Enhancing supply chain flows through blockchain

Peng, Ying; Chen, Xu; Wang, Xiaojun

DOI:
10.1080/00207543.2022.2157064

Enhancing Supply Chain Flows Through Blockchain: A Comprehensive Literature Review

Ying Peng[a], Xu Chen[a*], Xiaojun Wang[b]

[a] *School of Management and Economics, University of Electronic Science and Technology of China, Chengdu, 611731, China. E-mail: pengyeong@163.com (Ying Peng); xchenxchen@263.net (Xu Chen)*

[b] *School of Management, University of Bristol, Bristol, BS8 1TZ, U.K. E-mail: xiaojun.wang@bristol.ac.uk*

Abstract: Applications of blockchain in supply chain management (SCM) have received extensive attention among academics and industrial practitioners. Most current blockchain-related review papers focus on the values, methodologies, barriers, trends, and challenges of blockchain applications in the supply chain (SC) context. Despite some papers discussing blockchain's role in SCs from a specific perspective, the existing review papers mainly concentrate on blockchain's influence on one of the three critical SC flows. Hence, this study comprehensively reviews 251 academic papers to capture the precise impacts of blockchain on the material, information, and money flows in SCM. Following the above analyses, a conceptual framework is put forward to accentuate blockchain's influence on SCM. By unveiling a comprehensive research landscape, this study offers valuable viewpoints and vital information for scholars and practitioners to better identify research frontiers and themes of blockchain applications in SCM.

Keywords: supply chain management; blockchain; industrial intelligence, systematic review; bibliometric analysis; thematic analysis

* Corresponding author: Xu Chen, Tel: +86 28 83206622

1. Introduction

Blockchain has been an effective digital innovation to solve operational issues (Bai and Sarkis 2020). Its initial application, a peer-to-peer electronic cash system known as Bitcoin, emerges in 2008 (Dubey et al. 2022). The four primary attributes of blockchain are decentralization, openness, persistency, and anonymity (Di Vaio and Varriale 2020; Kouhizadeh and Sarkis 2018). Blockchain can reshape the business models of SCs due to its distinct attributes (Frizzo-Barker et al. 2020; Wang et al. 2019), which can achieve end-to-end traceability (Li, Lee, and Gharehgozli 2021; Omar et al. 2022a) and identify responsible parties (Niu, Shen, and Xie 2021). Blockchain allows peer-to-peer financial transactions, suggesting that members can transact without intermediaries' support and save on transaction costs (Martinez et al. 2019). Meanwhile, blockchain can improve business performance by affecting operational decisions (Nayal et al. 2021; Li et al. 2022).

In recent years, blockchain have attracted increasing attention from practitioners and scholars. For instance, the global shipping company Maersk partnered with IBM to track its shipping containers using blockchain cloud services developed by IBM, which can accelerate and secure customs clearance (Schmidt and Wagner 2019). To address China's food safety issues, IBM and Walmart created a blockchain-enabled alliance for food safety with JD.com (Liu et al. 2021b; Yang 2019).

Various scholars have reviewed the SCM literature regarding blockchain, and a summary of this research is presented in Table 1. Although previous studies have analyzed the values, barriers, trends, and challenges of blockchain applications in SCM and provided valuable insights, no study to date has analyzed the functions of blockchain in SCM from the view of enhancing the logistics, information, and financial flows. The existing literature mainly emphasizes blockchain's role in one of these three critical flows and focuses either generally or on a specific industry. SCM is represents the integration and coordination of logistics, information, and capital flows with the aim of efficiently and economically planning, controlling, and executing these critical flows of materials from production to distribution (Wong et al. 2020a; Chen, Wang, and Chan 2017). Therefore, to fulfill the goal of SCM, it calls for transparent information and effective transaction apart from getting the product in the right condition on schedule. To comprehend blockchain's role in managing SCs, it is essential to have detailed scrutiny from the viewpoint of three critical flows systematically and comprehensively with in-depth analysis including the specific impacts on each flow. Through bibliometric and thematic analyses of the relevant literature, this study envisages an extensive research landscape from the perspective of enhancing logistics, information, and financial flows and thereby suggesting avenues for future research.

The remainder of this paper is organized as follows. First, the research methodology is introduced in Section 2. Next, Section 3 outlines the results of descriptive and bibliometric analyses, then Section 4 paints the literature landscape around blockchain's influence on three critical flows by conducting thematic analyses and proposing future research directions. Section 5 discusses theoretical contributions, implications for policymakers and practitioners, and future research agenda. Section 6 concludes this study.

