accessible and academically validated evidence directly relevant to the research objective. Studies were excluded when they were not written in English, could not be accessed in sufficient full-text form, had not undergone an identifiable peer-review process, or

represented non-academic sources. Applying explicit eligibility criteria reduced arbitrary study selection and strengthened methodological consistency throughout the review process [34], [35].

3.6. Data Interpretation and Synthesis

The 53 selected articles were analyzed through a structured qualitative and thematic synthesis. Each study was examined according to its publication characteristics, geographical setting, research problem, methodological design, theoretical framework, key constructs, hypotheses, empirical findings, and stated novelty. Particular attention was given to relationships connecting blockchain adoption with supply chain performance and to recurring mechanisms such as transparency, traceability, trust, transaction efficiency, integration, and resilience. Organizational capabilities, technological readiness, managerial resources, and contextual conditions were also examined according to the roles assigned to them in the original studies rather than being predetermined as uniform variables. This interpretive structure was appropriate for synthesizing heterogeneous evidence while preserving differences among theoretical and methodological approaches [33]. It also enabled the review to identify convergent findings, contradictory evidence, contextual boundary conditions, and unresolved research gaps within the blockchain adoption–supply chain performance literature.

4 Result

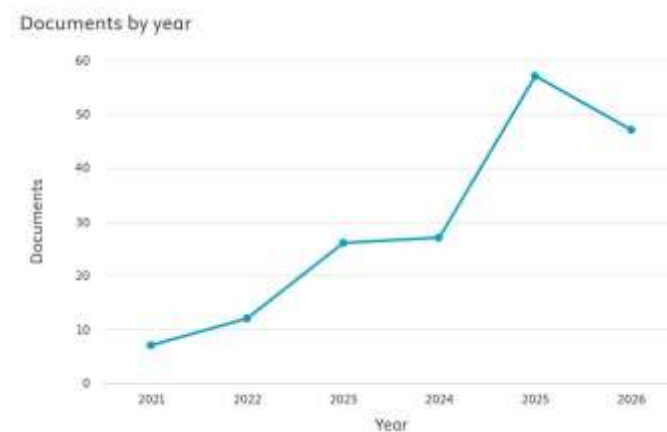


Fig. 2. Trend of Scopus-Indexed Documents by Year (2021–2026)

The annual distribution of documents indicates a clear expansion of scholarly attention to the research topic between 2021 and 2026. The number of publications increased from approximately 7 documents in 2021 to 12 in 2022, followed by a substantial rise to around 26 in 2023 and a modest increase to 27 in 2024. The most pronounced growth occurred in 2025, when the number of documents more than doubled to approximately 57,

representing the highest publication volume within the observed period. In 2026, the number declined to around 47 documents; however, this figure remained considerably higher than those recorded between 2021 and 2024. The overall publication pattern therefore reflects a marked acceleration of research activity, particularly after 2022, with the sharp increase in 2025 indicating intensified academic engagement with the topic.

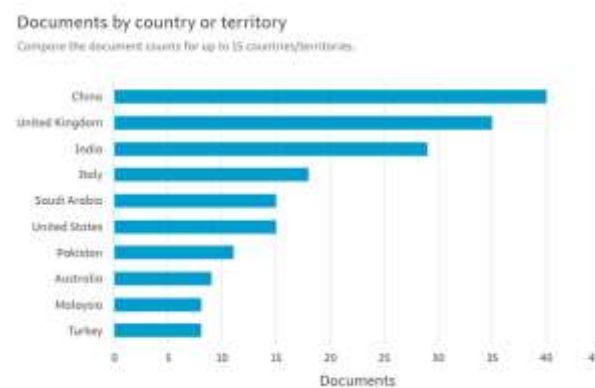


Fig. 3. Number of Scopus Indexed Documents by Country

The geographical distribution of publications reveals a strong concentration of research activity in several major countries, with China emerging as the leading contributor with approximately 40 documents. The United Kingdom ranked second with 35 publications, followed by India with approximately 29 documents, indicating substantial research engagement across both developed and emerging economies. Italy contributed around 18 publications, while Saudi Arabia and the United States each accounted for approximately 15 documents. A smaller but still notable contribution was observed from Pakistan, with around 11 publications, followed by Australia with approximately 9 documents. Malaysia and Turkey each contributed around 8 publications. This distribution demonstrates that the literature has developed across diverse geographical settings, although research output remains concentrated in a relatively small group of countries. The prominent contributions from China and India also indicate considerable scholarly attention from Asian economies, where supply chain digitalization and blockchain-related applications have become increasingly relevant. At the same time, contributions from the United Kingdom, Italy, the United States, and Australia demonstrate continued engagement from developed economies, resulting in a geographically diverse but unevenly distributed body of research.

4.1. Overview of Reviewed Studies

First (Year)	Author	Full Title	Research Location	Research Problem Statement	Hypothesis	Novelty
Tran (2026)	A	Bibliometric and Thematic Review of Metaverse and Reverse Logistics for a Sustainable Circular Economy	Global literature; Scopus database	Research integrating reverse logistics, circular economy, and immersive/metaverse technologies remains fragmented, with no comprehensive methodological review integrating these domains.	N/A; review study with research questions rather than hypotheses.	Integrates metaverse technologies with sequential reverse-logistics phases through a hybrid bibliometric–thematic review and conceptual framework.
Ruangkanjanes (2022)		Assessing Blockchain Adoption in Supply Chain Management , Antecedent of Technology Readiness, Knowledge Sharing and Trading Need	Taiwan and Indonesia	Empirical understanding of blockchain implementation in SCM remains limited, particularly regarding technology readiness and factors influencing adoption, transparency, and supply-chain performance.	H1 TR→BA (+); H2 TN→BA (+); H3 KS→BA (+); H4 BA→SCT (+); H5 BA→SCP (+); H6 BA→BCT (+).	Integrates technology readiness into a blockchain-adoption framework for SCM and empirically validates relationships with transparency and performance.
Babaei (2025)		Assessing the Impacts of Blockchain Technology on Supply Chain Efficiency: A Data-Driven Integrated Decision-Making Framework	Norwegian oil and gas sector	O&G supply chains need effective approaches for evaluating blockchain deployment strategies under uncertainty, while existing research provides limited strategic evaluation frameworks.	N/A; evaluates alternative blockchain deployment strategies rather than testing causal hypotheses.	Introduces data-driven DEA models integrating deterministic and non-deterministic environments to evaluate blockchain deployment strategies.

First (Year)	Author	Full Title	Research Location	Research Problem Statement	Hypothesis	Novelty
Nozdreva (2026)		A Unified Framework for Intelligent Logistics: Integrating Blockchain-AI Systems with Mobile Pedagogical Support	Regional logistics organizations	Logistics organizations may possess advanced blockchain-AI technologies but fail to achieve expected performance because employee learning, acceptance, and technological implementation are insufficiently integrated.	Integrated intervention improves performance and acceptance; learning engagement influences adoption through perceived usefulness; combined components create synergistic effects.	Integrates blockchain-AI logistics systems with mobile pedagogical support and empirically evaluates their combined socio-technical effect over 12 months.
Kılıç (2026)		Bibliometric Analysis of Artificial Intelligence Applications in Food Quality Control and Safety	Global literature; Web of Science	AI research in food quality and safety is rapidly expanding, but its intellectual development, applications, dominant themes, and emerging research directions require systematic mapping.	N/A; bibliometric study without causal hypotheses.	Maps AI-food quality/safety research and identifies five major themes and emerging integration with IoT and blockchain.
Alharbi (2026)		Bibliometric Insights into Technology-Driven Innovation in Project Procurement Management	Global literature; Web of Science	Technology-driven procurement literature is fragmented across management, SCM, information systems, and project management, limiting holistic understanding of digital procurement innovation.	N/A; bibliometric study without causal hypotheses.	First comprehensive bibliometric mapping of technology-driven innovation in project procurement management, covering intellectual structure, themes, and evolution.

First (Year)	Author	Full Title	Research Location	Research Problem	Hypothesis	Novelty
Gupta (2026)		Blockchain for Sustainable Agriculture: A Systematic Review Using SPAR-4-SLR and TCCM Framework	Global literature; Scopus	Blockchain-agriculture research is growing but fragmented and lacks a coherent framework explaining its contribution, challenges, theoretical foundations, contexts, and methodologies for sustainable agriculture.	N/A; three research questions guide the review.	Combines SPAR-4-SLR, bibliometric analysis and TCCM to systematically map blockchain research in sustainable agriculture.

