



Antecedents and consequences of blockchain adoption in supply chains: A systematic literature review

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Abstract:

Purpose: Despite the availability of several published reviews on the adoption of blockchain (BC) in supply chain (SC), at present, the literature lacks a comprehensive review incorporating the antecedents and consequences of BC adoption. Moreover, the complex adoption of BC in SC, explained with the mediating and moderating relationships, is not fully consolidated. Thus, the aim of this study was to conduct a systematic literature review (SLR) on BC technology adoption (BCTA) in SC by integrating its antecedents and consequences.

Method: Keyword searches were performed in multiple databases resulting 382 articles for evaluation and verification. After careful screening with respect to the purpose of the study and systematic processing of the retrieved articles, a total of 211 peer-reviewed articles were included in this study for review.

Findings: Various technological, organisational, individual, social, environmental, operational, and economic factors were found as the antecedents of BCTA in SC. In addition, numerous applications of BC Technology (BCT) were identified, including asset management, identity management, transaction management, data management and operations management. Finally, the consequences of BCTA were categorised as operational, risk management, economic, and sustainability outcomes.

Originality: By integrating the antecedents, applications, and consequences of BCTA in SC, including the mediators and moderators, an integrated framework was developed that can potentially assist researchers to develop theoretical models. Further, the results of this SLR provide future directions for studying BCTA in supply chain management (SCM).

Practical Implications: This study can assist relevant decision-makers in managing the factors influencing BCTA and the potential uses of the technology to enhance SC performance.

Article type: Literature review

Keywords: Blockchain adoption; antecedent; consequence; supply chain; supply chain management; systematic review.

1. Introduction

In the current data-driven society, collecting and sharing information across supply chain (SC) networks is essential (Saber et al., 2019b). However, authentic and verifiable architecture is required to promote data sharing (Francisco and Swanson, 2018, Sodhi and Tang, 2017). Fortunately, BCT – a peer-to-peer network that keeps records of digital asset transactions (Min, 2019) – offers information transparency, robustness, auditability, security and traceability (Queiroz and Wamba, 2019, Dasaklis et al., 2022). Consequently, over the years, academics and practitioners have expressed significant interest in the adoption of BCT in SC operations, including the effects on SC transparency (Zelbst et al., 2020), security (Salman et al., 2019), risk management (Fu and Zhu, 2019, Choi et al., 2019), traceability (Behnke and Janssen, 2019, Hastig and Sodhi, 2020) and sustainability (Treiblmaier, 2019, Yadav and Singh, 2020a).

Given that BC is an emerging technology (Kopyto et al., 2020, Saber et al., 2019b), its application (Kiu et al., 2020, Kopyto et al., 2020) and adoption (Helo and Hao, 2019, Min, 2019) in SC and supply chain management (SCM) are of increasing interest. Extant studies have individually identified the antecedents (Wahab et al., 2020, Sheel and Nath, 2020), applications (Ghode et al., 2020, Guo et al., 2020) and consequences (Casado-Vara et al., 2018, Vatankhah Barenji et al., 2020) of BCTA, but not in an integrated way. The development of an integrated framework combining the antecedents, applications, and consequences of BCTA is vital for future theory development and empirical investigations.

Against this backdrop and in response to calls for systematic reviews on BCTA in SC (Kshetri, 2018), this paper presents a systematic literature review on the antecedents, applications and consequences of BC adoption in SC. It develops an integrated framework that explains the complete landscape of BCTA in SC. It should be acknowledged here that several studies have reviewed the existing literature on BCTA in SC; however, these reviews have focused on specific areas of the SC, such as SC sustainability (Paliwal et al., 2020), SC resilience (Vivaldini and De Sousa, 2021), and SC performance management (Yang et al., 2021, Berneis et al., 2021). Thus, establishing a comprehensive picture of BC adoption in SC is still warranted.

This study offers three contributions. First, while previous studies including SLR on BCT and SC, showed BCT application in SC, logistics, and transport management for technology, trust, trade, and traceability/transparency context, our study is a first reported initiative with antecedents and consequences of BCT adoption in SC. Second, by integrating the antecedents and consequences of BCT use, this research offers a holistic model of BCT adoption in SC, consistent with information systems (IS) and SC theories, including the technology-organisation-environment (TOE) framework. Third, a comprehensive conceptual framework for BCT adoption in SC has been developed in this study, providing a better understanding of the current state of BCT adoption (BCTA) in SC. Finally, consistent with Hughes et al. (2019), several propositions are developed to guide future research on BCTA in SCM.

The remaining sections of this paper are structured as follows. Section 2 presents a review of studies on BCTA in SC and identifies their limitations to justify the need for the current paper. Section 3 presents the research methodology and the steps involved in the literature search, synthesis and review processes. Section 4 outlines the key findings of the reviewed papers and describes the development of the research framework based on these findings. Finally, Section 5 presents a discussion of the findings, the implications, the research contribution, the study limitations, and future research directions.

2. Review of previous studies on BCT

Several literature reviews on BCTA in SC have been published, summarised in Table 1. However, although BCTA in SC is of high interest, very few SLRs have been conducted to assess the impacts of BCT in SCM (Casino et al., 2019, Kummer et al., 2020, Berneis et al., 2021,

Dasaklis et al., 2022, Hussain et al., 2021, Paliwal et al., 2020). As a result, the current understanding of its potential remains limited. Moreover, BCTA is still in its infancy in SC, especially with respect to the development and diffusion of technology. To this end, a systematic review of current thinking is likely to assist academics and managers in sensemaking relating to technological innovation, potential disruptive effects, and efficacy (Wang et al., 2019b). Equally, a SLR provides the opportunity to decide whether to embrace, adjust the timing, or ignore BCTA in SCM.

Table 1: Summary of previously published review-based papers on BC in SC

Authors	Main theme	Summary	Limitations
Sangari and Mashatan (2022)	BT-SCM trends, gaps, and research needs	BT-SCM represents a young area of academic research, business practice, and technology development.	Lack of theoretical and empirical studies on the performance outcomes of BT-SCM.
Ruangkanjanases et al. (2022)	BT adoption in supply chain management system	Technology readiness into blockchain in the field of SCM	Lack of scope for cross-country business practice
Agi and Jha (2022)	A comprehensive framework for blockchain adoption in SC	Raising awareness about the advantages of blockchain over existing technologies	The limited scope of respondents for the sample
Dasaklis et al. (2022)	Blockchain-enabled SC traceability implementation	BC-enabled SC traceability system.	Lack of real-life traceability solution.
Yadav and Singh (2020b)	BC Implementation over the traditional method deployed in the SC	Comparative analysis between TSCM and BC-enabled SC using fuzzy-AHP	Lack of literature in this context due to the initial stage of BC technology.
Berneis et al. (2021)	BT in logistics in terms of economic benefit	BC-enabled secure data structure is very effective for high-value goods	Published case studies and concrete examples are still lacking
Paliwal et al. (2020)	BT in SC sustainability	Traceability and transparency are the key benefits are BT in SC	High cost of BT implementation in SC
Hussain et al. (2021)	BC-based Internet of Things (IoT) in SCM	IoT increases visibility in the SCM	Publication on BC-based IoT in SCM is still lacking

Kummer et al. (2020)	Current blockchain literature in logistics and SCM in the context of Organisational theories	BC literature in the context of logistics and SCM	BT is lacking in the LSCM context
Fosso Wamba et al. (2020)	Bitcoin, BC, and Fintech for competitive advantage	BT benefits/value and challenges/issues in SC industries.	Empirical studies on bitcoin, blockchain and Fintech are limited
Chang and Chen (2020)	BT issues and challenges in SC paradigm.	Potential applications and future research directions of BT in SCM	SC ecosystems have been less discussed in the extant literature
Pournader et al. (2020)	Traceability/Transparency for SC and logistics management.	Technology, trust, trade-in transport management	Limited studies relating to BT in SC, logistics, and transparency context
Helo and Hao (2019)	The role of BC in creating value in the domain of OSCM.	Blockchain-based applications in operations and SCM	BC applications regarding OSCM are still limited.
Saberi et al. (2019b)	BC-based smart contracts to fulfil sustainable SCM goals.	Four main barriers (intra-organisational, inter-organisational, system-related, and external) to achieving sustainable SCM goals	The internal and external limitations of organisations in adopting a new technology
Min (2019)	BC in SC operations from risk management/security perspectives.	Application of BCT that minimises risk and improves security in the SC	The limitation of BCT on SC-related research.
Casino et al. (2019)	BC in SC, business, healthcare, IoT, privacy, and data management.	The current state of BC and its applications for diverse sectors of SC business practices	The technical limitations of BC architecture in different sectors and industries.
Queiroz et al. (2019)	BC in SCM integration is still in the early stage.	BT in SCM integration revealed a lack of empirical study in this context	Limited studies on BC and SCM integration in the leading journals
Wang et al. (2019a)	The potential influence of BT in SC practices.	Reviewed the likelihood of BCT influencing future SC practices and policies	The limited search term selection for the SLR may exclude certain blockchain articles from this review.

1 2 3 4 5 6 7	Zhao et al. (2019)	Discussed BCTA in agri-food value chain management	BCT application for performance improvements in the agri-food value chain	Six significant limitations to BCTA in agri-food value chain management.
8 9 10 11 12 13 14	Kshetri (2018)	The impact of BC on various SCM objectives.	Reviewed BCT application in SCM in the context of strategic SC objectives	A high degree of computation costs, SC complexity, various laws, regulations

3. Research Methodology

This study has adopted a three-stage systematic review method to provide a transparent, reproducible, and scientific literature review on BC adoption in SCs, as Tranfield et al. (2003) suggested. These three stages are 1) planning the review, 2) conducting the review, and 3) documenting the review (see Fig. 1).

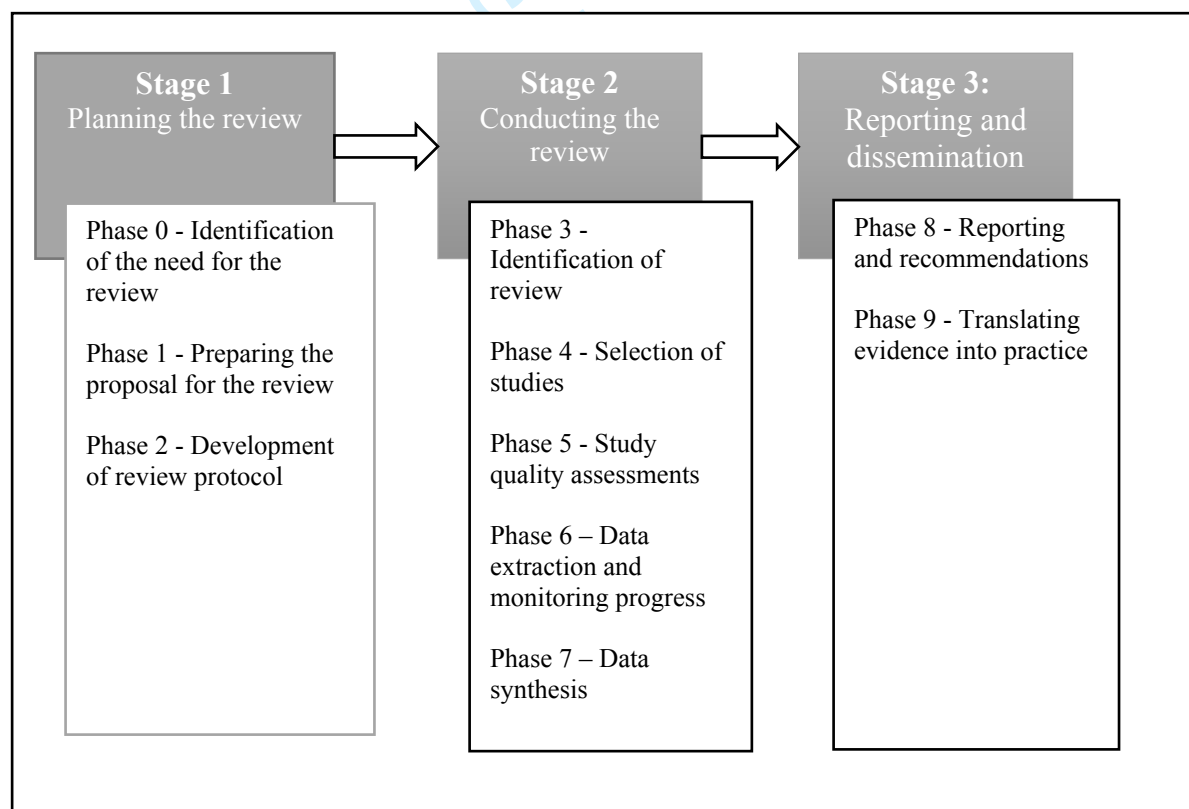


Figure 1: Three-state systematic literature review approach, sources Tranfield et al. (2003).

3.1 Search criteria

Publications related to BCTA in SC are in their infancy (Helo and Hao, 2019, Dobrovnik et al., 2018). Therefore, we initially considered studies from January 2010 to 31st Oct 2022. However, in the initial search, no articles have found before 2014. So, we modified the time frame for the article search from 1st January 2014 to 31st Oct 2022. Furthermore, to ensure academic rigour and quality, articles for this review were obtained from peer-reviewed scholarly journals only (Tranfield et al., 2003). Finally, only papers published in English were considered to generate a wide range of coverage. Table 2 indicates the inclusion and exclusion criteria of the study.

Table 2: Inclusion and exclusion criteria

Inclusion	Exclusion
Year of publication: From 1 st January 2010 to 31 st Oct 2022	Any publication before 1 st January 2010 and after 31 st Oct 2022
Databases: Scopus, Google Scholar, ProQuest ABI/INFORM Collection, and Web of Science	Other databases (produce similar output)
Journal type: Peer-reviewed, full text Source type: Scholarly journal Document type: Articles Language: English	Online sites and grey literature (conferences, reports, working papers from research groups, technical reports) Any other languages
Journal articles only	Books, conference papers, industry reports

3.2 Literature search

To ensure coverage of recent publications, we have considered keyword search strategy across four databases - Scopus, ProQuest, Google Scholar, and Web of Science. In addition, an advanced search tool that enabled two-level keywords was used to identify relevant articles. Level one consisted of blockchain OR distributed ledger OR smart contract, while level two included supply chain OR logistics OR source OR manufacture OR operation OR distribution. The following syntax we have used for the literature search:

("Blockchain" OR "distributed ledger" OR "smart contract") AND (("supply chain" OR "logistics" OR sourc* OR procur* OR purchas* OR manufactur* OR "operat*" OR distribut*))

We have considered the following stages for the search procedure:

In the first stage, the initial searches generated 482 articles from the databases, including 135 from Scopus, 200 from Google Scholar, 51 from ProQuest databases, and 61 from Web of Science, where 35 were common to all databases. Then, after careful screening, a total of 201 relevant articles we have selected for further processing.