Table 1. Overview and syntheses on SCM with regard to blockchain

Article	Systematic Review	Bibliometric Analysis	Focus	Industry	Key Findings
Cole, Stevenson, and Aitken (2019)	X		Influence on operations and SCM	General industry	Enhancing product safety, security, and quality; advancing inventory management; improving new product design; and lowering transaction costs
Saberi et al. (2019)	X		Application/implementation barriers	General industry	Intra- and inter-organizational, technology-related, and external economic entities
Wang, Han, and Beynon-Davies (2019b)	X		Influence on SCM	General industry	Visibility, traceability, digitalization, disintermediation, information-sharing, and security
Zhao et al. (2019)	X	X	Applications of blockchain	Agricultural industry	Traceable data, information security, manufacturing industry, and sustainability of water management
Chang, Iakovou, and Shi (2020)	X		Advantages and challenges of blockchain applications	Cross-border industry	Advantages: traceability, dispute resolution, security, compliance, and trust Challenges: technical challenges, interoperability, standardization, trust issues, and legal and regulatory challenges
Dutta et al. (2020)	X		Value of blockchain in various industries	General industry	Financial services, healthcare, agriculture, and other sectors due to transparency, authenticity, and disintermediation
Feng et al. (2020)	X		The value and benefits of blockchain	Agricultural industry	Information security, traceability, trust improvement, reducing economic loss, transparency, and sustainability
Hastig and Sodhi (2020)	X		Requirements and successful elements for SC traceability systems based on blockchain	General industry	Requirements: curb illegal activities, enhance operational efficiency, and detect market trends Successful elements: company ability, collaboration levels, technical maturity, etc.
Pournader et al. (2020)	X	X	Themes of blockchain applications	Transportation industry	Technology, trust, trade, and traceability or transparency
Lim et al. (2021)	X		Research themes, methodologies, and industries of blockchain applications in SCM	General industry	Themes: impact, functions, and configurations of blockchain Methodologies: conceptual, empirical, modeling, and technical categories Applied industries: agriculture, manufacturing, trading, and transportation
Niknejad et al. (2021)		X	Application trends and themes	Food/agricultural industry	Traceability system, technical issues of blockchain, and research evolution and benefits
Tandon et al. (2021)		X	Application status and themes	General industry	Strategy and regulatory matters in deployment, enablement and influence, multi-sector application, and low efficiencies
Zhu, Bai, and Sarkis (2022)	X		Theories used in explaining blockchain's application in SCM	General industry	Use of the antecedents, decisions, and outcomes (ADO) framework to investigate 10 popular theories.
This paper	X	X	Influence of blockchain on three flows in SCM	General industry	Product provenance identification, inventory optimization, logistics status monitoring, logistics process optimization, information-sharing, information security, information transparency, transaction process tracking, and transaction process simplification

2. Methodology

This study utilizes a systematic review to examine the evolution and potential avenues for research on blockchain-enabled SCM innovations and improvements, which can eliminate biases and synthesize holistic and comprehensive knowledge of the literature (Queiroz, Telles, and Bonilla 2020). The systematic review was processed according to the following guidelines. Firstly, we identified the research scope, that is, blockchain applications in SCM. Secondly, we combine two strings to conduct a full-text search for academic papers (search strings used are presented in Table 2).

We use identified strings to search for related papers in eight databases, as shown in Figure 1. Although this wide range of databases produced overlaps in research results, it helped prevent excluding any important articles. As most existing blockchain-related articles have been published over the past five years, there was no restriction on publication date. Initially, we retrieved 4,461 papers after completing the search in October 2022. To guarantee paper quality, initially retrieved papers were screened according to exclusion and inclusion criteria, ultimately obtaining 251 papers. The search and screening strategies are described in Figure 1.