Table 4.1 provides an overview of the reviewed studies by highlighting their research focus, geographical context, research problems, hypotheses, and novelty. The studies demonstrate that research on blockchain and digital technologies in supply chain management has developed across diverse contexts, ranging from empirical investigations in Taiwan, Indonesia, and the Norwegian oil and gas sector to global literature reviews based on Scopus and Web of Science databases. Despite their different contexts, the reviewed studies share a common concern regarding the fragmentation of digital technology implementation and the need to better understand how emerging technologies can improve supply chain processes and organizational outcomes. Several studies specifically examine blockchain adoption and its relationship with technology readiness, knowledge sharing, transparency, supply chain performance, and efficiency, while others extend the discussion toward artificial intelligence, intelligent logistics, sustainable agriculture, reverse logistics, circular economy, food quality and safety, and technology-driven procurement management. The studies also demonstrate methodological diversity. Empirical studies formulate and test relationships among technological and managerial constructs, whereas bibliometric and systematic review studies employ research questions instead of causal hypotheses to map existing knowledge and identify emerging research directions. The novelty of the reviewed studies generally lies in developing integrated frameworks, combining previously separated technological and managerial perspectives, introducing new analytical approaches, and examining emerging interactions between blockchain, artificial intelligence, sustainability, and supply chain management. Overall, the reviewed literature indicates a growing effort to move beyond viewing blockchain as an isolated technology and toward understanding its role within broader organizational, operational, and supply chain systems.

4.2. Research Types and Methodological Classifications

Research Type	Respondent Characteristics Classification	Sampling Technique Classification	Data Analysis Technique Classification	Source References
Quantitative	Managers, executives, SME owners, supply-chain professionals, manufacturing employees, logistics professionals, consumers, retail employees, agricultural stakeholders, healthcare supply-chain professionals, procurement and engineering professionals, and industry experts. Several studies used firms, simulated supply-chain actors, transaction records, or computational datasets rather than human respondents.	Purposive sampling, convenience sampling, non-probability sampling, online survey recruitment, organizational/firm-based surveys, time-lagged surveys, multi-stage screening, snowball sampling, and expert/judgmental sampling. Several modeling and simulation studies did not employ conventional respondent sampling.	SEM, PLS-SEM, CB-SEM, CFA, AMOS, regression, mediation/moderation analysis, bootstrapping, multi-group analysis, hierarchical regression, path analysis, ISM-MICMAC, Grey DEMATEL, ELECTRE III, game theory, stochastic optimization, agent-based simulation, machine learning, DEA, sensitivity analysis, and performance benchmarking.	Ruangkanjanases (2022); Yu (2022); Chittipaka (2023); Li (2023); Zhao (2024); Sun (2023); Cammarano (2023); Chunduri (2024); Wang (2025); Patel (2025); Feitosa e Silva (2026); He (2025); Huang (2025); Bhatti (2025); Chanda excluded; Nazir (2025); Tanchangya (2026); Shao (2025); Sharma (2024); Pawar (2025); Afrianto (2025); Dong (2023); Masudin (2021); Tamtam (2025); Al-Ababneh (2026); Almasarweh (2023); Nisar (2024); Purwaningsih (2024); Zhang (2026); El-Nakib (2026); Nayal (2023); Arifin (2026); Zirmire (2026); Babaei (2025); Nozdreva (2026).

Research Type	Respondent Characteristics Classification	Sampling Technique Classification	Data Analysis Technique Classification	Source References
Qualitative	HR managers, organizational practitioners, industry professionals, and stakeholders with direct knowledge or experience of blockchain implementation, organizational readiness, and supply-chain operations.	Primarily purposive sampling and stakeholder/expert selection. Participants were selected based on relevant professional experience and knowledge.	Semi-structured interviews, thematic analysis, qualitative content analysis, and exploratory interpretation of stakeholder perceptions and implementation experiences.	Chanda (2025); other qualitative studies identified in the mapping where applicable.
Literature Review	No conventional human respondents. Units of analysis consist mainly of peer-reviewed journal articles, conference papers, indexed publications, bibliographic records, and previously published empirical or conceptual studies.	Systematic database searching and screening using Scopus, Web of Science, Google Scholar, PRISMA/PRISMA-ScR, SPAR-4-SLR, and predefined inclusion/exclusion criteria. Some reviews used publication-period and subject-relevance screening.	Systematic literature synthesis, thematic analysis, content analysis, bibliometric analysis, science mapping, co-word analysis, keyword co-occurrence, bibliographic coupling, network analysis, functional classification, conceptual synthesis, and TCCM analysis.	Chakraborty (2023); Gaynor (2024); Sadurya (2026); Kieu (2026); Elviani (2025); Pérez-Elizundia (2023); Al-Jabri (2026); Bhore (2026); Tran (2026); Kılıç (2026); Alharbi (2026); Gupta (2026).

Table 4.2 presents the methodological classification of the reviewed studies based on research type, respondent characteristics, sampling techniques, and data analysis techniques. The studies are classified into three main categories: quantitative research, qualitative research, and literature reviews, demonstrating considerable methodological diversity in research related to blockchain, digital technologies, and supply chain management. Quantitative studies constitute a prominent methodological approach and involve diverse units of analysis, including managers, executives, SME owners, supply-chain professionals, manufacturing employees, logistics professionals, consumers, agricultural stakeholders, healthcare professionals, industry experts, firms, simulated supply-chain actors, transaction records, and computational datasets. These studies employ various sampling approaches, such as purposive, convenience, non-probability, snowball,

organizational survey, time-lagged, and expert or judgmental sampling. Their analytical techniques are similarly diverse, ranging from SEM, PLS-SEM, CB-SEM, CFA, regression, mediation and moderation analysis, and bootstrapping to more specialized methods such as ISM-MICMAC, Grey DEMATEL, ELECTRE III, game theory, stochastic optimization, agent-based simulation, machine learning, DEA, sensitivity analysis, and performance benchmarking. In contrast, qualitative studies primarily focus on managers, organizational practitioners, and industry stakeholders with direct experience in blockchain implementation and supply-chain operations, generally using purposive or expert selection alongside semi-structured interviews, thematic analysis, and qualitative content analysis. Literature review studies do not involve conventional human respondents but instead analyze peer-reviewed articles, conference papers, bibliographic records, and previous empirical or conceptual studies. These reviews apply systematic database screening and analytical approaches such as thematic synthesis, bibliometric analysis, science mapping, keyword co-occurrence, bibliographic coupling, conceptual synthesis, and TCCM analysis. Overall, the methodological variation shown in Table 4.2 reflects the multidisciplinary nature of the field and illustrates how researchers employ both empirical and evidence-synthesis approaches to investigate technological adoption, supply-chain processes, and organizational outcomes.

4.3. Theory-to-Variable Mapping Across Studies

Theory Used	Key Variables / Constructs	Source References
Technology–Organization–Environment (TOE) Framework	Technological factors; organizational factors/capabilities; environmental factors; relative advantage; compatibility; security; IT resources; management support; regulatory pressure; adoption barriers; blockchain adoption; organizational resistance; supply-chain performance	Chittipaka (2022); Nayal (2021); El-Nakib (2026); Zirmire (2026)
Unified Theory of Acceptance and Use of Technology (UTAUT / UTAUT2)	Performance expectancy; effort expectancy; social influence; behavioral intention; use behavior; technology acceptance; perceived usefulness; blockchain adoption	Nozdreva (2026); Huang (2025); Nayal (2021); Arifin (2026)
Technology Acceptance Model (TAM) / Technology-Adoption Perspective	Perceived usefulness; technology familiarity; acceptance; adoption intention; blockchain benefits; trust; transparency; technology readiness	Conceição (2026); Chakraborty (2023)
Technology Readiness	Technology readiness; trading needs; knowledge sharing; blockchain adoption; supply-chain transparency; blockchain transparency; supply-chain performance	Ruangkanjanases (2022); Chakraborty (2023)
Dynamic Capabilities Theory (DCT)	Digitalization; network capability; organizational capabilities; sensing; seizing; resource reconfiguration; business-model innovation; blockchain adoption; resilience; sustainable/firm performance	Li (2023); Bhatti (2025); Wang (2025); Zirmire (2026)

Theory Used	Key Variables / Constructs	Source References
Resource-Based View (RBV)	Strategic resources; organizational capabilities; big-data analytics capability; digital-platform capability; network capability; supply-chain agility; visibility; flexibility; blockchain technology; sustainable organizational performance	Bhatti (2025); Nazir (2025); Tanchangya (2026)
Transaction Cost Economics (TCE)	Transaction-cost efficiency; blockchain capabilities; transparency; value-chain integration; supply-chain resilience; economic/environmental performance; blockchain adoption drivers/barriers	Gupta (2026); Wang (2025)
Task–Technology Fit (TTF)	Task characteristics; technology characteristics; task-technology fit; transparency; supply-chain agility; blockchain adoption; organizational performance	Almasarweh (2023)
DeLone and McLean Information Systems Success (ISS) Model	Information-system success; system/information quality; blockchain trust; behavioral intention; use behavior; perceived traceability; top-management support	Arifin (2026)
Socio-Technical Systems Theory (STS)	Blockchain-AI technology; human subsystem; technological subsystem; mobile pedagogical support; technology acceptance; learning outcomes; operational performance	Nozdreva (2026)
Experiential Learning Theory & Cognitive Load Theory	Learning engagement; mobile learning; perceived usefulness; employee learning; technology acceptance; system adoption	Nozdreva (2026)
Theory of Planned Behavior (TPB)	Behavioral attitudes; behavioral intention; technology acceptance/adoption; blockchain adoption	Chakraborty (2023); Shao (2025)
Stimulus–Organism–Response (SOR) Framework	Green attributes; blockchain-enabled traceability; utilitarian attitude; hedonic attitude; consumer knowledge; purchase intention	Shao (2025)
Circular Economy (CE) Perspective	Remanufacturing; recycling practices; reverse logistics; resource circularity; advanced technologies; environmental sustainability; firm performance	Tran (2026); Yu (2022); Al-Jabri (2026)
Reverse Logistics (RL) Perspective	Reverse-logistics processes; metaverse technologies; blockchain; digital twins; traceability; circular-economy outcomes	Tran (2026)
Green/Sustainable Supply Chain Perspective	Blockchain adoption; green supply-chain practices; environmental, economic and social sustainability; transparency; traceability; sustainable performance	Nazir (2025); Tanchangya (2026); Elviani (2025); Al-Jabri (2026)
Complex System Theory	Digital network capability; digital relationship quality; supply-chain resilience; digital integration; green knowledge collaboration; digital green innovation performance	Dong (2023)
Game Theory / Dynamic Game Theory	Blockchain adoption; demand uncertainty; green input; pricing; profitability; product sustainability; system stability; supply-chain performance	Zhao (2024); Sun (2023)