We have cross-checked 201 articles in the second stage and removed duplications. In this stage, 36 papers we have added from the Scopus database after conducting a manual search to avoid missing any relevant articles.

Finally, in the third stage, we conducted another manual search on the Google Scholar database to avoid keyword search errors, resulting in an additional 12 articles relevant to the theme. Thus, the three-stage search process described above resulted in 249 papers.

3.3 Evaluation of articles and inclusion

The 249 articles identified above were then evaluated and verified to ensure they met the study's scope (Tranfield et al., 2003). Through the evaluation process, 23 less relevant articles did not match the topic, hence removed after three authors read through the titles and abstracts following the procedure (Casino et al., 2019, Kummer et al., 2020). This process left 226 papers which were then read in full to identify the factors that influence BCTA in SC (i.e., antecedents), what BCT is used for (uses/application), and the impacts of BCTA on SCM (outcomes/consequences). At this stage, 15 articles were discarded as they were conference proceedings and were deemed to lack relevance to the study. Finally, 211 articles were considered appropriate for in-depth review and were included in this study. Following Olanrewaju et al. (2020), along with the antecedents, applications and consequences of BCTA in SC, we examined the associated mediators and moderators as well as the applied research methods and theories/models/frameworks utilised in each study. From this, a conceptual framework has developed.

Fig. 2 indicates the number of papers published on the topic of BCTA in SC. The publication trend shows that the research interest has been increasing since 2018. However, relatively limited papers were published since 2021 in the topic area of this study. Based on the review, we identified 18 papers reported in the research that had dropped since (see supplementary document, Appendix 1). It might be due to COVID -19 being interesting causes e.g., restricted movements during lockdowns and thereby less chance to collect data, non-attendance at conferences, and budget constraints of institutions). SC scholars focused on explaining/predicting the effects of COVID-19 and therefore were less productive on BCT issues, one of the predicted reasons (Omar et al., 2022).

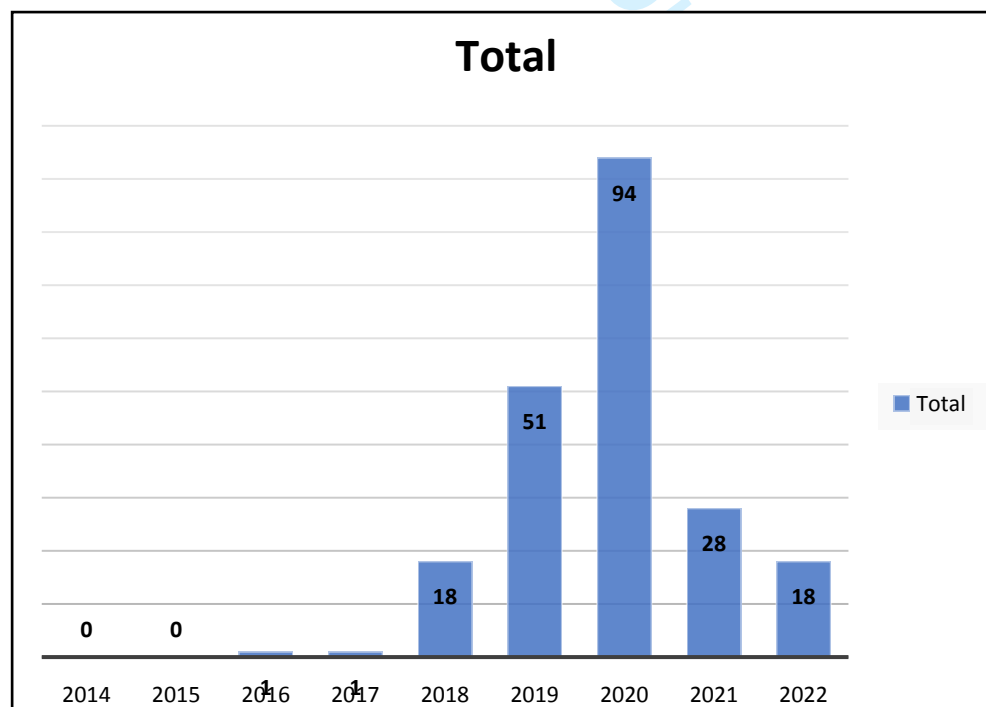


Fig. 1: Year-wise distribution of papers

4. Analysis and results

4.1 Research methods used in the articles

Various research methods have been applied to study BCTA in SC (see Fig. 3.). Fig. 3 shows that the qualitative method (n = 140) was the most common data collection method used in the reviewed articles, followed by the quantitative method (n = 65) and mixed methods (n = 6) approach.

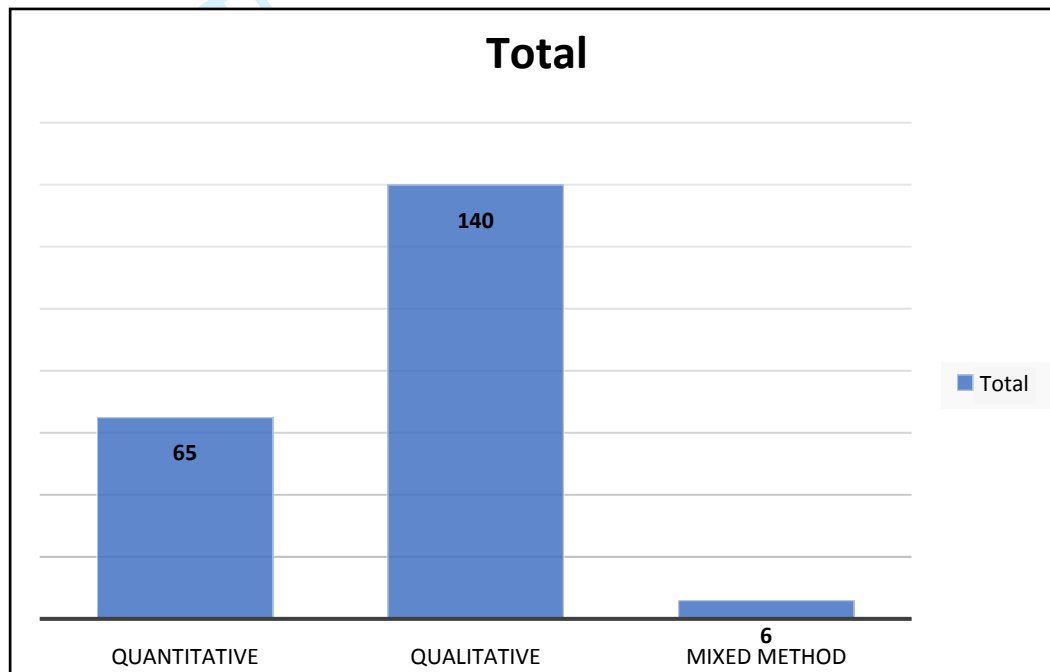


Fig. 2: Research methods used in published studies.

4.2 Theories and models used in the reviewed articles

The review highlights that relatively limited studies have investigated the theoretical lens of BCTA in SC-related issues (Nandi et al., 2020, Treiblmaier, 2018). Eleven of the 211 articles have adopted various organisational theories such as resource-based view (RBV) (Nandi et al., 2020, Martinez et al., 2019, Treiblmaier, 2018, Wamba and Queiroz, 2020b, Madhani, 2021), transaction cost theory (TCT) (Schmidt and Wagner, 2019), information processing theory (IPT) (Martinez et al., 2019), principal-agent theory (PAT) (Chang and Chen, 2020), dynamic capability theory (DCT) (Lambourdiere and Corbin, 2020) and institutional theory (Tran and Nguyen, 2020) (see supplementary document Appendix: 1, bibliometric information). Moreover, several models were adopted in the reviewed papers (see supplementary document Appendix: 1, bibliometrics information). Among them, three articles used the technology acceptance model (TAM). For example, Queiroz and Wamba (2019) used TAM to demonstrate the importance of understanding individual users' behaviours and perceptions of BCTA in SC. To understand the BCTA process in SC, one article integrated three adoption theories - the TAM, the theory of planned behaviour (TPB), and the technology readiness index (TRI) (Kamble et al., 2019). Francisco and Swanson (2018) used the diffusion of innovations theory (DOI), and Wamba and Queiroz (2020b) used the unified theory of acceptance and use of technology (UTAUT) for BC adoption in SC. It can be concluded that literature on BCTA in

SCs lacks the application of established organisational theories (Lambourdiere and Corbin, 2020) (see the supplementary document, [Appendix:1 bibliometric link](#)).

4.3 The antecedents of BC adoption

The antecedents identified in the review can be categorised into six groups: technological factors, organisational factors, individual factors, social factors, business environmental factors, and economic factors (see Table 3).

Sixteen Technological factors were identified in the reviewed articles (see Table 3). Researchers have applied various theories, including TOE, TAM, TPB, TRI, UTAUT, DOI and mean-variance (MV) analysis. Adding to that, various antecedents were examined, including infrastructure, communication, performance expectancy compatibility, and complexity, among others (Dobrovnik et al., 2018, Francisco and Swanson, 2018).

Five **Organisational factors** affecting BCTA in SC were repeatedly evident in the literature (see Table 3), including top management support, technological competence, technological knowledge, education context, and collaboration (Kamilaris et al., 2019, Nayak and Dhaigude, 2019). Among the organisational factors, top management support indicates a significant role in adopting new technology in the SC (Wamba and Queiroz, 2020a).

Individual factors were identified in the reviewed papers, including culture, behavioural intention, behavioural expectation, stakeholder awareness, stakeholder resistance, awareness of local context, and technological novelty-seeking (Yadav et al., 2020). Specifically, six essential factors that strongly influence BC adoption in SCM were identified by Wong et al. (2020b) (see Table 3). Furthermore, regarding these individual factors, the reviewed studies demonstrated that behavioural intention and technology awareness are essential in deciding on new technology adoption (Wahab et al., 2020).

Social factors influencing BCTA in SC included culture, climate, human rights, labour rights, working environment, and other localised social issues (Chan et al., 2020) that significantly influence BCTA in organisational SC (see Table 3). In the SCs activities, a BCT-based distributed, immutable, transparent and trustworthy database may provide better assurance for the community, human rights, and fair work practices (Saberri et al., 2019b). However, researchers argue that a guarantee for SC practices and social infrastructure may take a decade or two.

Seven key **Business environmental factors** were found to influence BCTA in SC, including competition, government support, stakeholder influence, deficiency of regulations, environmental uncertainty, stakeholder pressure and government regulations (see Table 3) (Francisco and Swanson, 2018, Verhoeven et al., 2018). For example, competitive pressure has been identified as a significant determinant of IT acceptance in organisational business practices (Saberri et al., 2019b, Wamba et al., 2020, Straubert and Sucky, 2021, Wang et al., 2021, [Sunny et al., 2022](#)). In addition, government support, such as providing applicable laws, offering economic incentives and providing appropriate IT infrastructure, are significant factors influencing BCTA in SCM (Queiroz and Wamba, 2019, Yadav et al., 2020, Varriale et al., 2021, [Agi and Jha, 2022](#), [Mukherjee et al., 2022](#), [Sangari and Mashatan, 2022](#)).

Economic factors were found to influence BCTA in SC activities, including five key factors: cost factor, asset scale, sales expense, asset specificity and profit margin. One key factor in BCTA is transaction cost reduction in SC practices (Pan et al., 2020). BCTA in organisational SC potentially promotes internal and external transaction cost reductions under three enablers: transparency, trust and disintermediation (Treiblmaier, 2018). To this end, BCTA reduces internal and external transaction costs and limits opportunistic behaviour in SC practices (Schmidt and Wagner, 2019).

Table 3: Antecedents of BC adoption in SCM research

No.	Antecedent Construct	Description	References
Technological Factors			
1	Infrastructure	The primary IT facilities that support business activities every day	Nayak and Dhaigude (2019), Yadav et al. (2020),
2	Communication	The exchange of meaning/information/data	Nayak and Dhaigude (2019)
3	Customer Acceptance	The end-user acceptance	Nayak and Dhaigude (2019), Fan et al. (2020)
4	Supplier acceptance	The acceptance by upstream suppliers/ raw material producer	Nayak and Dhaigude (2019)
5	Information system coordination	Consensus-based collaborative management	Yuan et al. (2019)
6	Performance expectancy	Trust in technology	Queiroz and Wamba (2019), Francisco and Swanson (2018),
7	Facilitating conditions (Compatibility)	Compatibility with current technology	Queiroz and Wamba (2019), Francisco and Swanson (2018), Dobrovnik et al. (2018),
8	Relative advantage	Perception of how BCT is better than current practice	Dobrovnik et al. (2018), Wong et al. (2020a),
9	Complexity	Perceived difficulty in understanding BCT and BCT use.	Dobrovnik et al. (2018), Wong et al. (2020a)
10	Trialability	A trial-based experiment	Dobrovnik et al. (2018)
11	Observability	Visibility of results from the use of BCT	Dobrovnik et al. (2018)
12	Interoperability & standardisation	Smart-contract execution	Chang et al. (2020), Yadav et al. (2020)
13	Information quality	Real-time information, immutability, visibility	Dolgui et al. (2020), Jayaraman et al. (2019)
14	Security and privacy	Blockchain-based security system	Yadav et al. (2020)
15	Technical aspects	Peer-to-Peer network, Public-Key Cryptography, Hash Function, Consensus Mechanism	Kamilaris et al. (2019)
16	Effort expectancy	Trust in technology	Francisco and Swanson (2018)
Organisational Factors			
1	Top/Upper management support	The strategic decision-makers	Nayak and Dhaigude (2019), Wong et al. (2020a),
2	Technological competence	Lack of expertise	Saberi et al. (2019a), Wang et al. (2021)