Table 2. Search strings

String number	Keywords
String 1	Blockchain(s) OR Block-chain OR Distributed ledger OR Smart contract(s)
String 2	Supply chain(s) OR Supply chain management OR Supplier OR Supply OR Manufacturing supply chain OR Transport OR Logistics

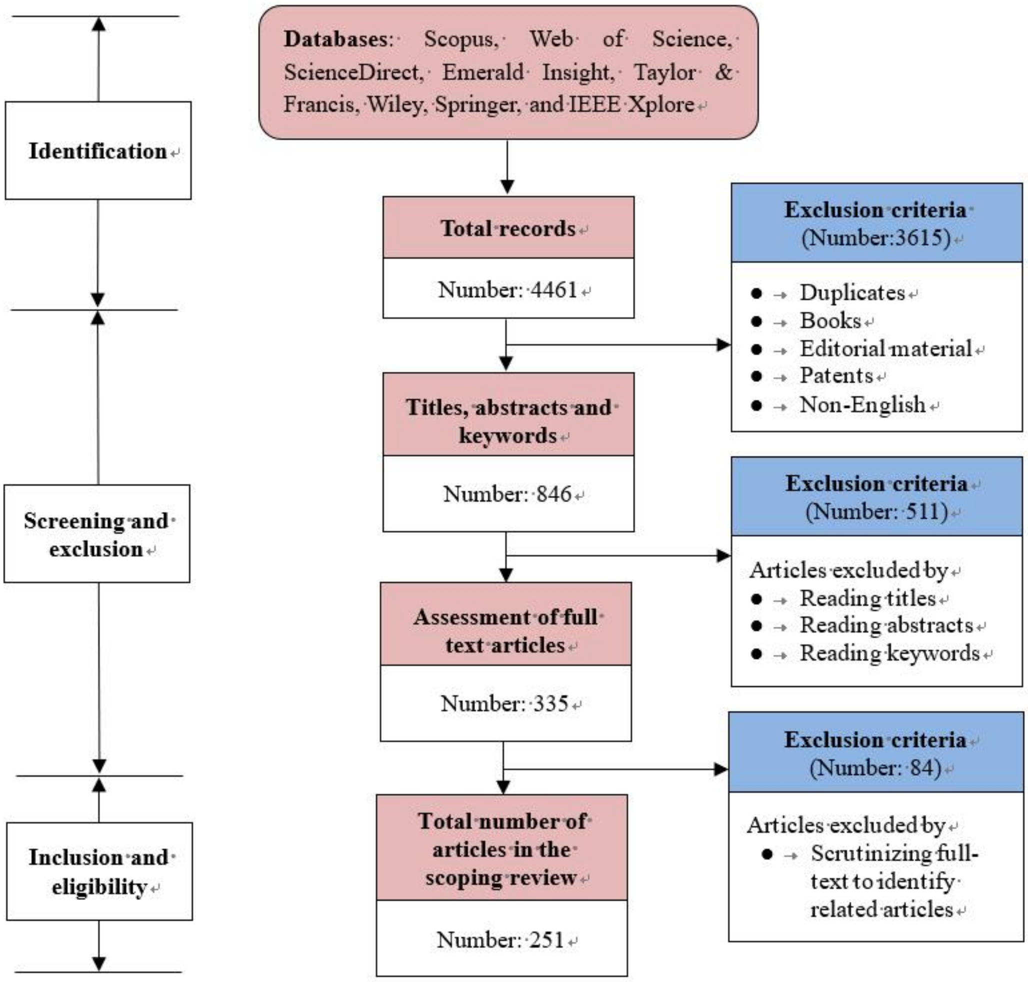

Figure 1. Search and screening strategies

Figure 1 Alt Text: After searching for papers in databases and filtering unrelated papers, 251 papers were obtained.

3. Results of descriptive and bibliometric analyses

3.1. Year range analysis

Figure 2 displays the number of relevant papers from 2016 to 2021. The number of papers published in 2022 does not include all the papers published this year. Therefore, we exclude statistics for 2022 from Figure 2. The first relevant paper (Tian 2016) was published in 2016, which correspond to the result of the recent literature review paper on blockchain (Müßigmann, von der Gracht, and Hartmann 2020). This congruence demonstrates that the research field of SCM considering blockchain is relatively cutting-edge. In particular, rapid and explosive growth began in 2018 and is ongoing.