Theory Used		Key Variables / Constructs	Source References
Stackelberg Theory	Game Theory	Blockchain cost; consumer awareness; manufacturer encroachment; cost sharing; government subsidy; pricing; profit; sales; environmental outcomes	Zhang (2026)
Vendor Inventory Industry Perspective	Managed (VMI) / 4.0	Blockchain; RFID; IoT; VMI; procurement performance; customer satisfaction; lead time; unfilled orders	Cammarano (2022)
Industry Blockchain Traceability Perspective	4.0 /	Blockchain traceability; smart contracts; Ethereum; RFID/IoT; product authenticity; transparency; security; operational efficiency	Cammarano (2022); Patel (2025); Yu (2022)
Distributed Blockchain Technology Framework	Ledger /	Immutability; decentralization; traceability; transparency; smart contracts; data integrity; authentication; security; transaction efficiency	Wang (2025); Patel (2025); Afrianto (2025); Al-Ababneh (2025)
Supply-Chain Traceability Framework		EDI; RFID; blockchain; traceability system; managerial initiative; transparency; food cold-chain performance	Masudin (2021)
Blockchain-Enabled SCM Perspective		Blockchain utilization/adoption; transparency; traceability; data integrity; transaction efficiency; supply-chain efficiency; export performance; financial performance	Sadurya (2026); Purwaningsih (2023)
Supply Chain Finance / SCM Perspective		Supply-chain finance; SME financing; collaboration; innovation; resilience; sustainability; blockchain	Pérez-Elizundia (2023)
Ecological Modernization Theory		Supply-chain finance innovation; technological capability; institutional support; environmental-governance effectiveness; ecological protection	He (2025)
Innovation Theory	Diffusion Theory	Innovation characteristics; blockchain adoption; diffusion/adoption drivers and barriers; sustainable agriculture	Gupta (2026)
Institutional Theory		Regulatory environment; institutional pressure/support; blockchain adoption; organizational adoption barriers	Gupta (2026)
Design Research Framework	Science (DSR)	Blockchain traceability artifact; decentralization; immutability; auditability; security; visibility; reliability; trust; process efficiency	Feitosa e Silva (2026)
Decision Theory / Data Envelopment Analysis Perspective		Blockchain deployment strategy; assessment criteria; uncertainty; efficiency; strategic performance	Babaei (2025)
Multi-Criteria Decision-Making (MCDM)		AI-enabled initiatives; blockchain; operational efficiency; cost efficiency; tracking; environmental impact; customer satisfaction; technology prioritization	Tamtam (2025); Yalçıntaş (2026)
Grey System Adoption-Barrier Framework	/	Regulatory compliance; implementation cost; supply-chain complexity; technological barriers; economic barriers; blockchain adoption	Nisar (2024)
Blockchain Driver Framework	Adoption	Adoption drivers; transparency; traceability; trust; investment; infrastructure; supply-chain dynamics	Sharma (2024)

Theory Used	Key Variables / Constructs	Source References
Foundational Technology Framework	Ease of implementation; novelty; necessity; industry fit; blockchain application potential	Gaynor (2024)
Technical Blockchain / Consensus Framework	PBFT/t-PBFT; consensus efficiency; throughput; latency; communication overhead; scalability; security; adaptive consensus	Chunduri (2024); Pawar (2025); Bhore (2026)
No Single Formal Theory / Conceptual or Review-Based Perspective	Blockchain, AI, digital transformation, transparency, traceability, sustainability, SCM integration, procurement innovation, and technology applications; constructs vary according to review scope	Kılıç (2026); Alharbi (2026); Kushe (2026); Sadurya (2026); Elviani (2025); Pérez-Elizundia (2023)

Table 4.3 presents the mapping between the theoretical foundations and key variables or constructs identified across the reviewed studies, illustrating the multidisciplinary nature of blockchain and digital technology research within supply chain management. The literature employs a wide range of theoretical perspectives to explain technology adoption, organizational capabilities, behavioral intentions, supply chain processes, and performance outcomes. Technology-adoption frameworks are particularly prominent, including the Technology–Organization–Environment (TOE) Framework, Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), Technology Readiness, and Task–Technology Fit (TTF). These perspectives are commonly associated with constructs such as technological and organizational factors, management support, regulatory pressure, performance expectancy, effort expectancy, perceived usefulness, transparency, and blockchain adoption. In parallel, strategic management theories such as the Dynamic Capabilities Theory (DCT), Resource-Based View (RBV), and Transaction Cost Economics (TCE) are used to explain how organizational resources, digital capabilities, network capabilities, transaction efficiency, resilience, and technology adoption contribute to firm and supply chain performance. Other studies extend the theoretical landscape through behavioral, sustainability, and information-system perspectives, including the Theory of Planned Behavior (TPB), Stimulus–Organism–Response (SOR) Framework, Circular Economy perspective, Socio-Technical Systems Theory, and DeLone and McLean Information Systems Success Model. The mapping further shows that blockchain is conceptualized differently across studies: as an adoption outcome, technological capability, enabling infrastructure, traceability mechanism, or antecedent of operational and sustainability outcomes. Moreover, several studies combine multiple theoretical perspectives, indicating that no single theory fully captures the technological, organizational, behavioral, and interorganizational complexity of blockchain-enabled supply chains. Overall, Table 4.3 demonstrates how theoretical diversity supports the examination of relationships among blockchain adoption, transparency, traceability, trust, organizational capabilities, supply chain resilience, sustainability, and performance.

4.4. Review of Findings

The reviewed literature showed that research on blockchain adoption and supply chain performance had evolved from an early emphasis on the technological characteristics of distributed ledgers toward a broader management-oriented understanding of how

blockchain generated operational, strategic, relational, and sustainability outcomes. As summarized in the preceding tables, blockchain was rarely treated as an isolated technological intervention. Instead, the studies positioned adoption within a network of organizational capabilities, technological readiness, transparency, traceability, trust, integration, resilience, transaction efficiency, and institutional conditions. This pattern was particularly important for the present review because it suggested that the relationship between blockchain adoption and supply chain performance could not be understood solely through the technical properties of blockchain. The reviewed evidence instead indicated that performance outcomes depended on the organizational and supply chain mechanisms through which blockchain was implemented and utilized.

Direct empirical evidence supported a positive relationship between blockchain adoption and supply chain performance in several settings, while other studies showed that this relationship operated through intermediate mechanisms or remained contingent on organizational and contextual conditions. Blockchain adoption was found to significantly influence supply chain performance [2]. More recent evidence similarly demonstrated a substantial positive effect of blockchain technology adoption on supply chain performance [36]. Other studies broadened the outcome domain toward efficiency, resilience, sustainable performance, export performance, transparency, and organizational performance. Consequently, the findings collectively supported a more nuanced interpretation in which blockchain adoption represented an enabling capability whose performance implications were shaped by complementary managerial resources and supply chain processes rather than an automatic technological benefit.

4.4.1. Overview of Empirical Trends

A central empirical trend across the reviewed studies was the progressive movement from investigating whether blockchain could improve supply chains toward explaining how, under what conditions, and through which mechanisms such improvements occurred. Direct cross-country evidence from Taiwan and Indonesia showed that blockchain adoption significantly influenced supply chain performance and supported improvements in visibility and accountability [2]. Technology readiness, trading needs, and knowledge sharing were also relevant to adoption, suggesting that technological capability alone was insufficient without organizational preparedness and interorganizational knowledge processes [2]. The findings further indicated that blockchain integration supported supply chain management performance and that performance could be measured and predicted within the proposed framework [2].