3	Technological knowledge	Limited literacy and knowledge	Chang et al. (2020)
4	Education context	Limited education and training platforms	Kamilaris et al. (2019)
5	Collaboration	Autonomous long-term relationships between SC members	Garcia-Torres et al. (2019)
Individual Factors			
1	Behavioural intention	Factors influencing the decision to use BCT	Queiroz and Wamba (2019), Francisco and Swanson (2018),
2	Behavioural expectation	An employee's ability to implement BT use	Queiroz and Wamba (2019)
3	Stakeholder awareness	Stakeholder knowledge of BCT	Yadav et al. (2020), Verhoeven et al. (2018)
4	Stakeholder resistance	Stakeholder capacity to accept new technology	Yadav et al. (2020)
5	Technological novelty seeking	Trust, positive attitudes toward new technological innovation	Verhoeven et al. (2018), Gurtu and Johny (2019)
6	Awareness of local context	Understanding of previously successful applications	Verhoeven et al. (2018)
Social Factors			
1	Culture	A set of beliefs, values, symbols and assumptions	Nayak and Dhaigude (2019)
2	Social influence	Individual's attitudes, beliefs or behaviour	Francisco and Swanson (2018)
3	Customer behaviour	Influence on customer behaviour	Francisco and Swanson (2018)
4	Human rights, labour rights	Requirements of the legal aspects of BT adoption in SC	Bai and Sarkis (2020)
Environmental Factors			
1	Competitive pressure	Competitive pressure between similar firms in the market	Nayak and Dhaigude (2019),
2	Government support /Government regulations	The regulatory bodies/ policies and laws	Yadav et al. (2020), Kamble et al. (2019)
3	Stakeholder influence	Stakeholders relative power	Duan et al. (2020), Yadav et al. (2020)
4	Deficiency of rules/regularity uncertainty	Lack of regulatory support/ legislation	Duan et al. (2020), Wong et al. (2020a)
5	Environmental uncertainty	Economic, political uncertainty, natural disaster, pandemic, etc	Schmidt and Wagner (2019),
6	Market dynamics	The continuously changing state of a highly competitive and complex market environment	Wong et al. (2020a)
7	Customer pressure	The influence of customer demand and choice	Saberi et al. (2019a)

8	Market uncertainty	Ambiguity in customer behaviour	Saberi et al. (2019a)
9	Policies	Regulatory policies and laws	Kamilaris et al. (2019), Wong et al. (2020a)
10	Governance	SCM governance practices	Garcia-Torres et al. (2019)
11	Competitive advantage	Bargaining power of suppliers, bargaining power of buyers, potential new entrants, industry competition, substitutes	Treiblmaier (2018)
Economic Factors			
1	Cost factor	Intermediary cost/ transaction cost /time save	Roeck et al. (2020); Wong et al. (2020a)
2	Asset scale	Positive impact on asset turnover rate	Pan et al. (2020)
3	Sales expense	The rate of sales expenses reduction	Pan et al. (2020)
4	Asset specificity	The degree to which a thing of value	Schmidt and Wagner (2019),
5	Profit margin	BT ensures lowered operation and inventory costs	Pan et al. (2020), Fu and Zhu (2019), Schmidt and Wagner (2019), Queiroz et al. (2019)

4.4 Areas of BC adoption and application

This review identified different uses of BC across various SC activities. These include: focusing on achieving SC objectives (Kshetri, 2018), deploying traceability mechanisms in wider SCs (Behnke and Janssen, 2019), increasing visibility and transparency for products and processes in SC activities, tracking, tracing and recording inventory (Remko Van, 2019), and automating the contracting mechanism and information-sharing opportunities in SCs (Longo et al., 2019), among others.

Fu and Zhu (2019) demonstrated a data storage and access mechanism using BCT in a big production enterprise of SC. Such data storage mechanisms improve data storage efficiency, privacy and access, thereby improving data management efficiency in SC practices. Table 4 summarises the literature review on BC application/usage in SC.

Table 4: BC application/usage in SCs

Blockchain Application Areas	Blockchain with Other Technologies	References
Asset Management		
Machinery, lands management	IoT	Helo and Hao (2019)
Ownership management	IoT	Helo and Hao (2019)
Intellectual Property management	IoT	Helo and Hao (2019)

Identity Management		
Material management	IoT	Helo and Hao (2019),
People management	Smart Contracts	Helo and Hao (2019)
Machine management	Smart Contracts, IoT	Helo and Hao (2019)
Distributor management	Smart Contracts, IoT	Helo and Hao (2019)
Transaction Management		
Order chain/ transaction management	Smart Contracts, IoT, Geth, Ethereum	Helo and Hao (2019), Yoo and Won (2018), Fosso et al. (2020), Queiroz et al. (2019)
Inventory management	IoT	Helo and Hao (2019)
Financial management	IoT, Cloud Computing	Helo and Hao (2019), (Jiang et al., 2022)
Data Management		
Product data/ SC data management	IoT, Smart Contracts, RFID, Ethereum-like blockchain (UnicalCoin), Ethereum, AgriBlockIoT	Lin et al. (2019), Helo and Hao (2019), Zhu and Kouhizadeh (2019),
Healthcare information	IoT, Smart Contracts	Mackey et al. (2019), Kamran et al. (2021)
Cross-border e-commerce SC data	IoT, Smart Contract	Liu and Li (2020)
Operations Management		
Logistics/ transportation operations management	IoT, Smart Contract	Pournader et al. (2019), Dobrovnik et al. (2018), Tönnissen and Teuteberg (2020), Xu and He (2022) ,
Business practices disruption management	IoT, Smart Contract	Casino et al. (2019), Sahebi et al. (2020)
Reverse logistics management	IoT	Kouhizadeh et al. (2019)
SC operations management	IoT, Smart Contract, RFID Tag, AI, Ethereum blockchain, Cloud Computing	Chang et al. (2018), Cole et al. (2019), Chang et al. (2020), Chang et al. (2022) , Lohmer et al. (2022)
Manufacturing management	RFID Smart Contract	Abeyratne and Monfared (2016), Westerkamp et al. (2019)

Value chain management	Cloud computing, RFID, Smart Contracts, IoT, QR Code, Ethereum	Feng et al. (2020), Salah et al. (2019), Behnke and Janssen (2019),
SC performance management	Smart Contracts, IoT, RFID, QR Code	Mahyuni et al. (2020), Kim Sundtoft and Kinra (2019)
E-Procurement management	IoT	Matyskevici and Kremer-Matyskevici (2020)
Operations management for social media SC	Smart Contracts, IoT, AI	Choi et al. (2020)
Operations management for humanitarian SC	AI and 3D printing	Rodríguez-Espíndola et al. (2020)

4.4.1 BCT with other emerging technologies

BC works in SC with other emerging technologies such as the internet of things (IoT), artificial intelligence (AI) and cloud computing. For example, Kshetri (2018) shows that the links between BC with AI and IoT solutions improve transparency, accountability, and SC performance. BC-based smart contracts minimise intermediary activities from the organisational SC, reducing cost, promoting greater SC transparency, and improving visibility. IoT devices can carry out autonomous transaction processes in SC. BC-based IoT can also create value by tracking fraud and preventing imitation of products/processes across the SC network (Rejeb et al., 2019, Salah et al., 2019).

4.5 Consequences of BC adoption*

The extant literature discussed the impact of adopting BCT in SC using different terminologies. For example, four papers (Hughes et al., 2019, Reyes et al., 2020, Chang et al., 2022, Sangari and Mashatan, 2022) have examined *perceived benefits* of BC use in SC, while 33 other studies discussed the expected consequences (see the supplementary document Appendix 2, consequences of BC adoption *1). Finally, 39 papers looked at the impact of BC on SCM (see supplementary document Appendix 2, consequences of BC adoption *2). In the current review, the 'consequences' and 'outcomes' were combined and categorised into four groups: 1) operational outcomes, 2) risk management outcomes, 3) economic outcomes, and 4) sustainability outcomes.

4.5.1 Operational outcomes

BC potentially improves the operational efficiency of SC by improving real-time communication, ensuring trust-building, and securing relationships between SC members (Kamble et al., 2020b, Martinez et al., 2019, Gurtu and Johny, 2019). It also ensures transparency, real-time tracking, visibility and traceability for products and processes in SC, enhancing SC operational performance (Aung and Chang, 2014, Pan et al., 2020). In addition, BC-based transparency mechanisms allow users to view the entire transaction history through SC (Brandon, 2016, Kamath, 2018). For example, many food SC, such as coffee and soya bean producers, use BC traceability mechanisms to trace food ingredients and products, from growing and production to processing and distribution (Kamath, 2018, Lin et al., 2019).

4.5.2 Risk management outcomes

Four articles in the identified BC literature examined SC risk management. For example, Fu and Zhu (2019) studied SC endogenous risk management based on BC technology. Choi et al.

(2019) used MV analysis to examine risk management for air logistics operations. Min (2019) demonstrated the importance of identifying specific SC activities associated with a risk to reduce the vulnerability of SC interactions in the global market. Considering the potential of BCT to manage SC risks, Min (2019) highlighted various SC risk sources, including geographic, economic, political, technological, social, market, climate/environment, logistic, managerial, financial, legal/ethical, regulatory and cultural/relational.

4.5.3 Economic outcomes

BC can support cost-intensive activities (upstream and downstream SC (Treiblmaier, 2018). As BC offers technological mechanisms for SC visibility, transparency and traceability, it can eliminate many intermediaries and, thus, save time and reduce costs in SC (Prashar et al., 2020, Sander et al., 2018). For example, in 2016, IBM & Maersk undertook a pilot project demonstrating the successful application of BC for tracking international logistics from the Kenyan coastal city of Mombasa to Rotterdam in the Netherlands (Kshetri, 2018). This project demonstrated that a decentralised traceability mechanism significantly reduced paperwork handling and saved time and costs in managing international container shipments (Kshetri, 2018). Other studies have reported that BC promotes decentralised traceability to save time, reduce costs and secure product safety and quality in SC (Hastig and Sodhi, 2020, Yiu, 2021).

4.5.4 Sustainability outcomes*

Only 21 of the 211 studies addressed BC-based SC sustainability (see supplementary document Appendix 2, sustainability outcome *1). For example, Saberi et al. (2019b) proposed that BC is more effective for economic and environmental sustainability than social sustainability. Manupati et al. (2020) studied BC-based sustainability for monitoring carbon emission levels and operational costs within a multi-echelon SC. Castka et al. (2020) addressed the role of BC in improving the accuracy and timeliness of social and environmental dimensions of sustainability audits in SC. Table 5 presents a summary of the consequences of BCTA in SC.

Table 5: Consequences of BC adoption in SC

No.	Operational outcome	Description	References
1	Speed	Reduces lead time	Kshetri (2018)
2	Dependability	Digital certification increases SC performance	Kshetri (2018)
3	Flexibility	Improve SC efficiency	Kshetri (2018)
4	Monitoring Performance	Increase transparency	Manupati et al. (2020),
5	Traceability	Electronic tracking and tracing	Figorilli et al. (2018), Meidute-Kavaliauskiene et al. (2021), Fan et al. (2020), Centobelli et al. (2022)
6	Process efficiency	Optimise SC process	Martinez et al. (2019); Santonino Iii et al. (2018), Viriyasitavat et al. (2022)
7	Provenance	The source of information, chain of custody	Montecchi et al. (2019)
8	Process integrity	Certifying authenticity, tracking custody	Cocco et al. (2021)

9	Supply chain performance	Smart contacts ensure supply chain performance	Litke et al. (2019), Upadhyay et al. (2020), Ruangkanjanases et al. (2022)
No.	Risk management outcome	Description	References
1	Risk reduction	Validate identity, verify the provenance, reduce cybersecurity risk	Fu and Zhu (2019),
2	Prevent quality defects	Error-free goods and services to satisfy customers	Min (2019)
3	Process safety	Data security and reliability, preventing counterfeit	Choi et al. (2019)
4	Supply chain resilience	Data immutability prevents risk occurrence by identifying risk sources	Vivaldini and De Sousa (2021)
No	Economic outcome	Description	References
1	Cost reduction	Eliminate paperwork, remove intermediaries from the SCs process	Perboli et al. (2018), Roeck et al. (2020)
2	Optimising operational cost	Reduce transportation costs, order costs, and inventory costs	Manupati et al. (2020)
3	Disintermediation	Saves time and cost	Tönnissen and Teuteberg (2020)
4	Cost structure governance	Reduces governance cost	Schmidt and Wagner (2019)
5.	Improving asset turnover rate	Positive impact on asset turnover rate	Pan et al. (2020)
No	Sustainability outcome	Description	References
1	Environmental and social sustainability	Mitigate noise pollution, congestion, and carbon dioxide emissions	Treiblmaier (2019), Rejeb and Rejeb (2020)
2	Optimising carbon emissions	BCT enables responsible carbon emissions approaches	Manupati et al. (2020)
3	Social sustainability	Drug and food safety, education, and culture	Chan et al. (2020),
4	Economic sustainability	Economic viability	Kamble et al. (2020a),
5	Environmental sustainability	Reduce carbon emission, waste reduction, reuse, and recycle in the SC process	Bai and Sarkis (2020)
6	Sustainable development	BCT ensure SC sustainability	Nayak and Dhaigude (2019), Mukherjee et al. (2022)
7	Environmental sustainability	waste reduction, reuse, recycle	Saberi et al. (2019b)

8	SC sustainability	economic viability, environmental protection and social equity	Garcia-Torres et al. (2019), Yadav and Singh (2020b)
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4.6 The moderators and mediators*

Seven of the 211 studies investigated the moderating and mediating variables related to BCTA in SCM (see Table 6). Among them, five studies examined a moderating variable (see supplementary document Appendix 2, moderators and mediators of *1), and two other studies examined mediating variables (Kamble et al., 2019, Sander et al., 2018). For example, Francisco and Swanson (2018) focused on trust in technology. They found that inter-organisational trust moderates the relationships between antecedents (performance expectancy, effort expectancy, facilitating conditions, social influence) and the intention to adopt BCT (Francisco and Swanson, 2018). Tran and Nguyen (2020) found that perceived helpfulness moderates the relationship between BCTA intention and usage behaviour. Wong et al. (2020b) studied the moderating effect of regulatory support on the food SC while Wamba et al. (2020) found that industry variables had no moderating effects on the relationships between antecedents (knowledge sharing and trading partner pressure) and SC performance. The roles of BC membership for enhancing performance in the SCM (Kim Sundtoft and Kinra, 2019), data availability rules (Kim Sundtoft and Kinra, 2019), industry variables roles (Wamba et al., 2020), and regulatory support on BC adoption in operations and SCM (Wong et al., 2020b)

Regarding the mediating effects, Sander et al. (2018) identified that consumers' perceptions of quality significantly mediate the relationship between BC-enabled transparency and traceability systems and consumers' purchasing decisions. Based on TAM, Kamble et al. (2019) identified perceived usefulness as a mediator between the perceived ease of use and attitude in BCTA. Table 6 presents a summary of the moderating and mediating factors. Perceived ease of use is a determining factor for blockchain adoption in SC (Kamble et al., 2019).

Table 6: Mediating and moderating factors*

Constructs - Moderators	References
Trust in technology	Francisco and Swanson (2018)
Inter-organisational trust	
Blockchain membership	Kim Sundtoft and Kinra (2019)
Data availability rules	
Industry variables	Wamba et al. (2020)
Regulatory Support	Wong et al. (2020b)
Perceived helpfulness	Tran and Nguyen (2020)
Constructs - Mediators	
Consumers' perceptions of quality	Sander et al. (2018)
Perceived usefulness	Kamble et al. (2019)
Perceived ease of use	
Supply Chain Performance with a mediating role	Rashid et al. (2022)

Note: *Mediating/moderating factors between antecedent constructs and BCTA as well as BCTA outcome constructs.