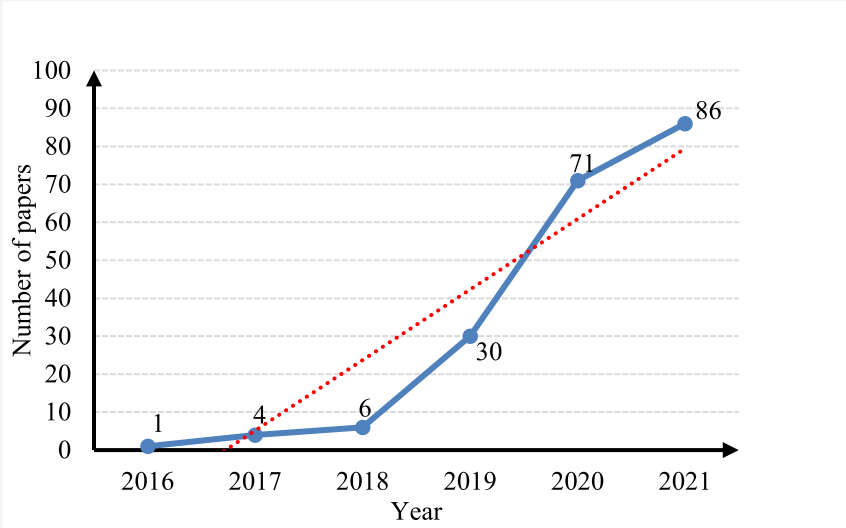

Figure 2. Annual number of papers published

Figure 2 Alt Text: The number of papers published shows an upward trend from 2016 to 2021, increasing from one paper in 2016 to 86 in 2021.

3.2. Journals analysis

A statistical analysis of journals highlights the leading journals, which allows readers to gain valuable information about suitable journals. Specifically, 215 papers are from the Academic Journal Guide 2021 ranking list (level 3 and above), the UTD journal list, and the ABDC Journal Quality List (A* and A journals). Papers published in high-level journals accounted for 85.66% of the total number, which indicates the quality of the selected papers. Table 3 lists journals publishing more than 2.5% of the total number of selected papers. These journals primarily publish in the areas of operations and information management.

Table 3. Number of papers published in different journals

Journal	Number	Percentage (%)
International Journal of Production Research	45	17.9
Transportation Research Part E: Logistics and Transportation Review	21	8.4
International Journal of Production Economics	20	8.0
Annals of Operations Research	15	6.0
Computers & Industrial Engineering	15	6.0
International Journal of Information Management	14	5.6
IEEE Access	12	4.8
IEEE Transactions on Engineering Management	11	4.4
Journal of Cleaner Production	10	4.0
Supply Chain Management	9	3.6

Production and Operations Management	7	2.8
Others (less than 2.5%)	72	28.7
Total	251	100

3.3. Article citation analysis

To determine the most influential academic papers, we set the minimum threshold for total citations at 70, and 78 papers were obtained. Since some nodes are not connected to others, only 73 nodes and 10 groups are visualized in Figure 3. Specifically, Saberi et al. (2019) obtained the most attention with 1012 citations, followed by Tian (2016) with 744 citations and Kshetri (2018) with 742 citations.

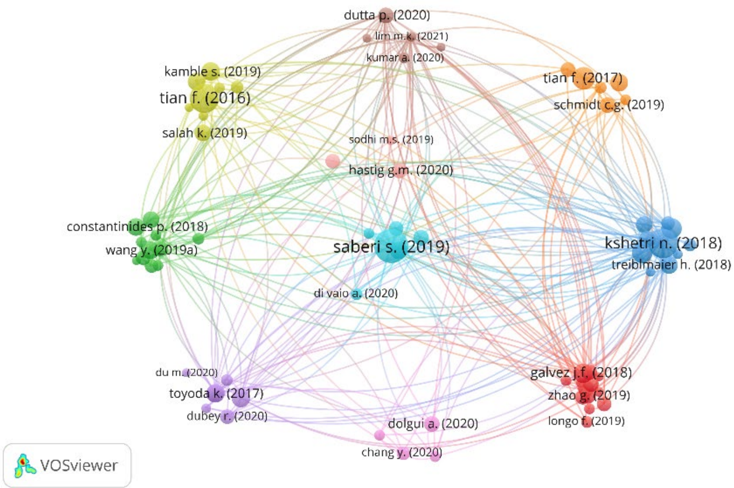

Figure 3. Visualization of paper citations

Figure 3 Alt Text: After setting the minimum citations at 70, we grouped 73 papers into 10 clusters.