This direct relationship was reinforced by more recent empirical evidence showing that blockchain technology adoption exerted a substantial positive effect on supply chain performance [36]. Blockchain adoption represented one of the strongest relationships within the structural model, while organizational capabilities promoted adoption and adoption barriers constrained it [36]. Blockchain adoption subsequently operated as a pathway through which organizational conditions affected performance. Technological infrastructure, qualified human resources, and adequate financial resources strengthened organizations' capacity to adopt blockchain, whereas implementation costs, deficiencies in technical knowledge, regulatory uncertainty, infrastructure constraints, and resistance to change impeded adoption and performance [36]. These findings shifted the

interpretation from a simple technology–performance association toward a capability–adoption–performance sequence.

Similar patterns emerged when supply chain performance was operationalized through more specific outcomes. Blockchain, together with EDI and RFID, supported traceability in Indonesian food cold chains, while traceability subsequently contributed to cold-chain performance [1]. Managerial initiatives also significantly influenced performance, although their role in supporting the traceability–performance relationship was not uniformly positive [1]. This evidence demonstrated that blockchain-derived performance could emerge indirectly through improved information visibility and traceability, while managerial intervention could produce different effects depending on how it was implemented.

Evidence from SMEs further extended the performance discussion to supply chain efficiency, export performance, and financial performance [37]. Blockchain utilization improved supply chain efficiency and export performance, but its direct effect on financial performance was not significant [37]. Supply chain efficiency, however, improved financial performance and mediated the effect of blockchain utilization, whereas export performance did not provide the same mediating mechanism [37]. This distinction suggested that blockchain-generated operational improvements should not automatically be equated with immediate financial returns. Instead, blockchain appeared to create value first through operational and information-processing mechanisms, after which financial benefits might emerge under appropriate organizational conditions.

The sustainability literature further broadened this pattern. Research on blockchain-enabled sustainable agricultural supply chains positioned blockchain adoption between multiple antecedents and sustainable supply chain performance [3]. The evidence indicated that blockchain could improve supply chain performance through transparency, reliability, trust, agility, alignment, adaptability, and competitiveness [3]. Green and lean practices, top-management support, supply chain risk, environmental conditions, regulatory support, performance expectancy, innovation capability, supply chain integration, and cost were identified as potential antecedents of blockchain adoption, which was subsequently linked to sustainable supply chain performance [3]. These findings demonstrated that the adoption–performance relationship could extend beyond conventional efficiency indicators.

Organizational resource commitments, blockchain technology, and green supply chain practices were also associated with corporate sustainability [7]. Blockchain adoption was further positioned as a moderating condition in relationships involving supply chain agility, visibility, flexibility, green supply chain management, and sustainable organizational performance [8]. In addition, blockchain-enabled capabilities such as transparency, traceability, real-time connectivity, value-chain integration, cybersecurity, and transaction-cost efficiency did not generate identical performance effects [6]. Supply chain resilience mediated several relationships with value co-creation, economic performance, and environmental performance, although some pathways remained statistically insignificant [6]. For example, resilience significantly mediated the effects of traceability and transparency on economic performance, whereas mediation involving real-time connectivity and cybersecurity was not consistently significant [6].

Technical and modeling studies provided complementary evidence that blockchain could support authentication, information integrity, transaction security, traceability, operational coordination, and efficiency [9], [10], [11], [12], [13], [38], [39], [40], [41], [42]. These studies applied mathematical, computational, system-design, optimization, simulation, security, and traceability perspectives to blockchain-enabled supply chains. Collectively, their findings indicated that blockchain-related benefits were sensitive to implementation costs, system architecture, market structure, technological scalability, and other technical constraints [9], [10], [11], [12], [13], [38], [39], [40], [41], [42]. A data-driven integrated decision-making framework similarly demonstrated that blockchain-enabled supply chain efficiency could be evaluated through strategic and technical performance criteria rather than solely through conventional behavioral adoption models [14]. Taken together, these studies complemented survey-based evidence by showing that performance outcomes also depended on technical scalability and system design.

Overall, the empirical evidence summarized in the reviewed studies did not support an unconditional claim that blockchain adoption automatically improved every dimension of performance. Instead, it indicated a predominantly positive but mechanism-dependent and context-sensitive relationship. Efficiency, transparency, traceability, trust, resilience, integration, and organizational capabilities repeatedly appeared as channels through which blockchain-related value was realized.

4.4.2. Theoretical Frameworks and Methodological Approaches

The theoretical mapping presented in the preceding Theory-to-Variable Mapping Across Studies table revealed substantial theoretical heterogeneity. Rather than being dominated by one established theory, blockchain–supply chain research drew on technology-adoption, strategic-management, behavioral, sustainability, information-systems, and operations perspectives. This theoretical diversity reflected the multidimensional nature of blockchain adoption: implementation required technological feasibility, organizational preparedness, interorganizational coordination, user acceptance, and the ability to translate digital infrastructure into measurable performance.

The Technology–Organization–Environment (TOE) framework represented one of the most prominent perspectives. TOE was combined with the Unified Theory of Acceptance and Use of Technology (UTAUT) to explain blockchain adoption in sustainable agricultural supply chains [3]. This framework was distinctive because it simultaneously incorporated organizational, environmental, technological, and behavioral adoption considerations [3]. Previous literature had not sufficiently integrated TOE and UTAUT to explain blockchain adoption within this context [3]. TOE-related adoption logic was also combined with Dynamic Capabilities Theory to explain the role of organizational capabilities and adoption barriers in blockchain-enabled supply chain performance [36]. In another context, TOE was applied to organizational resistance and digital transformation within Saudi healthcare supply chains [43]. Collectively, these studies indicated that blockchain adoption was shaped by factors extending beyond technological superiority.

Behavioral adoption theories provided another important theoretical stream. UTAUT was extended by incorporating trust in safety and comparing enterprise and

consumer perspectives [16]. The findings revealed different adoption logics across stakeholder groups: enterprise adoption intention was primarily driven by expected performance, whereas consumers assigned greater importance to trust in blockchain-enabled safety [16]. Trust also operated beyond a simple direct antecedent by mediating selected relationships [16]. UTAUT was further integrated with the DeLone and McLean Information Systems Success Model, with blockchain trust positioned at the center of adoption behavior [44]. Information-system characteristics and effort expectancy contributed to trust, trust strengthened behavioral intention, and behavioral intention subsequently predicted actual use [44]. These findings reinforced the argument that blockchain adoption could not be reduced to objective technical characteristics because perceptions of reliability, information quality, usability, and trust also influenced adoption behavior.

Task–Technology Fit (TTF) provided another explanation of the adoption–performance relationship. Task characteristics, technology characteristics, transparency, supply chain agility, blockchain adoption, and overall SME performance were integrated within a TTF-based framework [4]. This perspective was particularly relevant because it implied that technology generated performance benefits when its functionality corresponded with organizational and operational requirements [4]. The Theory of Planned Behavior was also combined with the Stimulus–Organism–Response framework to investigate blockchain-enabled traceability, consumer attitudes, knowledge, and purchase intention [45]. Although consumer purchase intention differed from supply chain performance, this evidence broadened the understanding of blockchain-derived value by demonstrating how traceability information could influence downstream market responses [45].

Strategic-management theories provided a complementary explanation. The Resource-Based View (RBV) and Dynamic Capabilities Theory were combined to examine how digital capabilities generated supply chain innovation and firm performance [46]. Although the focal technology was big data analytics rather than blockchain, the findings demonstrated an important mechanism relevant to the present review: digital technologies generated performance benefits when firms possessed complementary platform and network capabilities [46]. Dynamic Capabilities Theory and Transaction Cost Economics were also used to explain how blockchain-enabled capabilities influenced resilience, value co-creation, and sustainability performance [6]. Resource-oriented reasoning further explained how organizational resource commitments, green supply chain practices, agility, visibility, flexibility, and related supply chain capabilities contributed to sustainability outcomes [7], [8].

Other theoretical lenses further illustrated the diversity of the field. Ecological Modernization Theory was employed to explain the relationship between supply chain finance innovation, environmental governance, and ecological protection [47]. Complex System Theory provided a foundation for examining the dynamic evolution of digital green innovation within integrated green building supply chains [48], while Circular Economy perspectives were applied to technological innovation and recycling practices [49]. Socio-technical and learning perspectives were also used to explain how blockchain–AI technologies and employee learning jointly influenced logistics performance and technology acceptance [50].

Game-theoretical approaches characterized several studies examining blockchain-enabled supply chain dynamics, counterfeit-product supervision, and sustainable remanufacturing strategies [10], [38], [40]. Decision and optimization perspectives were applied to blockchain deployment strategies, digital supply-chain transformation, blockchain adoption barriers, and blockchain–AI integration [5], [14], [51], [52], [53]. These studies shifted attention from behavioral adoption toward strategic decision-making, optimization, and the evaluation of alternative technological configurations.

The technical literature emphasized consensus mechanisms, security, scalability, authentication, traceability, and system performance rather than organizational adoption theories. Blockchain-based secure traceability, dynamic blockchain scalability, adaptive consensus mechanisms, security enhancement, and product authentication were examined through technical and computational perspectives [9], [11], [12], [13], [54]. These approaches demonstrated that blockchain performance depended not only on organizational adoption but also on the reliability, scalability, security, and architecture of the underlying technological system.