4.7 Conceptual framework development

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3 Fig. 4 shows a comprehensive conceptual framework of BCTA in SC, we have developed based
4 on the reviewed papers. The resulting framework is different from other frameworks on BC
5 adoption in SC that have recently been developed, such as that created by Nayak and Dhaigude
6 (2019) and that of Francisco and Swanson (2018). Furthermore, our framework is different as
7 it focuses on a holistic perspective, encapsulating the antecedents, usage and consequences of
8 BC adoption in SC and the mediating and moderating factors.
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11 Various frameworks have been evident in the reviewed papers. For example, Treiblmaier
12 (2018) proposed a framework to understand the theoretical starting point in BC-based SC
13 research. Wang et al. (2019b) proposed a framework using individuals' sensemaking theory to
14 explore emerging BC technology transforming SC. Finally, Wong et al. (2020a) proposed a
15 TOE framework to investigate the adoption of BC in operations and supply chain management
16 (OSCM) for small-medium enterprises. However, our comprehensive conceptual framework is
17 an extension of the TOE framework.
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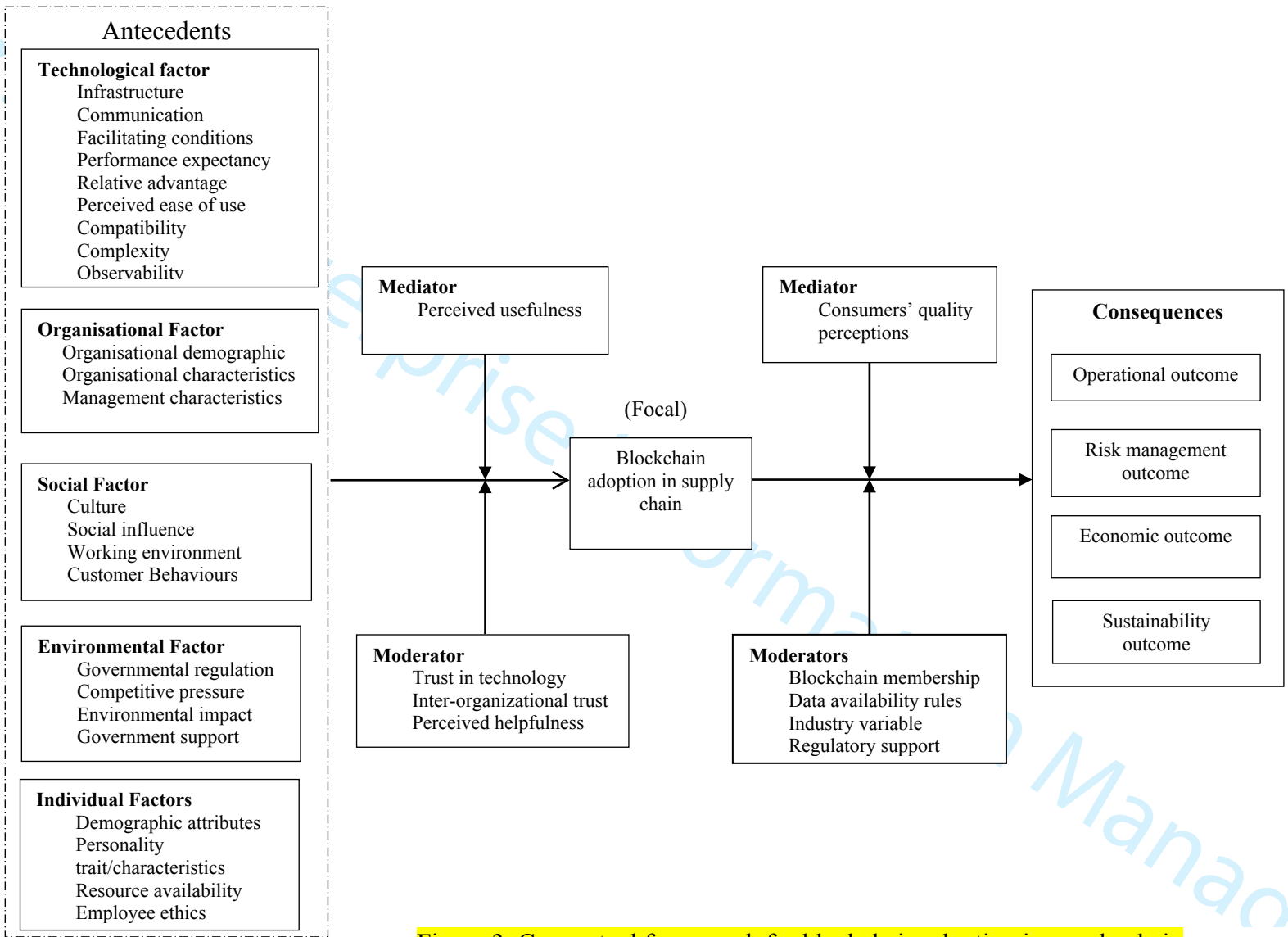


Figure 3. Conceptual framework for blockchain adoption in supply chain

5. Discussion

This study presents a SLR on the antecedents and consequences of BCTA in SCM. This review identified various factors that influence BCTA in SC and BCT use; these were classified into five broader categories: technological, organisational, social, environmental and individual. Our analysis suggests that existing studies have predominantly focused on technological, environmental and organisational elements, while social and individual factors have received relatively less attention (Wong et al., 2020b). Yet, the role of BC in achieving various SC objectives have been received significant attention (Kshetri, 2018).

The use of BC for SC traceability has received widespread research attention (Garcia-Torres et al., 2019, Kamble et al., 2020b, Salah et al., 2019, Yiu, 2021, Bischoff and Seuring, 2021, Centobelli et al., 2022, Omar et al., 2022, Varavallo et al., 2022). Furthermore, research indicates that many BC-based traceability mechanisms have recently been proposed in diverse SC areas (Kamath, 2018, Lin et al., 2019), considering the effectiveness of the BC-based traceability mechanism on SC (Prashar et al., 2020). However, relatively few studies have focused on such traceability in the food SC context (Prashar et al., 2020, Zhao et al., 2019).

The impacts of BC on SCM have primarily been evaluated for SC operational performance, including decentralisation, technicalities of technology, elimination of intermediates, mechanisms of transparency and traceability, provenance, ensuring quality, increasing speed, enhancing trust, and protection against fraudulent activities, among others. Studies undertaken between 2015-2017 focused on the role of BC, the technicalities of the technology, and the relative advantage of BC over current technology in the SC, which led to the identification of significant factors such as the strategic adoption of BC in SC. However, studies between 2018-2020 focused more on the impact of BC on SC performance improvement, including SC visibility, transparency, traceability, sustainability, and innovation (Bai and Sarkis, 2020, Yadav et al., 2020). These are (visibility, transparency, traceability, sustainability, and innovation) which are essential in achieving a competitive advantage in SCM. Finally, concerning the theories used in the reviewed articles, only 12 of the 211 studies have adopted a theoretical lens in investigating the research problem. This can be interpreted that, from the theoretical realm, BCTA research is still in its infancy, given that the extant literature uses limited development of theory toward understanding the BCTA phenomenon. Furthermore, these studies have explored many different types of theories, and only rarely was the same theory used more than twice (except RBV). Thus, while scholars acknowledge diverse perspectives, it is unclear which theories are most relevant, nor whether a single or integrated theory is needed.

6. Conclusion

6.1 Implications to research and practice

This literature review shows that numerous researchers had either conceptually derived or studied the causal relationships of various antecedents and consequents of BCTA in the presence or absence of mediators and moderators, using both quantitative and qualitative methods. All these attributes are delineated in the proposed causal framework of BCT research (see Fig. 4 and Tables 5 & 6). This systematic literature review allows us to assess the level of knowledge development on BCTA, explore the implications for practice and research and recommend some future research directions. In addition, the comprehensive conceptual framework (figure 4) may serve as a baseline for future research to be carried out by BCT and SC academics.

With regard to antecedents, this article provides the frequent concerns and issues (e.g., technological, organisational, environmental, social and individual issues) affecting the level of BCTA in SCs. Such information may assist managers in implementing BCT in various SC to set prioritised strategies and direct resources and more attention to potential issues that may negatively affect the business realization of such projects. It will further guide us to identify the key technical and non-technical factors of BCT implementation leading to achieving business value. More precisely, future research may empirically look at how BCTA within SCs can be linked to technological, organisational, and environmental resources to create organisational benefits and, thus, improved and transparent SCs.

For the outcome variables, this study highlights the potential outcomes (operational, risk-management, economic, and sustainability) of BCTA in SCs. The analysis of articles on BCTA in SCs shows that the highest number of published articles is concerned with the SC operational outcomes (approximate 50%), followed by risk management outcomes (approximate 20%), economic outcomes (approximate 20%), and sustainability outcomes (Approximate 10%). These results indicate significant opportunities for future research in the areas of BCTA in SCs risk management outcomes, economic outcomes, and SC sustainability outcomes.

Among the mediators, consumers' perceptions of quality, perceived usefulness, and perceived ease of use are identified in reviewed papers. The various choice of tools is a significant element in the category of SC attributes in conducting BCTA in SC management research. SCM is complex and requires different types of approaches and analysis. Thus, the choice of tools has a mediating effect on the relationship between antecedents and outcomes.

As regards the moderators, trust in technology, inter-organisational trust, blockchain membership, data availability rules and perceived helpfulness, industry variables, and regulatory support are found in the reviewed literature. In addition, the category of SC user characteristics, demographic factors, cultural differences and user personality and cultural difference are some of the primary controlling factors used to examine the relationship between antecedents and outcomes of BCTA in SC management research. Future research may explore if the moderators (e.g., trust) change the strength of the effects of the antecedents of BCTA, which will guide us to assess the impacts of the moderators, if any, on the interdependency of the antecedents.

The proposed conceptual framework demonstrates that the researchers have selected and used various attributes in various combinations following their academic studies. For instance, some researchers contained technological, organisational, and social factors but had a different choice of tool for analysis. To this end, the classification of the variables may differ based on the nature of SC

6.2 Key lessons learnt

Although BCT has been discussed for almost a decade, a significant interest in its adoption has been observed in the literature between 2018 and 2020. Based on a literature review of 194 articles and applied theories and models, this study presents a comprehensive conceptual framework consisting of the antecedents and consequences of BCTA in SC. Accordingly, it identifies several key lessons. First, in near future, BCT will play a critical role in the value creation activities along global SC. Accordingly, we need to respond well to the 'what' and 'how' questions i.e., *what* are significant factors that drive BCTA in various SCs, and *how* exactly we can derive the most out of it. Accordingly, researchers have identified several antecedents and likely impacts of BCTA, see figure 4. Intuitively, the antecedents and consequents may differ with the industry (e.g., food vs. manufacturing SC) and the context (e.g., developing vs. developed economy). Irrespectively, BCT can primarily be used for value-creation activities in SC, focusing on participating organisations' operational, technological, and economic performance. In addition, economic, social, and environmental considerations are also valid for BCTA, although comprehensive empirical evidence than anecdotes are limited.

6.3 Limitations of this research

While this study offers diverse implications, certain limitations remain. *First*, the review of the extant literature may not be exhaustive, yet we believe it was comprehensive. We utilized four major databases and followed a published methodology to conduct our literature review; however, the search was not exhaustive. For instance, some other studies could discuss BCTA without using these keywords in the title and were not included in our analysis. Future research should consider covering other databases and other relevant papers. *Second*, BCTA research is in its early stage. For analysis, we emphasized journal articles to maintain rigour. In addition, only articles written in English were included in this review, whereas BCTA in non-English speaking countries reporting regional experiences will continue to surface. Future research, including papers from books or conference proceedings, including non-English languages, promises to advance and shape future research, practice, and policy related to BCTA in SC. *Finally*, although we employed a systematic approach to classify the articles, the inclusion of articles into our final selection was based on our subjective judgment. However, the selected articles were reviewed by the co-authors with the right to veto. Future studies should be conducted to corroborate our classifications.

6.4 Future research recommendations

Our literature review suggests four recommendations for future research. Overall, this SLR highlights the lack of empirical research on BCTA in SCs (Batwa and Norrman, 2020, Sheel and Nath, 2020) and suggests future empirical studies. Moreover, among the 211 reviewed articles, the qualitative (140 articles) method was the most-applied method, followed by the quantitative (empirical) (56 articles) and mixed-methods approach (six studies) (see Fig. 3). Thus, there is a need for future empirical research on BCTA in SCM using the mixed method.

Secondly, the integrated framework developed in this study can be validated to explore BC use within different business contexts to understand the importance of BCTA in SC. The framework may determine the factors influencing BC usage and the consequences for emerging SC. The framework further suggests that SC can manipulate the moderating factors to better impact. Mediating factors have also been identified to improve SC's performance. More specifically, there is a need for more studies on the impact of BCTA on performance in complex SCs (Kshetri, 2018). To do this, a consensus on the measurement of SC performance and a better understanding of the effect of BC on SCs are needed (Kshetri, 2018, Manupati et al., 2020). Accordingly, longitudinal studies are required to establish the effect of BC on sustainable SC performance management, considering the various stakeholders involved and locations and institutions that accept and use the technology (Creydt and Fischer, 2019). This

review identified that relatively few studies (i.e., nine) examined the roles of (three) mediating and (seven) moderating variables in investigating BCTA and the use of SCT in SCM. Further investigation of mediating and moderating variables is needed.

Thirdly, BCT may ensure environmental, social, and economic sustainability in SC (Di Vaio and Varriale, 2020), especially a green SC (Kouhizadeh and Sarkis 2018), even though Di Vaio and Varriale (2020) challenged. However, according to Lim et al. (2021) lack of studies reported on BCT and sustainability. Specifically, most studies are conceptual (Nayak and Dhaigude, 2019). Moreover, few papers provide a partial perspective; for instance, Rejeb and Rejeb (2020) found that the majority of papers focused on the economic and environmental implications of BC on SCs, ignoring social dimension. Therefore, a holistic approach combining all aspects of sustainability derived from BCTA needs to be further explored.

Fourthly, most studies on BCT use present the experience of developed countries. However, it is understood that the technological infrastructure, organisational variables, and facilitating conditions make it challenging for a country like India to adopt technology in their SC activities. Furthermore, cultural issues and environmental and political factors play vital roles in adopting new technology in SCs (Yadav et al., 2020). Therefore, more research on BCTA in SCs from developing countries' contexts is essential; comparative studies vis-à-vis BCTA in developed and developing countries' SC would better guide us in generating recipes for successful implementation of BCT in SCs.