Methodologically, the Research Types and Methodological Classifications table showed a strong quantitative orientation. SEM, PLS-SEM, CB-SEM, CFA, regression, mediation, moderation, bootstrapping, and multi-group analysis were frequently used to test causal relationships involving blockchain adoption, technological readiness, transparency, traceability, trust, organizational capabilities, and performance [1], [2], [3], [8], [16], [36], [44]. This methodological pattern demonstrated the field's strong emphasis on testing structural relationships among adoption antecedents, mediating mechanisms, contextual conditions, and performance outcomes.

Qualitative evidence was comparatively less dominant. Organizational readiness, human-resource considerations, and implementation barriers were examined through HR-manager perspectives using a qualitative design [55]. This approach provided insights into organizational and behavioral issues that were less easily captured through cross-sectional structural models.

Literature reviews and bibliometric studies also constituted an important methodological stream. These studies mapped intellectual structures, emerging themes, technological applications, sustainability issues, adoption barriers, and future research directions across blockchain and related digital technologies [15], [54], [56], [57], [58], [59], [60], [61], [62], [63], [64]. Their use of systematic review protocols, bibliometric mapping, thematic analysis, science mapping, and conceptual synthesis broadened understanding of the development of blockchain-related supply chain research beyond individual empirical settings.

Overall, this methodological diversity strengthened the breadth of the evidence base by combining behavioral modeling, organizational analysis, technical evaluation, optimization, qualitative investigation, and systematic knowledge synthesis. However, the strong concentration of cross-sectional survey designs also exposed important limitations concerning causal inference, post-adoption behavior, temporal change, and the long-term realization of blockchain-enabled supply chain performance.

4.4.3. Contextual and Cultural Implications

The geographical distribution summarized in the Overview of Reviewed Studies table indicated that blockchain adoption had been investigated across heterogeneous economic, industrial, and institutional settings. This diversity was analytically important because blockchain adoption was not embedded in a uniform technological environment. Infrastructure maturity, regulation, organizational capabilities, stakeholder expectations, industry structure, and cultural conditions differed considerably across the reviewed settings and therefore shaped both adoption and performance.

Cross-country evidence from Taiwan and Indonesia demonstrated that blockchain adoption and implementation were strongly influenced by contextual conditions [2]. The findings explicitly acknowledged that implementation approaches developed within these two settings might not be directly transferable to other countries [2]. Cross-country business processes were also identified as a managerial challenge, indicating that blockchain integration could not be separated from the institutional and commercial characteristics of trading partners [2]. This observation was particularly important for international supply chains because a blockchain platform could technically provide standardized records while still operating across heterogeneous legal, organizational, and market systems.

Indonesia represented another recurring empirical context. Evidence from food cold chains during COVID-19 showed that managerial initiatives could generate complex effects on traceability-enabled performance [1]. Organizational politics, excessive intervention, and the quality of strategic decisions could alter the effectiveness of managerial initiatives [1]. Evidence from Indonesian SMEs further demonstrated that blockchain utilization improved supply chain efficiency and export performance, although financial performance did not improve directly [37]. In cleaner-energy supply chains, technology trust was constructed primarily from assessable system characteristics, while perceived risk exhibited an unexpected positive relationship with behavioral intention [44]. This finding suggested that, in high-stakes industrial settings, greater awareness of technological risk did not necessarily discourage adoption because knowledgeable users could simultaneously recognize risks and perceive stronger reasons for implementation [44].

Agriculture and food supply chains generated another important contextual cluster. Evidence from India showed that blockchain adoption in agricultural supply chains was influenced by cost, green and lean practices, supply chain risk, environmental conditions, regulatory support, and supply chain integration [3]. Research on China's fisheries supply chain emphasized regulatory compliance, implementation cost, and complex supply-chain structures as major barriers to blockchain adoption [5]. Blockchain-enabled traceability also reduced authenticity concerns and information asymmetry among organic-rice consumers in China [45]. Enterprise and consumer stakeholders, however, did not evaluate blockchain benefits in identical ways: enterprises emphasized performance-related expectations, whereas consumers placed greater importance on trust in blockchain-enabled safety [16]. These findings were particularly relevant to agricultural commodity chains because producers, intermediaries, exporters, buyers, regulators, and consumers could evaluate blockchain according to different criteria.

Manufacturing and logistics studies similarly demonstrated substantial contextual variation. Research involving the automobile sector in Malaysia and China linked advanced technologies with remanufacturing, recycling, and firm performance [49]. Evidence from electrical and electronics manufacturing in Malaysia emphasized the importance of organizational resource commitments and green supply chain practices [7]. In Bangladeshi manufacturing firms, blockchain adoption moderated selected relationships between supply chain capabilities and green supply chain management [8]. Evidence from Jordanian SMEs connected blockchain adoption with task–technology fit, transparency, supply chain agility, and overall performance [4]. Research involving Chinese logistics firms further revealed heterogeneity according to firm age, size, and financial capacity [6]. Selected resilience-related relationships differed between newer and older firms and between smaller and larger organizations [6]. Such findings indicated that even within a single national environment, organizational characteristics could alter the performance implications of blockchain-enabled capabilities.

Other studies widened the contextual scope further. Blockchain-related applications were examined within international logistics [65], Chinese green-building supply chains [48], Saudi healthcare supply chains [43], and Saudi municipal solid-waste management [63]. Organizational readiness and implementation barriers were also investigated from the perspective of automobile-sector HR managers in Punjab, India [55]. Within the textile industry, blockchain was associated with traceability, transparency, smart-contract automation, authenticity, and operational efficiency, while implementation costs, technological barriers, and the need for industry-wide collaboration remained important constraints [64].

Taken together, these contextual differences cautioned against interpreting blockchain adoption as culturally or institutionally neutral. The technology's immutable and decentralized characteristics could remain technically consistent across settings, but its organizational value depended on regulatory support, technological infrastructure, managerial capabilities, supply-chain structure, stakeholder trust, and adoption maturity. This contextual heterogeneity also helped explain why some relationships were consistently positive while others varied across studies. Country and industry should therefore be treated not merely as descriptive characteristics but as potential boundary conditions influencing the realization of blockchain-enabled supply chain performance.

4.4.4. Justification of Research Novelty

The novelty emerging from the reviewed literature did not rest on claiming that blockchain adoption or supply chain performance had never been reviewed. Instead, the evidence demonstrated that a more defensible research opportunity lay in synthesizing a fragmented relationship that had been investigated through multiple theories, industries, performance dimensions, mechanisms, and methodological designs. This distinction was important because existing reviews had already investigated blockchain applications, sustainable supply chains, agricultural systems, digital supply chains, and technology adoption.

Existing reviews addressed different fragments of the broader domain. Blockchain applications in sustainable agriculture were systematically examined through structured

review and framework-based approaches [59]. Blockchain technology within sustainable supply chains was also reviewed from a broader sustainability perspective [62], while applications in fashion management, merchandising, and textile supply chains were synthesized separately [64]. Technical review work concentrated on adaptive blockchain consensus mechanisms [54]. Other studies mapped trajectories in supply chain integration and identified blockchain and artificial intelligence as emerging technological themes [61]. Reverse logistics, circular economy, and emerging digital technologies were examined through hybrid bibliometric and thematic synthesis [56]. Supply chain finance research was mapped through bibliometric analysis [60], whereas technology-driven developments in food quality and project procurement were investigated in other specialized review streams [57], [58]. Digital supply-chain technologies were also reviewed within municipal solid-waste management [63]. These reviews demonstrated that blockchain had already entered several specialized literature streams, but their analytical focal points were not identical to a systematic synthesis of blockchain adoption as an antecedent of supply chain performance.

The empirical literature further justified this focus. A direct positive relationship between blockchain adoption and supply chain management performance was empirically validated [2]. More recent evidence demonstrated that blockchain adoption had a substantial positive effect on supply chain performance and partially mediated relationships between organizational capabilities, adoption barriers, and performance [36]. Other studies, however, operationalized performance differently. Blockchain-enabled traceability was linked to food cold-chain performance [1], while other evidence separated supply chain efficiency, export performance, and financial performance [37]. Sustainable supply chain performance represented another outcome domain [3], while resilience, value co-creation, economic performance, and environmental performance were examined as distinct consequences of blockchain-enabled capabilities [6]. Corporate sustainability [7] and sustainable organizational performance [8] were also treated as separate performance outcomes. These variations demonstrated that the dependent construct remained conceptually dispersed across the literature.

The same fragmentation occurred on the blockchain side. Some studies operationalized blockchain adoption directly, whereas others examined blockchain utilization, blockchain-enabled traceability, blockchain capabilities, implementation readiness, trust, smart contracts, or system-level applications. Adoption intention was examined through UTAUT and trust-related mechanisms [16], while other research distinguished technology trust, behavioral intention, and actual use behavior [44]. Blockchain adoption was also explained through task–technology fit, transparency, and supply chain agility [4]. Adoption drivers were prioritized through decision-oriented analysis [52], whereas blockchain adoption barriers were examined separately [5]. Managerial perceptions, organizational readiness, and implementation barriers were explored through qualitative evidence [55]. Technical investigations instead concentrated on security, scalability, system feasibility, authentication, and consensus mechanisms [9], [12], [13], [54].

This dispersion established a stronger novelty argument than simply stating that no previous systematic literature review existed. The research gap concerned the absence of an integrated synthesis explaining how blockchain adoption translated into supply chain

performance, which mechanisms repeatedly explained that translation, which contextual factors altered it, and how different theoretical perspectives conceptualized the relationship. Across the reviewed literature, transparency, traceability, trust, integration, resilience, transaction efficiency, organizational capability, and managerial support repeatedly emerged as explanatory mechanisms, although their roles varied across studies as antecedents, mediators, moderators, capabilities, or performance dimensions.

Accordingly, the present SLR contributes by organizing these fragmented findings into an adoption-to-performance architecture. This synthesis preserves the central relationship between blockchain adoption and supply chain performance while identifying the mechanisms and boundary conditions documented in existing studies rather than prematurely treating every recurring construct as an additional formal variable. This approach is also consistent with the methodological heterogeneity of the reviewed evidence, which included quantitative surveys, qualitative studies, mathematical models, simulations, multi-criteria decision-making approaches, bibliometric reviews, and systematic literature reviews. The novelty of the present study therefore arises from integrative explanation and structured synthesis rather than from technological novelty alone.

4.4.5. Hypotheses and Overall Synthesis

The hypotheses reported across the reviewed empirical studies provided the clearest basis for synthesizing the direction of the blockchain adoption–supply chain performance relationship. At the broadest level, the evidence supported a sequential logic in which organizational, technological, environmental, and behavioral conditions influenced blockchain adoption, while adoption subsequently affected supply chain outcomes. Nevertheless, the specific pathways varied substantially, indicating that a single direct-effect model captured only part of the phenomenon.

A model incorporating technology readiness, trading needs, knowledge sharing, blockchain adoption, supply chain transparency, supply chain performance, and blockchain transparency provided direct empirical support for the focal relationship of the present SLR [2]. Blockchain adoption significantly contributed to supply chain management performance, while technology readiness emerged as an important managerial consideration [2]. More recent evidence examined relationships among organizational capabilities, adoption barriers, blockchain technology adoption, and supply chain performance [36]. Organizational capabilities positively influenced blockchain adoption, whereas adoption barriers negatively influenced it, and blockchain adoption subsequently exerted a positive effect on supply chain performance [36]. Adoption also partially mediated the relationships between organizational capabilities, adoption barriers, and performance [36].

A more elaborate antecedent structure incorporated green and lean practices, top-management support, supply chain risk, internal and external environmental conditions, regulatory support, performance expectancy, innovation capability, supply chain integration, and cost into a model explaining blockchain adoption and sustainable supply chain performance [3]. This evidence demonstrated that blockchain adoption was embedded within broader organizational and supply-chain conditions rather than

representing an exogenous technological decision [3]. Resource commitment was also shown to support blockchain technology deployment, with blockchain facilitating green supply chain practices that subsequently contributed to corporate sustainability [7]. Blockchain adoption was further examined as a moderating condition in relationships connecting supply chain agility, visibility, flexibility, green supply chain management, and sustainable organizational performance [8].

Performance mechanisms also emerged from studies conducted in specialized contexts. EDI, RFID, and blockchain supported traceability within food cold chains, while traceability subsequently contributed to cold-chain performance [1]. Managerial initiatives directly influenced performance, although their interaction with traceability produced more complex effects [1]. Evidence from SMEs similarly showed that blockchain utilization enhanced supply chain efficiency and export performance but did not directly improve financial performance [37]. Supply chain efficiency significantly mediated the relationship between blockchain utilization and financial performance, suggesting that operational improvements could precede financial outcomes [37]. This finding challenged the assumption that blockchain implementation automatically translated into immediate profitability.

Further evidence demonstrated that blockchain-enabled capabilities did not produce uniform performance effects [6]. Multiple capabilities—including transparency, traceability, real-time connectivity, value-chain integration, cybersecurity, and transaction-cost efficiency—were examined together with supply chain resilience as potential pathways toward value co-creation, economic performance, and environmental performance [6]. Several indirect relationships were significant, particularly those involving traceability, transparency, and transaction-cost efficiency, whereas relationships involving real-time connectivity, cybersecurity, and value-chain integration were not consistently significant [6]. This mixture of supported and unsupported pathways demonstrated that blockchain's performance value depended on the particular capability activated and the specific performance outcome under consideration.

Adoption-oriented studies added another layer to the synthesis. Enterprise and consumer stakeholders relied on different determinants when evaluating blockchain adoption [16]. Performance expectancy was particularly important to enterprise stakeholders, whereas consumers placed greater emphasis on trust in blockchain-enabled safety [16]. Other evidence demonstrated that blockchain trust increased behavioral intention and that behavioral intention strongly predicted actual use, while top-management support functioned as a direct organizational enabler rather than as the anticipated moderating mechanism [44]. Task–technology fit, transparency, supply chain agility, blockchain adoption, and organizational performance were also shown to be interconnected [4]. Collectively, these findings suggested that performance benefits were unlikely to materialize unless blockchain progressed beyond technical availability toward organizational acceptance, appropriate task alignment, and actual utilization.

The wider evidence base reinforced this interpretation from complementary methodological perspectives. Adoption drivers and barriers were systematically evaluated through decision-oriented approaches [5], [52], while qualitative evidence highlighted workforce readiness, managerial perceptions, and implementation difficulties [55].

Technological capability and institutional support were important within related supply-chain innovation settings [47]. Complementary digital, platform, and network capabilities were also shown to transform technological resources into supply chain innovation and firm performance [46]. Digital integration and knowledge collaboration similarly contributed to innovation-related outcomes within complex supply chain systems [48]. Together, these studies reinforced the importance of complementary organizational and institutional conditions in translating digital technologies into performance.

Decision models, optimization approaches, simulations, and system-design studies provided further evidence that technical feasibility constituted another important boundary condition. Blockchain-enabled supply chain performance depended on factors such as technical architecture, deployment strategy, implementation cost, information integrity, authenticity, security, scalability, consensus mechanisms, and system configuration [9], [10], [11], [12], [13], [14], [38], [39], [40], [42], [51], [53]. These studies demonstrated that even where organizational willingness to adopt blockchain existed, inadequate technical design or unfavorable cost and scalability conditions could restrict the realization of supply chain benefits.

Review-based studies placed these empirical patterns within a broader intellectual landscape. Existing syntheses demonstrated increasing intersections between blockchain and sustainability, digital transformation, supply chain integration, circular economy, finance, food systems, logistics, artificial intelligence, and other emerging technologies [15], [54], [56], [57], [58], [59], [60], [61], [62], [63], [64]. Blockchain was also situated within the broader evolution and assessment of foundational digital technologies [66]. The breadth of these research streams reinforced the importance of distinguishing the focal blockchain adoption–supply chain performance relationship from the wider technological, organizational, and institutional mechanisms surrounding it.

Across the reviewed hypotheses and findings, the most consistently supported synthesis was therefore that blockchain adoption was positively associated with supply chain performance, but the magnitude and form of this relationship depended on how adoption was enabled and how performance was conceptualized. Transparency, traceability, information integrity, efficiency, trust, integration, resilience, and coordination repeatedly emerged as mechanisms through which blockchain-generated value could be realized. Organizational capabilities, top-management support, regulatory conditions, implementation costs, technological readiness, firm characteristics, and adoption barriers repeatedly appeared as conditions capable of strengthening or constraining that value realization.

The reviewed evidence consequently supported retaining Blockchain Adoption as the focal antecedent and Supply Chain Performance as the focal outcome. The recurrent constructs identified across the literature are better interpreted as theoretically meaningful antecedents, mechanisms, capabilities, mediators, moderators, boundary conditions, or performance dimensions to be evaluated through systematic synthesis rather than automatically converted into additional formal variables.

5 Discussion

The findings of this systematic literature review showed that blockchain adoption was generally associated with improved supply chain performance, but the relationship was neither automatic nor uniformly direct. Instead, blockchain generated value through several interconnected mechanisms, particularly transparency, traceability, trust, transaction efficiency, integration, and supply chain resilience. Empirical evidence demonstrated that blockchain adoption positively influenced supply chain performance and transparency, while technology readiness and knowledge sharing supported successful adoption [2]. Similarly, blockchain-supported traceability contributed to food cold-chain performance, indicating that technological adoption could influence performance indirectly through improvements in supply chain processes [1]. The broader evidence therefore suggested that blockchain should be viewed as an enabling capability rather than an independent performance solution, as its benefits depended on how effectively its technological features were incorporated into organizational and interorganizational activities.