For Supplementary Document-please, see the below link:

https://drive.google.com/file/d/1fBD4aVGqLKmxOEenEh8a9MyHrzwKFHx1/view?usp=share_link

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Supplementary document**Appendix 1: Bibliometric information**

Title	Authors	Journal	Methodology	Industry /Firm	Theories used	Country of Study
1 Blockchain's roles in meeting key supply chain management objectives.	Kshetri (2018)	International Journal of Information Management	Qualitative method (Case study analysis)	Food manufacturing	No	N/A
A Blockchain Application: The Dairy Supply Chain.	Kasten (2019)	Journal of Supply Chain Management Systems	Qualitative method (Design science research)	Dairy industry	No	USA
A blockchain-based approach for a multi-echelon sustainable supply chain.	Manupati et al. (2020)	International Journal of Production Research	Quantitative method (Case study analysis: used MATLAB software)	Multi-echelon SC industries	No	India

A blockchain implementation prototype for the electronic open source traceability of wood along the whole supply chain.	Figorilli et al. (2018)	Sensors (Switzerland)	Qualitative method (conceptual paper)	Forest wood manufacturing	No	Italy
A blockchain-based framework of cross-border e-commerce supply chain.	Liu and Li (2020)	International Journal of Information Management	Qualitative method (Case study analysis)	Cross border distribution industries	No	China
A conceptual model of sustainable supply chain management in small and medium enterprises using blockchain technology.	Nayak and Dhaigude (2019)	Cogent Economics & Finance	Qualitative method (conceptual paper)	SMEs-Manufacturing industry	No	India
A Content-Analysis Based Literature Review in Blockchain Adoption within Food Supply Chain.	Duan et al. (2020)	International Journal of Environmental Research and Public Health	Qualitative method (Literature review: content analysis)	Food SC industries	No	N/A

1 2 3 4 5 6 7 8 9 10 11	A Decentralized Application for Logistics: Using Blockchain in Real-World Applications.	Christodoulou et al. (2018)	The Cyprus Review	Qualitative method (Case study analysis)	Logistics industry	No	Cyprus
12 13 14 15 16 17	A distributed ledger for supply chain physical distribution visibility.	Wu et al. (2017)	Information (Switzerland)	Qualitative method (Case study analysis)	Food and pharmaceutical industries	No	N/A
18 19 20 21 22 23 24 25 26	A study on the transparent price tracing system in supply chain management based on blockchain.	Yoo and Won (2018)	Sustainability (Switzerland)	Qualitative method (conceptual paper)	Various SC industries	No	Korea
27 28 29 30 31 32 33 34 35 36	A supply chain transparency and sustainability technology appraisal model for blockchain technology.	Bai and Sarkis (2020)	International Journal of Production Research	Quantitative method (Group decision method: Hesitant fuzzy set)	Not specified	Regret Theory (RT)	China

<p>1 2 3 4 5 6 7 8 9 10 11 12 13</p> <p>A systematic literature review of blockchain-based applications: current status, classification and open issues.</p>	<p>Casino et al. (2019)</p>	<p>Telematics and Informatics</p>	<p>Qualitative method (Literature review: thematic content analysis)</p>	<p>Financial, Education, Healthcare industry</p>	<p>No</p>	<p>N/A</p>
<p>14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31</p> <p>A Systematic Review of Blockchain Literature in Logistics and Supply Chain Management: Identifying Research Questions and Future Directions.</p>	<p>Kummer et al. (2020)</p>	<p>Future Internet</p>	<p>Qualitative method (Literature review)</p>	<p>Not specified</p>	<p>Agency Theory (AT), Information Theory (IT), Institutional Theory (IT); Network Theory (NT), Resource-Based View (RBV), And Transaction Cost Analysis (TCA)</p>	<p>N/A</p>

Achieving sustainable performance in a data-driven agriculture supply chain: A review for research and applications.	Kamble et al. (2020a)	International Journal of Production Economics	Qualitative method (Literature review: content analysis)	Agri-food Industry	No	N/A
Analysing the impact of blockchain-technology for operations and supply chain management: An explanatory model drawn from multiple case studies.	Tönnissen and Teuteberg (2020)	International Journal of Information Management	Qualitative method (Case study analysis)	Ocean Freight, Agri digital, Agri-food, Animal product, Cognizant Retail, Open Bazaar, Origin Tracking, Cargo Chain, LifeCrypter, and Everledger	No	N/A
Analysis of coordination mechanism of supply chain management information system from the perspective of block chain.	Yuan et al. (2019)	Information Systems and eBusiness Management	Quantitative method (Simulation experiments: used MATLAB)	Not specified	No	China

1 2 3 4 5 6 7 8 9 10 11	Applications of blockchain technology to logistics management in integrated casinos and entertainment.	Liao and Wang (2018)	Informatics	Qualitative method (Case study analysis)	Gaming and Entertainment industry	No	USA
12 13 14 15 16 17 18 19 20 21 22	Applying blockchain technology to improve agri-food traceability: A review of development methods, benefits and challenges.	Feng et al. (2020)	Journal of Cleaner Production	Qualitative method (Literature review)	Agri-food industry	No	China
23 24 25 26 27 28 29	Are Distributed Ledger Technologies the panacea for food traceability?	Pearson et al. (2019)	Global Food Security	Qualitative method (Conceptual paper)	Food industry	No	UK
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	At the Nexus of Blockchain technology, the circular economy, and product deletion.	Kouhizadeh et al. (2019)	Applied Sciences	Qualitative method (Conceptual paper)	Reverse logistics industries	No	N/A

1 2 3 4 5 6 7 8 9 10 11	Big Production Enterprise Supply Chain Endogenous Risk Management Based on Blockchain.	Fu and Zhu (2019)	IEEE Access	Qualitative method (Case study analysis)		No	N/A
12 13 14 15 16 17 18 19	Bitcoin, blockchain and fintech: a systematic review and case studies in the supply chain.	Fosso et al. (2020)	Production Planning & Control	Mixed method (Literature review and case study)	Financial services and several SC industries	No	N/A
20 21 22 23 24 25 26 27 28 29 30 31	Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA.	Queiroz and Wamba (2019)	International Journal of Information Management,	Quantitative method (Survey data analysed using Partial least squares structural equation modelling (PLS-SEM)): an empirical investigation	Agriculture, forestry, fishing, Arts, Entertainment, Construction, Education, Electricity, and Manufacturing industries	Network Theory (NT)	India and USA
32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain and more-Algorithm driven food traceability.	Creydt and Fischer (2019)	Food Control	Qualitative (Conceptual paper)	Food industry	No	Germany

1 2 3 4 5 6 7 8 9 10 11	Blockchain and supply chain management integration: A systematic review of the literature.	Queiroz et al. (2019)	Supply Chain Management: An International Journal	Qualitative method (Literature review: content analysis)	Electric power, Intelligent transportation systems, Healthcare industries	No	N/A
12 13 14 15 16 17 18	Blockchain and supply chain relations: A transaction cost theory perspective.	Schmidt and Wagner (2019)	Journal of Purchasing and Supply Management	Qualitative method (Explanatory studies)	Healthcare industry	Transaction Cost Theory (TCT)	N/A
19 20 21 22 23 24 25 26	Blockchain applications in supply chains, transport and logistics: a systematic review of the literature.	Pournader et al. (2019)	International Journal of Production Research	Qualitative method (Literature review)	Various supply chain industries, including pharmaceutical industries	No	N/A
27 28 29 30 31 32	Blockchain critical success factors for sustainable supply chain.	Yadav and Singh (2020)	Resources Conservation and Recycling	Qualitative method (Literature review)	Manufacturing, Services, and Healthcare industries	No	India
33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain design for supply chain management.	Chang et al. (2018)	Available at SSRN	Quantitative method	Not specified	No	USA

1 2 3 4 5 6 7 8 9	Blockchain for and in Logistics: What to Adopt and Where to Start.	Dobrovnik et al. (2018)	Logistics	Qualitative method (Conceptual paper)	Logistics industries	No	N/A
10 11 12 13 14 15 16 17 18	Blockchain in global supply chains and cross border trade: a critical synthesis of the state-of-the-art, challenges and opportunities.	Chang et al. (2020)	International Journal of Production Research,	Qualitative method (Literature review)	Global trade industries	No	USA
19 20 21 22 23 24 25 26	Blockchain in Industries: A Survey.	Al-Jaroodi and Mohamed (2019)	IEEE Access	Qualitative method (Survey: surveying different industrial domains	Financial, Healthcare, Manufacturing, Robotic, Agriculture, and food industries	No	USA, Canada, China, Japan
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain in Logistics and Supply Chain: A Lean Approach for Designing Real-World Use Cases.	Perboli et al. (2018)	IEEE Access	Qualitative method (Case study analysis)	Fresh food industry	No	Italy

1 2 3 4 5 6 7 8 9 10 11 12	Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities.	Wamba and Queiroz (2020)	International Journal of Information Management	Qualitative method (Literature review)	Various SC industries	No	Top 20 countries (North American countries, Asian countries, and European countries)
13 14 15 16 17 18 19 20 21 22	Blockchain-oriented dynamic modelling of smart contract design and execution in the supply chain.	Dolgui et al. (2020)	International Journal of Production Research,	Quantitative method (virtual operation: experimental study)	Industry 4.0	Dynamic Control Theory (DCT)	N/A
23 24 25 26 27 28	Blockchain practices, potentials, and perspectives in greening supply chains.	Kouhizadeh and Sarkis (2018)	Sustainability (Switzerland),	Qualitative method (Theoretical paper)	Greening SC	No	USA
29 30 31 32 33 34 35 36	Blockchain ready manufacturing supply chain using distributed ledger	Abeyratne and Monfared (2016)	International Journal of Research in Engineering and Technology	Qualitative method (Literature review)	Manufacturing industry	No	N/A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Blockchain research, practice and policy: Applications, benefits, limitations, emerging research themes and research agenda.	Hughes et al. (2019)	International Journal of Information Management	Qualitative method (Literature review)	Standard Chartered, Mumbai ICICI, HDFC, Kotak Mahindra, Axis bank and Small and Medium Enterprises (SMEs)	No	N/A
16 17 18 19 20 21 22 23 24	Blockchain technology adoption barriers in the Indian agricultural supply chain: an integrated approach.	Yadav et al. (2020)	Resources, Conservation and Recycling	Quantitative method (Modelling: used ISM-DEMATEL-Fuzzy MICMAC)	Agricultural firm /Five Agro organizations	Fuzzy Set Theory (FST)	India
25 26 27 28 29 30 31 32	Blockchain technology and enterprise operational capabilities: An empirical test.	Pan et al. (2020)	International Journal of Information Management,	Quantitative method (Empirical study: ordinary least squares method)	Software service, Computer equipment, Internet, Electrical Equipment	No	China
33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain technology and its relationships to sustainable supply chain management.	Saberi et al. (2019b)	International Journal of Production Research	Qualitative method (Literature review and case analysis)		Information Theory (IT)	N/A

1 2 3 4 5 6 7	Blockchain technology for enhancing supply chain resilience.	Min (2019)	Business Horizons	Qualitative method (conceptual paper)	Not specified	No	N/A
8 9 10 11 12 13 14 15 16	Blockchain technology: implications for operations and supply chain management.	Cole et al. (2019)	Supply Chain Management: An International Journal,	Qualitative method (Literature review: Thematic analysis)	Various supply chain industries including Unilever, Walmart, and Sainsbury's industries	Social Capital Theory (SCT), Transaction Cost Economics (TCE) Theory, Agency Theory (AT)	N/A
17 18 19 20 21 22 23 24 25 26 27	Blockchain technology in agri-food value chain management: A synthesis of applications, challenges and future research directions.	Zhao et al. (2019)	Computers in Industry	Qualitative method (Literature review)	Agri-food Industry	No	N/A
28 29 30 31 32 33 34 35 36 37	Blockchain technology in supply chain management for sustainable performance: Evidence from the airport industry.	Di Vaio and Varriale (2020)	International Journal of Information Management,	Qualitative method (Literature review and case study analysis)	Airport industries	No	Italy

1 2 3 4 5 6 7 8 9 10 11	Blockchain technology, supply chain information, and strategic product deletion management.	Zhu and Kouhizadeh (2019)	IEEE Engineering Management Review	Qualitative method (Theoretical paper)	Not specified	No	N/A
12 13 14 15 16	Blockchain for Cities - A Systematic Literature Review	Shen and Pena-Mora (2018)	IEEE Access	Qualitative method (Literature review)	Various SC field	No	N/A
17 18 19 20 21	Blockchain's adoption in IoT: The challenges, and a way forward.	Makhdoom et al. (2019)	Journal of Network and Computer Applications	Qualitative method (Literature review)	Software service industry / IoT environment	No	N/A
22 23 24 25 26 27 28	Blockchain-based safety management system for the grain supply chain.	Zhang et al. (2020)	IEEE Access	Qualitative method (Case study analysis)	Wheat-processing enterprises in Shandong Province	No	China
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain-Based Soybean Traceability in Agricultural Supply Chain.	Salah et al. (2019)	IEEE Access	Qualitative method (Theoretical paper)	Agricultural industry	No	N/A

1 2 3 4 5 6 7 8 9 10 11 12 13	Blockchain-Based Traceability and Visibility for Agricultural Products: A Decentralized Way of Ensuring Food Safety in India.	Prashar et al. (2020)	Sustainability	Quantitative method (Case study analysis)	Agricultural industry	No	India
14 15 16 17 18 19	Blockchain-driven customer order management.	Martinez et al. (2019)	International Journal of Operations & Production Management	Quantitative method (Case study analysis)	Food industries/ Walmart and Food IBM "Food Trust"	Information Processing Theory (IPT), Resource-Based View (RBV) Theory	UK
20 21 22 23 24 25 26 27 28 29 30	Blockchain-enabled logistics finance execution platform for capital-constrained E-commerce retail.	Li et al. (2020)	Robotics and Computer-Integrated Manufacturing	Qualitative method (Case study: object-oriented methodology (OOM))	Small and medium enterprises (SMEs)	No	China
31 32 33 34 35 36	Blockchain-enabled supply chain: An experimental study.	Longo et al. (2019)	Computers & Industrial Engineering	Quantitative method (Experimental study)	Retail industry	No	N/A

Blockchains and the supply chain: Findings from a broad study of practitioners.	Saberi et al. (2019a)	IEEE Engineering Management Review	Quantitative method (Survey)	Association of supply chain management, formerly APICS	No	USA
Blockchains for supply chain management: Architectural elements and challenges towards a global scale deployment.	Litke et al. (2019)	Logistics	Qualitative method (Literature review)	Supply chain and logistics industry	No	N/A
Blockchains in operations and supply chains: A model and reference implementation	Helo and Hao (2019)	Computers and Industrial Engineering,	Qualitative method (Literature review and bibliometrics analysis)	Indian service industry, food distribution industries, SMEs, among other supply chain industries	No	N/A
Blockchain-technology-supported platforms for diamond authentication and certification in luxury supply chains.	Choi (2019)	Transportation Research Part E	Quantitative method (Case study analysis)	Dimond supply chain industry	No	N/A