The review further revealed that organizational capabilities and contextual conditions determined the extent to which blockchain adoption translated into measurable performance improvements. Technological readiness, managerial resources, knowledge sharing, infrastructure, and organizational capabilities facilitated adoption, whereas implementation costs, limited technical knowledge, regulatory uncertainty, and resistance to change could constrain its effectiveness. These findings help explain why similar blockchain applications may produce different outcomes across organizations, industries, and countries. They also refine the conventional Blockchain Adoption to Supply Chain Performance relationship by suggesting an adoption-to-performance pathway in which blockchain creates technological possibilities that must be supported by appropriate organizational capabilities and contextual conditions. This integrated perspective represents an important contribution of the review because it connects previously fragmented research on adoption drivers, technological mechanisms, organizational capabilities, and performance outcomes into a more coherent explanation of how blockchain-enabled supply chain value is created.

6 Limitation

This study has several limitations that should be considered when interpreting its findings. First, although the systematic literature review drew evidence from Scopus, Web of Science, and Google Scholar and applied predefined screening criteria, the review was restricted to English-language academic publications. Relevant studies published in other languages or outside these databases may therefore have been overlooked. Second, the reviewed literature is methodologically heterogeneous, combining surveys, structural equation modelling, qualitative studies, simulations, and literature reviews. Such variation makes direct comparison difficult and limits the possibility of drawing strong causal conclusions across studies.

The findings also reveal an important limitation in the current evidence base. Although blockchain adoption is generally associated with improved supply chain performance, these benefits are not uniform. Transparency, traceability, trust, transaction efficiency, integration, and resilience appear to explain much of the value created, while organizational readiness, managerial resources, knowledge sharing, and institutional conditions influence whether these benefits are realized. Operational improvements also do not necessarily translate into immediate financial gains.

These limitations have both theoretical and managerial implications. Blockchain should therefore be understood as an enabling capability rather than a stand-alone solution. Future research should test the identified mechanisms through longitudinal and multi-country studies, particularly across industries with different regulatory and technological environments. Greater attention should also be given to mediating and moderating relationships among blockchain adoption, organizational capabilities, and performance. Mixed-method designs could further explain why similar blockchain investments generate different outcomes across firms. Finally, future studies should distinguish operational, financial, resilience, and sustainability performance to determine whether blockchain creates value differently across these dimensions.

References

- [1] Masudin, I., Ramadhani, A., Restuputri, D.P., Amallynda, I.: The Effect of Traceability System and Managerial Initiative on Indonesian Food Cold Chain Performance: A Covid-19 Pandemic Perspective. *Global Journal of Flexible Systems Management*. 22(4), pp. 331–356 (2021)
- [2] Ruangkanjanases, A., Hariguna, T., Adiandari, A.M., Alfawaz, K.M.: Assessing Blockchain Adoption in Supply Chain Management, Antecedent of Technology Readiness, Knowledge Sharing and Trading Need. *Emerging Science Journal*. 6(5), pp. 921–937 (2022)
- [3] Nayal, K., Raut, R.D., Narkhede, B.E., Priyadarshinee, P., Panchal, G.B., Gedam, V.V.: Antecedents for Blockchain Technology-Enabled Sustainable Agriculture Supply Chain. *Annals of Operations Research*. 327(1), pp. 293–337 (2023)
- [4] Almasarweh, M.S., Jawasreh, Z., AlGhasawneh, Y., Al Matalaka, M., Alshuaibi, M., Kalbounch, N., Al Zoubi, M.: The Impacts of Task Technology Fit, Transparency, and Supply Chain Agility on the Blockchain Adoption by SMEs in Jordan. *International Journal of Data and Network Science*. 7(3), pp. 1303–1310 (2023)
- [5] Nisar, U., Zhang, Z., Wood, B.P., Ahmad, S., Ellahi, E., Ul Haq, S.I., Alnafissa, M., Abd-Allah, E.F.: Unlocking the Potential of Blockchain Technology in Enhancing the Fisheries Supply Chain: An Exploration of Critical Adoption Barriers in China. *Scientific Reports*. 14, 10167 (2024)
- [6] Wang, T., Al Mamun, A., Masukujjaman, M., Yang, Q.: Synergy of Blockchain-Enabled Supply Chains, Resilience, and Sustainability Performance in Chinese Logistic Firms. *Operations Management Research*. 18, pp. 1067–1087 (2025)
- [7] Nazir, S., Tariq, A., Piprani, A.Z., Ali, M., Gohar, M.: Resource Commitments for Technology-Deployments to Boost Corporate Sustainability. *Journal of Innovation Management*. 13(1), pp. 54–80 (2025)
- [8] Tanchangya, T., Siddiqi, K.O., Naher, K., Esquivias, M.A., Islam, N., Das, S., Chowdaury, S., Fariha, S.: Supply Chain Integration and Sustainable Organizational Performance: Moderating Role of Blockchain Adoption. *Emerging Science Journal*. 10(3), pp. 1690–1710 (2026)

- [9] Chunduri, V., Raparathi, M., Yellu, R.R., Keshta, I., Byeon, H., Soni, M., Bhatt, M.W.: Blockchain-Based Secure Optimized Traceable Scheme for Smart and Sustainable Food Supply Chain. *Discover Sustainability*. 5, 110 (2024)
- [10] Zhao, L.W., Jin, S., Gao, P.: Dynamics Analysis of Green Supply Chain under the Conditions of Demand Uncertainty and Blockchain Technology. *Scientific Reports*. 14, 25339 (2024)
- [11] Patel, A., Sai, S., Daiya, A., Akolekar, H., Chamola, V.: Blockchain Enabled Traceability in the Jewel Supply Chain. *Scientific Reports*. 15, 3837 (2025)
- [12] Pawar, M.K., Patil, P.: Scalability Enhancement for Blockchains by Dynamic Difficulty Level Adjustment: A Machine Learning Approach. *Engineering, Technology & Applied Science Research*. 15(5), pp. 26440–26447 (2025)
- [13] Afrianto, I., Djatna, T., Arkeman, Y., Hermadi, I.: Security Enhancement and Performance Assessment in Blockchain-Based Smallholder Palm Oil Supply Chain. *International Journal of Engineering*. 38(3), pp. 580–596 (2025)
- [14] Babaei, A., Babaei Tirkolae, E., Simic, V., Golpîra, H.: Assessing the Impacts of Blockchain Technology on Supply Chain Efficiency: A Data-Driven Integrated Decision-Making Framework. *Group Decision and Negotiation*. 34, pp. 871–902 (2025)
- [15] Chakraborty, K., Ghosh, A., Pratap, S.: Adoption of Blockchain Technology in Supply Chain Operations: A Comprehensive Literature Study Analysis. *Operations Management Research*. 16(4), pp. 1989–2007 (2023)
- [16] Huang, J., Fang, F., Leong, Y.C., Yiing, L.S.: Exploring Blockchain Adoption in Food Safety: A Dual-Stakeholder Perspective Using the UTAUT Model. *Journal of Ecohumanism*. 4(1), pp. 3160–3176 (2025)
- [17] Tornatzky, L.G., Fleischer, M.: *The Processes of Technological Innovation*. Lexington Books, Lexington, MA (1990)
- [18] Davis, F.D.: Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*. 13(3), pp. 319–340 (1989)
- [19] Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D.: User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*. 27(3), pp. 425–478 (2003)
- [20] Queiroz, M.M., Wamba, S.F.: Blockchain Adoption Challenges in Supply Chain: An Empirical Investigation of the Main Drivers in India and the USA. *International Journal of Information Management*. 46, pp. 70–82 (2019)
- [21] Kamble, S., Gunasekaran, A., Arha, H.: Understanding the Blockchain Technology Adoption in Supply Chains—Indian Context. *International Journal of Production Research*. 57(7), pp. 2009–2033 (2019)
- [22] Barney, J.: Firm Resources and Sustained Competitive Advantage. *Journal of Management*. 17(1), pp. 99–120 (1991)
- [23] Teece, D.J., Pisano, G., Shuen, A.: Dynamic Capabilities and Strategic Management. *Strategic Management Journal*. 18(7), pp. 509–533 (1997)
- [24] Teece, D.J.: Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*. 28(13), pp. 1319–1350 (2007)
- [25] Williamson, O.E.: *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. Free Press, New York (1985)
- [26] Schmidt, C.G., Wagner, S.M.: Blockchain and Supply Chain Relations: A Transaction Cost Theory Perspective. *Journal of Purchasing and Supply Management*. 25(4), 100552 (2019)