1 2 3 4 5 6 7 8 9 10	Boundary conditions for traceability in food supply chains using blockchain technology.	Behnke and Janssen (2019)	International Journal of Information Management	Qualitative method (Case study analysis: empirical investigation)	Dairy food processes industry	No	Netherland
11 12 13 14 15 16 17 18 19	Building trust and equity in marine conservation and fisheries supply chain management with blockchain.	Howson (2020)	Marine Policy	Qualitative method (conceptual paper)	Marine conservation and fisheries industry	No	N/A
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	Combining Blockchain Technology and the Physical Internet to Achieve Triple Bottom Line Sustainability: A Comprehensive Research Agenda for Modern Logistics and Supply Chain Management.	Treiblmaier (2019)	Logistics	Qualitative method (conceptual paper)	Logistics and SCM industry	Principal-Agent Theory (PAT), Transaction Cost Analysis (TCA), Resource-Based View (RBV), Network Theory (NT)	N/A

1 2 3 4 5 6 7 8 9 10	Distributed ledger technology in supply chains: A transaction cost perspective.	Roeck et al. (2020)	International Journal of Production Research	Qualitative method (abductive multiple case study: Empirical data analysis)	Diamond industry, Food industry, Pharma industry	Transaction Cost Economics (TCE)	N/A
11 12 13 14 15 16 17 18 19	DL-Tags: DLT and Smart Tags for Decentralized, Privacy-Preserving, and Verifiable Supply Chain Management.	Benčić et al. (2019)	IEEE access,	Quantitative method (Conceptual paper)	Wine industry	No	N/A
20 21 22 23 24 25 26 27 28 29 30	Dynamics between blockchain adoption determinants and supply chain performance: An empirical investigation.	Wamba et al. (2020)	International Journal of Production Economics	Quantitative method (Survey: empirical investigation)	Manufacturing, Transportation, and Construction industry	No	India and USA

Examples from Blockchain Implementations in Logistics and Supply Chain Management: Exploring the Mindful Use of a New Technology.	Verhoeven et al. (2018)	Logistics	Qualitative method (Case study: analysed secondary data)	Ocean Transport, Product recall in food supply chains, and International Transport industry	Grounded Theory (GT)	China, USA and Finland
Exploring blockchain implementation in the supply chain.	Remko van (2019)	International Journal of Operations & Production Management	Mixed method of quantitative and qualitative (using a focus group and a survey_ empirical investigation)	Logistics services, Retail and Food and beverage products industry	No	North America, Europe and USA
Fit-for-purpose?' - Challenges and opportunities for applications of blockchain technology in the future of healthcare.	Mackey et al. (2019)	BMC Medicine	Qualitative method (conceptual paper)	Healthcare industry	No	N/A
Food Safety Traceability System Based on Blockchain and EPCIS.	Lin et al. (2019)	IEEE Access	Qualitative method (conceptual paper)	Food SC industry	No	N/A

Food traceability on blockchain: Walmart's pork and mango pilots with IBM.	Kamath (2018)	The Journal of the British Blockchain Association	Qualitative method (Case study:)	Walmart's food SC	No	USA
How blockchain improves the supply chain: case study alimentary supply chain.	Casado-Vara et al. (2018)	Procedia computer science,	Qualitative method (Case study analysis)	Food tracking industry	No	Spain
How the blockchain enables and constrains supply chain performance.	Kim Sundtoft and Kinra (2019)	International Journal of Physical Distribution & Logistics Management	Qualitative method (Literature review)	Not specified	Organisational Theory (OT)	N/A
IGR token-raw material and ingredient certification of recipe based foods using smart contracts.	Dos Santos et al. (2019)	Informatics	Qualitative method (Literature review)	Not specified	No	N/A

Improving opportunities in healthcare supply chain processes via the internet of things and blockchain technology	Jayaraman et al. (2019)	International Journal of Healthcare Information Systems and Informatics	Qualitative method (conceptual paper)	Healthcare industry	No	N/A
Information disclosure structure in supply chains with rental service platforms in the blockchain technology era.	Choi et al. (2020a)	International Journal of Production Economics	Quantitative method (Case study:	Rental service industry	No	China
Integrated innovative product design and supply chain tactical planning within a blockchain platform.	Rahmanzadeh et al. (2020)	International Journal of Production Research	Quantitative method (Case study: used mixed integer programming model i	Home appliance manufacturer industry	Fuzzy Set Theory (FST)	Iran
International policy coordination for blockchain supply chains.	Allen et al. (2019)	Asia and the Pacific Policy Studies	Qualitative method (conceptual paper)	Not specified	No	Asia-Pacific region

1 2 3 4 5 6 7 8 9 10	It's real, trust me! Establishing supply chain provenance using blockchain.	Montecchi et al. (2019)	Business Horizons	Qualitative method (Conceptual paper)	Not specified	No	UK
11 12 13 14 15 16 17	Leveraging the Internet of Things and blockchain technology in Supply Chain Management.	Rejeb et al. (2019)	Future Internet,	Qualitative method (Literature review)	Not specified	No	N/A
18 19 20 21 22 23 24	Making sense of blockchain technology: How will it transform supply chains?	Wang et al. (2019b)	International Journal of Production Economics	Qualitative method (Empirical study)	Supply chain industry	Sensemaking Theory (ST)	UK
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Mapping the potentials of blockchain in improving supply chain performance.	Mahyuni et al. (2020)	Cogent Business and Management	Qualitative method (Literature review)	Supply chain industry	No	N/A

Modeling the blockchain enabled traceability in agriculture supply chain.	Kamble et al. (2020b)	International Journal of Information Management	Quantitative Method (Interpretive Structural Modelling (ISM)-Decision-Making Trial and Evaluation Laboratory DEMATEL)	Agri-Food industry	No	India
Modernizing the supply chain of airbus by integrating RFID and blockchain processes.	Santonino III et al. (2018)	International Journal of Aviation, Aeronautics, and Aerospace	Qualitative method (Literature review)	Airbus industry	No	US, Hong Kong,
Potential of blockchain technology in supply chain management: a literature review	Gurtu and Johny (2019)	International Journal of Physical Distribution & Logistics Management	Quantitative Method (Literature review)	Not specified	No	N/A
Security services using blockchains: A state of the art survey.	Salman et al. (2019)	IEEE Communications Surveys and Tutorials	Qualitative method (Literature review: Survey)	Security services industry	No	N/A

Supply chain re-engineering using blockchain technology: A case of smart contract-based tracking process.	Chang et al. (2019)	Technological Forecasting and Social Change	Qualitative method (Conceptual paper)	Logistics tracking industry	No	N/A
The acceptance of blockchain technology in meat traceability and transparency.	Sander et al. (2018)	British Food Journal	Quantitative Method (Empirical study: semi-structured interview data analysed using SPSS and Smart PLS)	Meat retail Industry	No	Germany, Netherlands
The Economic Advantages Of Blockchain Technology In E-Procurement.	Matyskevic and Kremer-Matyskevic (2020)	Regional Formation and Development Studies	Quantitative Method (Literature review)	E-procurement industry	No	EU countries, USA, and UK
The impact of the blockchain on the supply chain: a theory-based research framework and a call for action.	Treiblmaier (2018)	Supply Chain Management	Qualitative method (conceptual paper)	Logistics, Software, and Shipping industries	Principal Agent Theory (PAT), Transaction Cost Analysis (TCA), Resource-Based View (RBV), Network Theory (NT)	N/A

The mean-variance approach for global supply chain risk analysis with air logistics in the blockchain technology era.	Choi et al. (2019)	Transportation Research Part E	Quantitative Method (Literature review)	Air logistics industry	Mean Variance (MV) Theory	N/A
The power of a blockchain-based supply chain.	Azzi et al. (2019)	Computers & industrial engineering,	Qualitative method (Case study analysis)	Pharmaceutical drugs manufacturing industries	No	N/A
The rise of blockchain technology in agriculture and food supply chains.	Kamilaris et al. (2019)	Trends in Food Science & Technology	Qualitative method (conceptual paper)	Food industry	No	N/A
The Supply Chain Has No Clothes: Technology Adoption of Blockchain for Supply Chain Transparency.	Francisco and Swanson (2018)	Logistics	Qualitative method (Conceptual paper)	Various SC industries including Dimond industry, Coffee beans firm	Behavioural Theory, Unified Theory Of Acceptance And Use Of Technology (UTAUT)	N/A

Time to seize the digital evolution: Adoption of blockchain in operations and supply chain management among Malaysian SMEs.	Wong et al. (2020)	International Journal of Information Management	Qualitative method (Survey: used PLS-SEM)	Small and medium size industries (SMEs)	Technology-Organisation Environment (TOE) Theory	Malaysia
Toward an ontology-driven blockchain design for supply-chain provenance.	Kim and Laskowski (2018)	Intelligent Systems in Accounting, Finance and Management	Qualitative method (Case study)	Pharmaceutical, and luxury goods industry	No	N/A
Towards an Autonomous Industry 4.0 Warehouse: A UAV and Blockchain-Based System for Inventory and Traceability Applications in Big Data-Driven Supply Chain Management.	Fernández-Caramés et al. (2019)	Sensors (Basel, Switzerland)	Qualitative method (Literature review)	Autonomous Industry 4.0	No	N/A

Traceability for sustainability– literature review and conceptual framework.	Garcia-Torres et al. (2019)	Supply Chain Management: An International Journal.	Qualitative method (Literature review)	Apparel industry	No	N/A
Understanding blockchain technology for future supply chains: a systematic literature review and research agenda.	Wang et al. (2019a)	Supply Chain Management: An International Journal	Qualitative method (Literature review)	Pharmaceutical, Agri-food, and Airline industries/ High value product supply chains	No	N/A
Understanding the Blockchain technology adoption in supply chains- Indian context.	Kamble et al. (2019)	International Journal of Production Research	Quantitative method (survey: used structural equation modelling (SEM) tool)	Automobile, FMCG and Logistics industry	Technology Acceptance Model (TAM), Theory Of Planned Behaviour (TPB) And Technology Readiness Index (TRI) Theory	India

Tracing manufacturing processes using blockchain-based token compositions.	Westerkamp et al. (2019)	Digital Communications and Networks	Qualitative method (Conceptual paper)	Wood processing industry	No	N/A
When blockchain meets social-media: Will the result benefit social media analytics for supply chain operations management?	Choi et al. (2020b)	Transportation Research Part E: Logistics and Transportation Review	Qualitative method (Literature review)	Social media	No	N/A
When Blockchain Meets Supply Chain: A Systematic Literature Review on Current Development and Potential Applications	Chang and Chen (2020)	IEEE. Access	Qualitative method (Literature review)	Agricultural, Agri-food, Manufacturing, and Medical, industry	Principal Agent Theory (PAT)	N/A
A framework for exploring blockchain technology in supply chain management	Batwa and Norrman (2020)	Operations and Supply Chain Management	Qualitative Method (Literature review)	Financial, Pharmaceutical and Automotive Industry	No	N/A

1 2 3 4 5 6 7 8 9	A framework for food supply chain digitalization: lessons from Thailand	Kittipanya-ngam and Tan (2020)	Production Planning and Control	Qualitative Method (Case study analysis)	Food manufacturing	No	Thailand
10 11 12 13 14 15 16 17 18 19 20 21	A sustainable production capability evaluation mechanism based on blockchain, LSTM, analytic hierarchy process for supply chain network	Li et al. (2020)	International Journal of Production Research	Quantitative method (AHP and RNN-multicriteria decision-making models)	Gas manufacturing / consumption	Knowledge Pyramid Theory	N/A
22 23 24 25 26 27 28 29	Adoption of blockchain in supply chain: an analysis of influencing factors	Ghode et al. (2020)	Journal of Enterprise Information Management	Quantitative method (GRA Model)	Automotive, aerospace and manufacturing	No	N/A
30 31 32 33 34 35 36 37 38 39 40	An Exploration of the Role of Blockchain in the Sustainability and Effectiveness of the Pharmaceutical Supply Chain	Alharthi et al. (2020)	Journal of Supply Chain and Customer Relationship Management	Qualitative Method (Case study analysis)	Pharmaceutical industry	No	Kingdom of Saudi Arabia (KSA)

An integrated fuzzy-ANP and fuzzy-ISM approach using blockchain for sustainable supply chain	Yadav and Singh (2020)	Journal of Enterprise Information Management	Quantitative method (AHP and ANP-multicriteria decision-making model)	Technology Industry (Ever ledger, IBM), Shipping Industry (Maersk)	No	N/A
An intelligent blockchain-based system for safe vaccine supply and supervision	Yong et al. (2020)	International Journal of Information Management	Quantitative method (CNN, LSTM-based deep learning Models)	Vaccine manufacturing industry	No	N/A
Antecedents of blockchain technology adoption intentions in the supply chain	Sheel and Nath (2020)	International Journal of Business Innovation and Research	Quantitative method (Survey: empirical study)	Supply chain industries	No	India
Antecedents of blockchain technology application among Malaysian warehouse industry	Wahab et al. (2020)	International Journal of Logistics Systems and Management	Qualitative method (Literature review)	Malaysian warehouse industry	No	Malaysia

1 2 3 4 5 6 7 8 9 10 11 12 13 14	Applications of Blockchain Technology in Sustainable Fashion Supply Chains: Operational Transparency and Environmental Efforts	Guo et al. (2020).	IEEE Transactions on Engineering Management	Quantitative method (Literature review)	Fashion manufacturing industry	No	N/A
15 16 17 18 19	Applying Blockchain for Halal food traceability	Tan et al. (2020)	International Journal of Logistics Research and Applications	Qualitative method (Case study)	Meat Industry	Institutional theory and agency theory	N/A
20 21 22 23 24 25 26 27	Blockchain and maritime supply-chain performance: dynamic capabilities perspective	Lambourdiere and Corbin (2020)	Worldwide Hospitality and Tourism Themes	Qualitative method (Conceptual paper)	Maritime industry	Dynamic Capability Theory (DCT)	N/A
28 29 30 31 32 33	Blockchain and smart contracts in supply chain management: A game theoretic model	De Giovanni (2020)	International Journal of Production Economics	Quantitative method	Retail industry	Game theory	Italy
34 35 36 37 38 39 40	Blockchain and supply chain sustainability	Rejeb and Rejeb (2020)	Logforum	Qualitative method (Literature review)	Not specified	No	N/A