- [27] Goodhue, D.L., Thompson, R.L.: Task-Technology Fit and Individual Performance. *MIS Quarterly*. 19(2), pp. 213–236 (1995)
- [28] Wamba, S.F., Queiroz, M.M., Trinchera, L.: Dynamics between Blockchain Adoption Determinants and Supply Chain Performance: An Empirical Investigation. *International Journal of Production Economics*. 229, 107791 (2020)
- [29] Kshetri, N.: Blockchain's Roles in Meeting Key Supply Chain Management Objectives. *International Journal of Information Management*. 39, pp. 80–89 (2018)
- [30] Saberi, S., Kouhizadeh, M., Sarkis, J., Shen, L.: Blockchain Technology and Its Relationships to Sustainable Supply Chain Management. *International Journal of Production Research*. 57(7), pp. 2117–2135 (2019)
- [31] Kamble, S.S., Gunasekaran, A., Sharma, R.: Modeling the Blockchain Enabled Traceability in Agriculture Supply Chain. *International Journal of Information Management*. 52, 101967 (2020)
- [32] Tranfield, D., Denyer, D., Smart, P.: Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*. 14(3), pp. 207–222 (2003)
- [33] Snyder, H.: Literature Review as a Research Methodology: An Overview and Guidelines. *Journal of Business Research*. 104, pp. 333–339 (2019)
- [34] Page, M.J., et al.: The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. *BMJ*. 372, n71 (2021)
- [35] Kitchenham, B., Charters, S.: Guidelines for Performing Systematic Literature Reviews in Software Engineering. EBSE Technical Report EBSE-2007-01. Keele University and Durham University, UK (2007)
- [36] Zirmire, J.L., et al.: Blockchain Technology Adoption in Supply Chain Management: An Integrated Framework of Organizational Capabilities, Adoption Barriers, and Performance Outcomes. *International Journal of Computer Information Systems and Industrial Management Applications*. 18(3s), pp. 797–816 (2026)
- [37] Purwaningsih, E., Muslikh, Suhaeri, Basrowi: Utilizing Blockchain Technology in Enhancing Supply Chain Efficiency and Export Performance, and Its Implications on the Financial Performance of SMEs. *Uncertain Supply Chain Management*. 12(1), pp. 449–460 (2024)
- [38] Sun, Z., Xu, Q., Liu, J.: Dynamic Supervision of Counterfeit Products Based on Blockchain Technology: A Differential Game on Goodwill Accumulation. *PLOS ONE*. 18(10), e0293346 (2023)
- [39] Peter John, A., Mishra, U.: Optimizing Solid Waste, Effluents and Blockchain Technology Efforts towards a Sustainable Palm Oil Stochastic Supply Chain Model. *Scientific Reports*. 16, 18831 (2026)
- [40] Zhang, K., Li, X., Bai, Y.: When Green Meets Economic: Blockchain Adoption, Channel Conflict, and Sustainable Remanufacturing Strategies. *International Journal of Industrial Engineering Computations*. 17(2), pp. 785–804 (2026)
- [41] Cammarano, A., Varriale, V., Michelino, F., Caputo, M.: Blockchain as Enabling Factor for Implementing RFID and IoT Technologies in VMI: A Simulation on the Parmigiano Reggiano Supply Chain. *Operations Management Research*. 16, pp. 726–754 (2023)
- [42] Feitosa e Silva, H.: Blockchain for Beef Traceability: Developing an Artifact Using Design Science Research. *RAM—Revista de Administração Mackenzie*. 27(2), eRAMR2620195 (2026)
- [43] El-Nakib, I.: Analytics-Based Modeling of Organizational Resistance and Resilience in Saudi Healthcare Supply Chains. *International Journal of Advanced and Applied Sciences*. 13(5), pp. 96–109 (2026)

- [44] Arifin, M., Kusriani, E., Cahyo, W.N., Widodo, I.D.: A Trust-Driven Blockchain Framework for Securing Cleaner Energy Supply Chains: Evidence from Power Plant Spare Parts Systems. *Journal Européen des Systèmes Automatisés*. 59(3), pp. 839–854 (2026)
- [45] Shao, P., Ismail, N.A., Xu, H.: Green Attributes, Blockchain-Enabled Traceability Systems, and Purchase Intention towards Organic Rice in China: A Moderated Mediation Model. *International Journal of Operations and Quantitative Management*. 31(2), pp. 256–283 (2025)
- [46] Bhatti, S.H., Ahmed, A., Ferraris, A., Wan Hussain, W.M.H., Wamba, S.F.: Big Data Analytics Capabilities and MSME Innovation and Performance: A Double Mediation Model of Digital Platform and Network Capabilities. *Annals of Operations Research*. 350, pp. 729–752 (2025)
- [47] He, S.: Empirical Research on Supply Chain Finance Innovation Promoting Environmental Governance and Ecological Protection of SMEs. *Journal of Environmental & Earth Sciences*. 7(5), pp. 289–303 (2025)
- [48] Dong, T., Yin, S., Zhang, N.: The Interaction Mechanism and Dynamic Evolution of Digital Green Innovation in the Integrated Green Building Supply Chain. *Systems*. 11(3), 122 (2023)
- [49] Yu, Z., Umar, M., Rehman, S.A.: Adoption of Technological Innovation and Recycling Practices in Automobile Sector: Under the Covid-19 Pandemic. *Operations Management Research*. 15(1–2), pp. 298–306 (2022)
- [50] Nozdreva, I., Popova, V., Sivakova, S.: A Unified Framework for Intelligent Logistics: Integrating Blockchain-AI Systems with Mobile Pedagogical Support. *International Journal of Interactive Mobile Technologies*. 20(9), pp. 31–42 (2026)
- [51] Tamtam, F., Tourabi, A.: Advancing Digital Supply Chains through Generative AI: A Strategic Framework with the ELECTRE III Method. *Complex Systems Informatics and Modeling Quarterly*. 43, pp. 17–33 (2025)
- [52] Sharma, J., Tyagi, M., Sachdeva, A., Dhingra, S., Ram, M.: Prediction of Mutual Interdependencies Among the Drivers of Blockchain for Enhancing the Supply Chain Dynamics. *Journal of Computational and Cognitive Engineering*. 3(2), pp. 141–152 (2024)
- [53] Yalçıntaş, D., Oğuz, S.: Blockchain and Artificial Intelligence (AI) Integration in Sustainable Logistics and Supply Chain Management (SCM): AHP-Based Evaluation and Case Analysis. *Environmental Research and Technology*. 9(3), pp. 492–501 (2026)
- [54] Bhole, S.S., Natraj, N.A.: An Investigative Analysis of Adaptive Consensus Mechanisms for Distributed Blockchain Systems. *EAI Endorsed Transactions on Internet of Things*. 11 (2026)
- [55] Chanda, P., Singh, P., Ghosh, S.: Human Resource Managers' Perceptions Towards the Implementation of Blockchain Technology in the Automobile Industry: A Qualitative Study. *International Journal of Information Engineering and Electronic Business*. 17(6), pp. 81–98 (2025)
- [56] Tran, T.C., Le, T.T.T.: A Bibliometric and Thematic Review of Metaverse and Reverse Logistics for a Sustainable Circular Economy. *Discover Sustainability*. 7, 939 (2026)
- [57] Kılıç, A., Hendek, M., Uslu, D.: Bibliometric Analysis of Artificial Intelligence Applications in Food Quality Control and Safety. *Ukrainian Food Journal*. 15(2), pp. 566–587 (2026)
- [58] Alharbi, S.M.: Bibliometric Insights into Technology-Driven Innovation in Project Procurement Management. *Journal of Project Management*. 11(3), pp. 951–964 (2026)
- [59] Gupta, S., Sharma, P.K., Singh, S.P., Jha, S., Diksha: Blockchain for Sustainable Agriculture: A Systematic Review Using SPAR-4-SLR and TCCM Framework. *Tropical Agriculture*. 103(Special Issue 1), pp. 252–265 (2026)

- [60] Pérez-Elizundia, G., Sandoval, S., Lampón, J.F.: Trends in Global Research on Supply Chain Finance from 1970 to 2021: A Bibliometric Analysis. *European Journal of Family Business*. 13(1), pp. 92–112 (2023)
- [61] Kieu, M.K., Nayak, R., Akbari, M., George, M., Panwar, T.: Exploring Trajectories in Supply Chain Integration: A Systematic Analysis of Emerging Themes. *Management Review Quarterly*. 76, pp. 513–572 (2026)
- [62] Elviani, S., Supitriyani, Junita, R., Muda, I.: Sustainable Supply Chains Using Blockchain Technology: A Literature Review. *Heritage and Sustainable Development*. 7(2), pp. 1267–1278 (2025)
- [63] Al-Jabri, B., Alkahtani, M.: A Functional Systematic Review of Digital Supply Chain Technologies in Municipal Solid Waste Management with a Saudi Benchmark. *South African Journal of Industrial Engineering*. 37(1), pp. 73–87 (2026)
- [64] Sadurya, G., Selvaranee, J.K.: Blockchain Technology in Fashion Management, Merchandising & SCM: A Comprehensive Literature Review and Conceptual Framework for the Textile Industry in TN. *Indian Journal of Information Sources and Services*. 16(1), pp. 240–250 (2026)
- [65] Al-Ababneh, H.A., Kafka, S., Serbina, T., Maiboroda, O., Afanasiev, D.: The Impact of Blockchain Systems on the Transparency of International Logistics Operations. *Multidisciplinary Science Journal*. 8(6), e2026404 (2026)
- [66] Gaynor, M., Gillespie, K., Roe, A., Crannage, E., Tuttle-Newhall, J.E.: Blockchain Applications in the Pharmaceutical Industry. *Blockchain in Healthcare Today*. 7(1), 298 (2024)