1 2 3 4 5 6 7 8 9 10 11	Blockchain-based ubiquitous manufacturing: a secure and reliable cyber-physical system	Vatankhah Barenji et al. (2020)	International Journal of Production Research	Quantitative method (Byzantine consensus algorithm)	SMEs-Manufacturing industry	No	N/A
12 13 14 15 16 17 18 19	Blockchain: case studies in food supply chain visibility	Rogerson and Parry (2020)	Supply Chain Management: An International Journal	Qualitative method (exploratory case studies, conducted semi-structured interview technique)	Food Manufacturing industry	No	Australia, China, Greek and Fiji
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain for supply chain traceability: Business requirements and critical success factors	Hastig and Sodhi (2020)	Production Operations Management	Qualitative method (Literature review: thematic analysis)	Cobalt mining industry and pharmaceuticals industry	No	China and the Democratic Republic of the Congo

<p>Blockchain technology adoption in the supply chain (UTAUT2 with risk) - Evidence from Indian supply chains</p>	<p>Sheel and Nath (2020b)</p>	<p>International Journal of Applied Management Science</p>	<p>Quantitative method (Survey data analysed using R software)</p>	<p>Automobile, chemical, durable consumer manufacturing, electrical equipment manufacturing, fast-moving consumer goods, downstream petroleum supply chain, and sugar industry</p>	<p>No</p>	<p>India</p>
<p>Blockchain technology for enhancing swift-trust, collaboration and resilience within a humanitarian supply chain setting</p>	<p>Dubey et al. (2020)</p>	<p>International Journal of Production Research</p>	<p>Quantitative method (Survey: used variance analysis)</p>	<p>International non-governmental organisations (NGOs)</p>	<p>Organisational information processing theory (OIPT)</p>	<p>Asia, Europe, Africa, North America and South America</p>
<p>Blockchain technology in supply chain management: insights from machine learning algorithms</p>	<p>Hirata et al. (2020)</p>	<p>Maritime Business Review</p>	<p>Qualitative method (Literature review: text mining data analysed through machine learning algorithms)</p>	<p>Not specified</p>	<p>No</p>	<p>N/A</p>

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	Blockchain technology in supply chain operations: Applications, challenges and research opportunities	Dutta et al. (2020)	Transportation Research Part E: Logistics and Transportation Review	Qualitative method (Literature review)	Shipping, manufacturing, automotive, aviation, finance, technology, energy, healthcare, agriculture and food, e-commerce, and education among others industry	No	N/A
18 19 20 21 22 23 24 25 26 27	Blockchain technology-enabled supply chain systems and supply chain performance: a resource-based view	Nandi et al. (2020)	Supply Chain Management: An International Journal	Qualitative method (Case Study: content analysis)	Multiple industries	Resource-based view (RBV)	N/A
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain Technology in Logistics and Supply Chain Management - A Bibliometric Literature Review from 2016 to January 2020	Musigmann et al. (2020)	IEEE Transactions on Engineering Management	Qualitative method (Literature review: bibliometric analysis)	Not specified	No	N/A

1 2 3 4 5 6 7 8 9	Blockchain-based agri-food supply chain management: case study in China	Fu et al. (2020)	International Food and Agribusiness Management Review	Qualitative method (Descriptive Case study analysis)	Food Manufacturing industry	No	China
10 11 12 13 14 15	Blockchain-based food supply chain traceability: a case study in the dairy sector	Casino et al. (2020)	International Journal of Production Research	Qualitative method (Case study analysis)	Dairy industry	No	Greece
16 17 18 19 20 21 22 23	Co-creating blockchain adoption: theory, practice and impact on usage behavior	Tran and Nguyen (2020)	Asia Pacific Journal of Marketing and Logistics	Quantitative method (Survey: used PLS data analysis technique)	Grocery retailing, Travel, Finance and banking, E-commerce, Hospitality, Logistics/SC industry	No	Vietnam
24 25 26 27 28 29 30 31 32 33 34	Coordination of Supply Chain under Blockchain System-Based Product Lifecycle Information Sharing Effort	Hayrutdinov et al. (2020)	Journal of Advanced Transportation	Quantitative method (Model: Simulation Analysis-used Nash equilibrium solution)	Retail industry	Game theory	China

Corporate social responsibility (CSR) in fashion supply chains: A multi-methodological study	Chan et al. (2020)	Transportation Research Part E: Logistics and Transportation Review	Mix Method (Qualitative and Quantitative method: case study, semi-structure interviews and analytical analysis)	Fashion industry	Institutional theory, Resource-based theory, and Signalling theory	N/A
Demystifying blockchain: A critical analysis of challenges, applications and opportunities	Upadhyay (2020)	International Journal of Information Management	Qualitative method (Literature review)	Finance, Energy, Security and Privacy, Government, Education, Healthcare, Food supply chain, Service and Manufacturing Industry	No	N/A
Developing a framework for considering blockchain pilots in the supply chain – lessons from early industry adopters	Van Hoek (2020)	Supply Chain Management: An International Journal	Qualitative method (Case study analysis)	Manufacturing, Carrier, and Retails industry	No	Europe and USA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Digital technologies in supply chain management for production and digital economy development	Kartskhiya et al. (2020)	International Journal of Supply Chain Management	Qualitative method (theoretical analysis)	Retail, Financial services, and Oil and gas Manufacturing industry	No	N/A
16 17 18 19 20 21 22 23 24 25 26 27	Distributed ledgers and operations: What operations management researchers should know about blockchain technology	Babich and Hilary (2020)	Manufacturing and Service Operations Management	Qualitative method	Manufacturing and service Industry	No	N/A
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Expert oriented approach for analyzing the blockchain adoption barriers in humanitarian supply chain	Sahebi et al. (2020)	Technology in Society	Quantitative method (Literature review: inductive approaches, Fuzzy Delphi, and Best-Worst method (BWM))	Humanitarian SC industry	No	N/A

Exploring the potentials of blockchain application in construction industry: a systematic review	Kiu et al. (2020)	International Journal of Construction Management	Qualitative method (literature review)	Construction industry	No	N/A
Food supply chain in the era of Industry 4.0: blockchain technology implementation opportunities and impediments from the perspective of people, process, performance, and technology	Kayikci et al. (2020)	Production Planning and Control	Qualitative method (literature review: case study analysis)	Food Manufacturing industry	No	N/A

<p>Industry 4.0 and the supply chain digitalisation: a blockchain diffusion perspective</p>	<p>Wamba and Queiroz (2020)</p>	<p>Production Planning and Control</p>	<p>Quantitative method (Survey method: used PLS-SEM for data analysis)</p>	<p>Financial services industry, Fashion industry</p>	<p>Diffusion of innovations theory, the resource-based view, dynamic capability, the technology adoption model, and the institutional theory</p>	<p>India and the U.S</p>
<p>Industry 4.0: Opportunities and challenges for operations management</p>	<p>Olsen and Tomlin (2020)</p>	<p>Manufacturing and Service Operations Management</p>	<p>Qualitative method (Conceptual)</p>	<p>Goods manufacturing and Agricultural sector</p>	<p>No</p>	<p>N/A</p>
<p>Investigating the link between transaction and computational costs in a blockchain environment</p>	<p>Jabbar and Dani (2020)</p>	<p>International Journal of Production Research</p>	<p>Quantitative method (design science research)</p>	<p>Manufacturing and service industry</p>	<p>No</p>	<p>N/A</p>

Investment decision and coordination of green agri-food supply chain considering information service based on blockchain and big data	Liu et al. (2020)	Journal of Cleaner Production	Quantitative method (Mathematical simulation)	Agri-food Industry	No	China
Is Blockchain a Silver Bullet for Supply Chain Management? Technical Challenges and Research Opportunities	Kumar et al. (2020)	Decision Sciences	Qualitative method (Literature review: case study analysis)	Food industry	No	N/A
Managing the Dynamics of New Technologies in the Global Supply Chain	Reyes et al. (2020)	IEEE Engineering Management Review	Qualitative method (Theoretical analysis)	Global supply chain industry	No	N/A

On the financing benefits of supply chain transparency and blockchain adoption	Chod et al. (2020)	Management Science	Qualitative method (Literature review: Theory development)	Agricultural industry/SMEs	No	Mexico and Ukraine
Perception-based model for analyzing the impact of enterprise blockchain adoption on SCM in the Indian service industry	Karamchandani et al. (2020)	International Journal of Information Management	Quantitative method (Survey method: structural equation modelling (SEM) is used)	Service industry	No	India

Potentials of blockchain technology in supply chain management: Long-term judgments of an international expert panel	Kopyto et al. (2020)	Technological Forecasting and Social Change	Quantitative method (Survey: Interdisciplinary Delphi method)	Various supply chain industries	No	Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, Korea, Netherlands, Singapore, Swiss, Taiwan, UK, and USA
Scalable and secure product serialization for multi-party perishable good supply chains using blockchain	Thakur and Breslin (2020)	Internet of Things (Netherlands)	Qualitative method (Product serialization method)	Food manufacturing and retail industry	No	N/A

Supply chain management maturity: An all-encompassing literature review on models, dimensions and approaches	Cheshmbera h and Beheshtikia (2020)	Logforum	Qualitative method (literature review)	Industry 4.0	No	N/A
Technology assessment of blockchain-based technologies in the food supply chain	Köhler and Pizzol (2020)	Journal of Cleaner Production	Qualitative method (Case study analysis)	Food manufacturing industry	No	Kenya, USA, UK & Ireland / many countries
Technology-enhanced auditing: Improving veracity and timeliness in social and environmental audits of supply chains	Castka et al. (2020)	Journal of Cleaner Production	Qualitative method (Literature review)	Auditing industries (Deloitte, Ernst & Young, PwC, KPMG)	No	N/A
The impact of RFID, IIoT, and Blockchain technologies on supply chain transparency	Zelbst et al. (2020)	Journal of Manufacturing Technology Management	Quantitative method (Survey: used structural equation modelling)	211 various manufacturing Industries	General Living Systems Theory	USA

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	The potential of emergent disruptive technologies for humanitarian supply chains: the integration of blockchain, Artificial Intelligence and 3D printing	Rodríguez-Espíndola et al. (2020)	International Journal of Production Research	Qualitative method (Case study analysis)	Humanitarian logistics/ aids distribution industries	No	Mexico
16 17 18 19 20 21 22 23 24 25 26	The role of blockchain in reducing the impact of barriers to humanitarian supply chain management	Ozdemir et al. (2020)	International Journal of Logistics Management	Quantitative method (Survey: expert opinion used intuitionistic fuzzy decision-making trial and evaluation laboratory (IF-DEMATEL) method)	Aid industries/ Humanitarian organizations	No	Not disclosed
27 28 29 30 31 32 33 34 35 36	The significance of blockchain technology in digital transformation of logistics and transportation	Merkaš et al. (2020)	International Journal of E-Services and Mobile Applications	Qualitative method (Case Study method)	Food manufacturing, logistics industries	No	Colombia, California, Finland,

Unblocking the chain – findings from an executive workshop on blockchain in the supply chain	Van Hoek (2020b)	Supply Chain Management: An International Journal	Qualitative method (Expert opinion from the workshop: exploratory study)	Logistics industries	No	N/A
Unearthing the determinants of Blockchain adoption in supply chain management	Wong et al. (2020)	International Journal of Production Research	Quantitative method (Survey data analysed using SPSS)	Retail, Transportations and Logistics, Consumer Packaged Goods, Building Materials and Construction, Automotive and Assembly, Telecommunication, and others	No	N/A
A scheme for intelligent blockchain-based manufacturing industry supply chain management	Z. Xu et al. (2021)	Computing	Quantitative (System architecture)	Manufacturing Industry	No	N/A

A Systematic Literature Review of Blockchain-Enabled Supply Chain Traceability Implementations	Dasaklis et al. (2022)	Sustainability	Qualitative method (Literature review)	Various Supply Chain industry	No	N/A
A review of challenges and opportunities of blockchain adoption for operational excellence in the UK automotive industry	Upadhyay et al. (2020)	Journal of Global Operations and Strategic Sourcing	Qualitative method (Literature review)	Automotive industry	Diffusion of innovation theory	UK

<p>An Overview of Blockchain in Supply Chain Management: Benefits and Issues</p>	<p>Pardeshi (2021)</p>	<p>IUP Journal of Supply Chain Management</p>	<p>Qualitative method (Literature review)</p>	<p>Not specified</p>	<p>No</p>	<p>N/A</p>
<p>An integrated approach to model the blockchain implementation barriers in humanitarian supply chain.</p>	<p>Patil et al. (2020)</p>	<p>Journal of Global Operations and Strategic Sourcing.</p>	<p>Quantitative method (fuzzy best worst method (FBWM))</p>	<p>Various Supply Chain industry</p>	<p>No</p>	<p>N/A</p>

An integrated fuzzy-ANP and fuzzy-ISM approach using blockchain for sustainable supply chain	Yadav and Singh (2020)	Journal of Enterprise Information Management	Quantitative method (integrated approaches: fuzzy-analytic network process (fuzzy ANP))	Supply Chain Logistics Industry	No	N/A
An Integrated Impact of Blockchain on Supply Chain Applications	Meidute-Kavaliauskiene et al. (2021)	Logistics	Quantitative method (PLS-SEM)	Manufacturing Industry	No	Turkey

<p>Analyzing blockchain adoption barriers in manufacturing supply chains by the neutrosophic analytic hierarchy process</p>	<p>Vafadarnikjoo et al. (2021)</p>	<p>Annals of Operations Research</p>	<p>Quantitative method (Neutrosophic analytic hierarchy process (N-AHP))</p>	<p>Manufacturing Industry</p>	<p>No</p>	<p>N/A</p>
<p>Application of blockchain for supply chain financing: explaining the drivers using SEM.</p>	<p>Kabir and Islam (2021)</p>	<p>Journal of Open Innovation: Technology, Market, and Complexity</p>	<p>Quantitative method (Smart-PLS for SEM)</p>	<p>Service Industry</p>	<p>No</p>	<p>Bangladesh</p>

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Applications of Blockchain Technology in Logistics and Supply Chain Management— Insights from a Systematic Literature Review.	Berneis et al. (2021)	Logistics	Qualitative method (Literature review)	Not Specified	No	N/A
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Applying blockchain in the modern supply chain management: Its implication on open innovation.	Teodorescu and Korchagina (2021)	Journal of Open Innovation: Technology, Market, and Complexity.	Qualitative method (case studies analysis)	Manufacturing industry (Energy, food, and pharmaceutical industries).	No	Germany, Russia

<p>A data-driven, comparative review of the academic literature and news media on blockchain-enabled supply chain management: Trends, gaps, and research needs</p>	<p>Sangari and Mashatan, (2022)</p>	<p>Computers in Industry</p>	<p>Qualitative method (Literature review)</p>	<p>Not specified</p>	<p>No</p>	<p>N/A</p>
<p>A paradigm of blockchain and supply chain performance: a mediated model using structural equation modeling</p>	<p>Rashid et al., (2022)</p>	<p>Kybernetes</p>	<p>Quantitative method (Smart-PLS for SEM)</p>	<p>Manufacturing industry (Chemical/Plastic, FMCG, Textile, Pharmaceutical, Food and Beverages, Automobile, Cement/Steel, and others).</p>	<p>Network Perspective theory (NP theory)</p>	<p>Pakistan</p>

A trust transitivity model of small and medium-sized manufacturing enterprises under blockchain-based supply chain finance	Jiang et al., (2022)	International Journal of Production Economics	Quantitative method	Not specified	intuitionistic fuzzy set theory	N/A
Application of blockchain technology for sustainability development in agricultural supply chain: justification framework	Mukherjee et al., (2022)	Operations Management Research	Quantitative method (Analytic hierarchy process (AHP))	agricultural industry	No	N/A

<p>Assessing Blockchain Adoption in Supply Chain Management, Antecedent of Technology Readiness, Knowledge Sharing and Trading Need</p>	<p>Ruangkanjanes et al., (2022)</p>	<p>Emerging Science Journal</p>	<p>Quantitative method (Smart-PLS for SEM)</p>	<p>Not specified</p>	<p>No</p>	<p>Taiwan and Indonesia</p>
<p>Barriers to adoption of blockchain technology in green supply chain management.</p>	<p>Bag et al. (2020)</p>	<p>Journal of Global Operations and Strategic Sourcing.</p>	<p>Quantitative method (Integrated Fuzzy-Decision-Making Trial and Evaluation Laboratory approach (Fuzzy-DEMATEL)</p>	<p>Manufacturing industry (small and medium enterprises' (SM Es')).</p>	<p>No</p>	<p>India</p>

Blockchain Applications in Supply Chain Transactions.	Durach et al. (2021)	Journal of Business Logistics.	Mixed method of quantitative and qualitative (Delphi study and case study survey)	Manufacturing industry	No	Germany
Blockchain for supply chain performance and logistics management.	Yang et al. (2021)	Applied Stochastic Models in Business & Industry	Quantitative method (Mathematical Modelling)	Manufacturing industry	No	N/A

<p>Blockchain technology for sustainable supply chain management: A systematic literature review and a classification framework.</p>	<p>Paliwal et al. (2020)</p>	<p>Sustainability</p>	<p>Qualitative method (literature review)</p>	<p>No specified</p>	<p>Sensemaking theory</p>	<p>N/A</p>
<p>Blockchain adoption in the fashion sustainable supply chain: Pragmatically addressing barriers.</p>	<p>Caldarelli et al. (2021)</p>	<p>Journal of Organizational Change Management.</p>	<p>Qualitative method (exploratory case study)</p>	<p>Fashion Industry</p>	<p>No</p>	<p>Italy</p>

Blockchain adoption in the supply chain: an appraisal on challenges.	Ghode et al. (2020)	Journal of Manufacturing Technology Management.	Qualitative method (Interpretive structural modeling: literature review and expert's opinions)	Not specified	No	N/A
Blockchain and Self Sovereign Identity to Support Quality in the Food Supply Chain.	Cocco et al. (2021)	Future internet	Qualitative method (literature review)	Food manufacturing	No	N/A

<p>Blockchain as supply chain technology: considering transparency and security.</p>	<p>P. Xu et al. (2021)</p>	<p>International Journal of Physical Distribution & Logistics Management.</p>	<p>Qualitative method (literature review: text mining analysis)</p>	<p>Food industry and the diamond industry</p>	<p>No</p>	<p>N/A</p>
<p>Blockchain connectivity inhibitors: weaknesses affecting supply chain interaction and resilience.</p>	<p>Vivaldini and de Sousa (2021)</p>	<p>Benchmarking : An International Journal</p>	<p>Qualitative method (literature review: Content analysis)</p>	<p>Not Specified</p>	<p>No</p>	<p>N/A</p>

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Blockchain in Indian public distribution system: a conceptual framework to prevent leakage of the supplies and its enablers and disablers.	Mishra and Maheshwari (2021)	Journal of Global Operations and Strategic Sourcing	Qualitative method (literature review)	Agricultural supply chain	No	India
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain Technologies in Logistics and Supply Chain Management: A Bibliometric Review	Rejeb et al. (2021)	Logistics	Qualitative method (bibliometric review)	Not specified	Network analysis	N/A

<p>Blockchain technology development and implementation for global logistics operations: a reference model perspective</p>	<p>Kamran et al. (2021)</p>	<p>Journal of Global Operations and Strategic Sourcing</p>	<p>Qualitative method (Case study analysis)</p>	<p>Global logistics operations</p>	<p>Fit-for-purpose theoretical framework</p>	<p>N/A</p>
<p>Blockchain-Based IoT Devices in Supply Chain Management: A Systematic Literature Review</p>	<p>Hussain et al. (2021)</p>	<p>Sustainability</p>	<p>Qualitative method (Systematic Literature Review)</p>	<p>Multiples</p>	<p>No</p>	<p>N/A</p>

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Blockchain-driven supply chain decentralized operations – information sharing perspective	Xue et al. (2020)	Business Process Management Journal	Qualitative method (Conceptual paper)	Not Specified	Synergetic theory	N/A
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain-integrated technologies for solving supply chain challenges	Gohil and Thakker (2021)	Modern Supply Chain Research and Applications	Qualitative method (Literature review)	Not Specified	No	N/A

<p>Blockchain technologies for interoperation of business processes in smart supply chains</p>	<p>Viriyasitavat et al., (2022)</p>	<p>Journal of Industrial Information Integration</p>	<p>Qualitative method (conceptual paper)</p>	<p>industrial Internet of Things</p>	<p>No</p>	<p>N/A</p>
<p>Blockchain application in modern logistics information sharing: a review and case study analysis</p>	<p>Xu and He (2022)</p>	<p>PRODUCTION PLANNING & CONTROL</p>	<p>Mix Method (qualitative review, case study) and quantitative)</p>	<p>Not Specified</p>	<p>latent Dirichlet allocation topic model</p>	<p>N/A</p>

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Blockchain technology for bridging trust, traceability and transparency in circular supply chain	Centobelli et al., (2022)	Information & Management	in-depth case study	Not Specified	No	N/A
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Blockchain Technology for Supply Chain Management: A Comprehensive Review	Chang et al., (2022)	FinTech	Qualitative method (Literature review)	Not Specified	No	N/A

<p>Blockchain Technology in Operations & Supply Chain Management: A Content Analysis</p>	<p>Lohmer et al., (2022)</p>	<p>Sustainability</p>	<p>Qualitative method (Content analysis)</p>	<p>Not Specified</p>	<p>No</p>	<p>N/A</p>
<p>Blockchain technology in the supply chain: An integrated theoretical perspective of organizational adoption</p>	<p>Agi and Jha (2022)</p>	<p>International Journal of Production Economics</p>	<p>Quantitative method (Decision-Making Trial and Evaluation Laboratory approach (DEMATEL))</p>	<p>Manufacturing, Sales and distribution, Services provider, and Consulting</p>	<p>No</p>	<p>N/A</p>

Blockchain-based Supply Chain Traceability for COVID-19 personal protective equipment	Omar et al., (2022)	Computers & Industrial Engineering	Quantitative method(mathematical)	Healthcare	No	N/A
Blockchain-enabled beer game: a software tool for familiarizing the application of blockchain in supply chain management	Sunny et al., (2022)	Industrial Management & Data Systems	Design-based research	Beer inventory management	No	N/A

Decentralizing Supply Chain Anti-Counterfeiting and Traceability Systems Using Blockchain Technology	Yiu (2021a)	Future Internet	Qualitative method (conceptual paper)	Wine Industry	No	N/A
Designing a blockchain enabled supply chain	Wang et al. (2021)	International Journal of Production Research	longitudinal empirical study	Construction Industry	Kernel theory of business value	UK

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Enhancing Supply Chain Capabilities with Blockchain Deployment: An RBV Perspective	Madhani (2021)	The IUP Journal of Business Strategy	Qualitative method (conceptual paper)	Not Specified	Resource-Based View theory	N/A
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	Food supply chain in the era of Industry 4.0: blockchain technology implementation opportunities and impediments from the perspective of people, process, performance, and technology	Kayikci et al. (2022)	Production Planning & Control	Qualitative method (Literature review and case study)	Food industry	No	N/A

<p>How Useful Is a Distributed Ledger for Tracking and Tracing in Supply Chains? A Systems Thinking Approach</p>	<p>Straubert and Sucky (2021)</p>	<p>Logistics</p>	<p>Exploratory case study</p>	<p>Food, Carrier, Automotive, IIT Consulting, B2C retailer</p>	<p>Systems thinking approach</p>	<p>Europe and worldwide</p>
<p>Intellectual capital, blockchain-driven supply chain and sustainable production: Role of supply chain mapping</p>	<p>Kusi-Sarpong et al. (2022)</p>	<p>Technological Forecasting & Social Change</p>	<p>Quantitative (CB-SEM)</p>	<p>Textile industry</p>	<p>No</p>	<p>Pakistan and Bangladesh</p>

New organizational changes with blockchain: a focus on the supply chain	Varriale et al. (2021)	Journal of Organizational Change Management	Qualitative method (Literature review)	Not specified	No	N/A
On Blockchain Integration with Supply Chain: Overview on Data Transparency	Hellani et al. (2021)	Logistics	Qualitative method (Theoretical paper)	Not specified	No	N/A

<p>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</p> <p>Opportunities and limitations of public blockchain-based supply chain traceability</p>	<p>Bischoff and Seuring (2021)</p>	<p>Modern Supply Chain Research and Applications</p>	<p>Qualitative method (conceptual paper)</p>	<p>Logistics and Food industry</p>	<p>No</p>	<p>N/A</p>
<p>16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46</p> <p>Pricing and coordination of vaccine supply chain based on blockchain technology</p>	<p>Liu et al. (2021)</p>	<p>Internet Research</p>	<p>Quantitative method (Conceptual paper)</p>	<p>Vaccine safety</p>	<p>Game theory</p>	<p>N/A</p>

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Supply Chain Disruption Risk Management with Blockchain: A Dynamic Literature Review	Etemadi et al. (2021)	Information	Qualitative method (systematic literature network analysis and bibliometric network analysis)	Not specified	No	N/A
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	The role of blockchain in reducing the impact of barriers to humanitarian supply chain management	Ozdemir et al. (2020)	The International Journal of Logistics Management	Quantitative Method (Intuitionistic fuzzy multi-criteria decision-making)	Not specified	Intuitionistic fuzzy multi-criteria decision-making	N/A

<p>Timing of blockchain adoption in a supply chain with competing manufacturers</p>	<p>Ji et al. (2022)</p>	<p>International Journal of Production Economics</p>	<p>Quantitative method (Mathematical simulation)</p>	<p>Manufacturing and retail</p>	<p>No</p>	<p>N/A</p>
<p>Traceability Platform Based on Green Blockchain: An Application Case Study in Dairy Supply Chain</p>	<p>Varavallo et al. (2022)</p>	<p>Sustainability</p>	<p>Mix method (document analysis, field research, interview & focus group)</p>	<p>Dairy sector</p>	<p>No</p>	<p>Italy</p>

Toward Blockchain-Enabled Supply Chain Anti-Counterfeiting and Traceability	Yiu (2021b)	Future Internet	Qualitative method (conceptual paper)	Not specified	No	N/A
Influence of blockchain technology in manufacturing supply chain and logistics.	Raja Santhi and Muthuswamy (2022)	Logistics	Qualitative method (literature review)	Manufacturing	No	N/A

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Considering the traceability awareness of consumers: should the supply chain adopt the blockchain technology?	Fan et al. (2020)	Annals of Operations Research	Quantitative method (Conceptual paper)	Manufacturing and Retail	No	N/A
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Appendix 2: Outcomes of BC adoption

	References
Consequences of BC adoption*1	Aung and Chang, (2014); Bai and Sarkis, (2020); Casino et al., (2019); Choi, (2019); Di Vaio and Varriale, (2020); Garcia-Torres et al., (2019a); Hughes et al., (2019); Kamble et al., (2020a); Kamilaris et al., (2019); Kasten, (2019); Kim Sundtoft and Kinra, (2019); Manupati et al., (2020); Saberi et al., (2019b); Treiblmaier, (2019); Alharthi et al., (2020); Castka et al., (2020); Guo et al., (2020); Rejeb and Rejeb, (2020); Yadav and Singh, (2020b); Li et al., (2020b); Nayak and Dhaigude, (2019); Cocco et al., (2021); Hellani et al., (2021); Meidute-Kavaliauskiene et al., (2021); Raja Santhi and Muthuswamy, (2022); Rejeb et al., (2021); Straubert and Sucky, (2021); Viriyasitavat et al., (2022); Varavallo et al., (2022); Kayikci et al., (2022); Omar et al., (2022); Centobelli et al., (2022); Sagari and Mashatan (2022); Kusi-Sarpong et al. (2022);
Consequences of BC adoption *2	Azzi et al., (2019); Casado-Vara et al., (2018); Chang et al., (2018); Kamath (2018); Kouhizadeh et al., (2019); Kshetri (2018); Kamble et al., (2020a); Longo et al., (2019); Nayak and Dhaigude, (2019); Saberi et al., (2019a); Martinez et al., (2019); Min (2019); Mahyuni et al., (2020) Wamba and Queiroz, (2020a); Batwa and Norrman, (2020); Kittipanyangam and Tan, (2020); Dutta et al., (2020); Fu et al., (2020); Kartskhiya et al., (2020); Karamchandani et al., (2020); Merkaš et al., (2020); Van Hoek, (2020); Wong et al., (2020b); Hastig and Sodhi (2020); Caldarella et al., (2021); Durach et al., (2021); Kabir and Islam (2021); Madhani (2021); Pardeshi (2021); Rodrigues et al., (2021); Swarup and Kushwaha (2021) Teodorescu and Korchagina (2021); Wang et al., (2021); Yiu (2021); Rashid et al., (2022);

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	Mukherjee et al., (2022); Ruangkanjanases et al., (2022); Ji et al., (2022); Kusi-Sarpong et al., (2022);
Sustainability outcomes *1	Bai and Sarkis (2020); Garcia-Torres et al., (2019a); Kamble et al., (2020a); Kouhizadeh and Sarkis (2018); Manupati et al., (2020); Nayak and Dhaigude (2019); Saberi et al., (2019b); Treiblmaier (2019); Yadav and Singh, (2020a); Alharthi et al., (2020); Castka et al., (2020); Guo et al., (2020); Li et al., (2020b);, Rejeb and Rejeb (2020); Yadav and Singh (2020b); Hughes et al., (2019), Di Vaio and Varriale (2020); Yadav and Singh (2020); Bag et al., (2020); Caldarelli et al., (2021); Etemadi et al., (2021);
Moderators and mediators *1	Francisco and Swanson, (2018); Kim Sundtoft and Kinra, (2019); Wamba et al., (2020); Tran and Nguyen, (2020); Wong et al., (2020b); Rashid et al., (2022);