3.4. Co-occurring keywords analysis

Figure 4 displays co-occurrences of keywords, which can display current mainstream research structures. The minimum threshold for a keyword was set at three occurrences. Initially, 63 out of 701 author keywords met this threshold. We unified identical meaning words and removed items such as “blockchain” and “supply chain management” from the analysis. Ultimately, only 34 keywords were visualized, with the most dominant research direction being traceability (21 occurrences), followed by transparency (20) and sustainability (18).

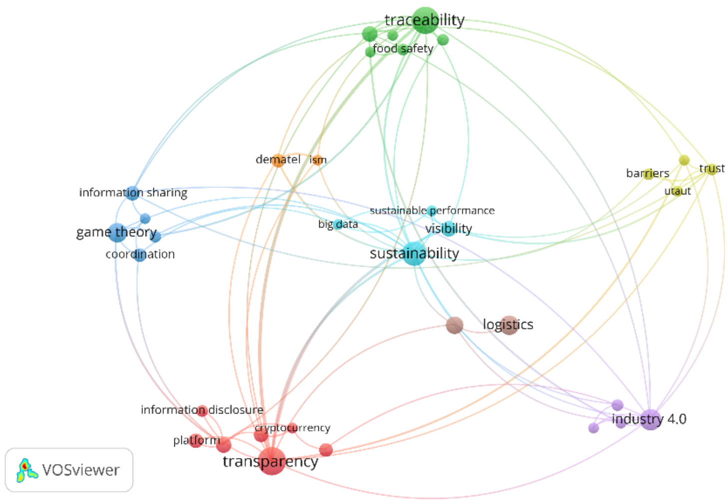

Figure 4. Visualization of co-occurring keywords

Figure 4 Alt Text: Setting the minimum threshold as 3 in all papers, then 8 clusters are obtained.

4. Thematic analysis

This section examines the related literature from the perspective of blockchain's role in enhancing logistics, information, and financial flows. Several subthemes are identified within each critical flow. Every subtheme encompasses analyses of blockchain's specific influence and discussions of associated future research directions.

4.1. Supply chain logistics management

Logistics, an essential component of the SC process, is the effectual forward and reverse flow of products, related services, and available information from the place of raw materials to the place of consumption to meet consumer demand (Mentzer et al. 2001). It implies that logistics involves a variety of activities. Due to the absence of transparency and traceability, participants often cannot track the logistics process and products' provenance. Additionally, ambiguous information always fails inventory control, incurring extra management costs. Blockchain has the potential to completely revolutionize traditional logistics business models (Tönnissen and Teuteberg 2020). After synthesizing the literature, we explore blockchain's role in logistics and summarize four themes based on the sequence in which logistics activities occur: (1) product provenance identification, (2) inventory optimization, (3) logistics status monitoring, and (4) logistics process optimization. Table

4 summarizes key literature for each subtheme.

4.1.1. Product provenance identification

Products' origins gain growing attention among consumers during the COVID-19 period, especially for food and medicines closely related to health (Katsikouli et al. 2021; Kumar, Liu, and Shan 2020; Yang, Zhang, and Shi 2021). Many scholars argue that blockchain applications can track goods' origins (Choi and Ouyang 2021; Lu and Xu 2017; Menon and Jain 2021; Wang, Chen, and Zghari-Sales 2021), thus alleviating consumer worries about product safety (Chaudhuri et al. 2021; Tsolakis et al. 2021) and quality (Koh, Dolgui, and Sarkis 2020; Niu et al. 2021; Tao, Wang, and Zhu 2022), and preventing fraud (Ji et al. 2022; Liu 2022; Kshetri 2021), combating counterfeit (Choi 2019; de Boissieu et al. 2021; Li, Fan, and Wu 2021; Tan 2022), and further raising consumer trust (Galvez, Mejuto, and Simal-Gandara 2018; Howson 2020; Kamble et al. 2021; Saurabh and Dey 2021). Additionally, the urgent knowledge of product provenance is a non-negligible driver of blockchain adoption (Kamble, Gunasekaran, and Sharma 2020; Kayikci et al. 2022; Samad et al. 2022). However, the lack of government regulation may make stakeholders reluctant to adopt blockchain in SCM (Yadav et al. 2020). Therefore, establishing uniform standards is necessary. Blockchain's role in mitigating consumers' concern about the original source of products is well investigated with proposed systems or frameworks. Specifically, Cui et al. (2019) and Ding et al. (2020) develop blockchain-established frameworks to ensure products' true origins, while both Ferdousi, Gruenbacher, and Scoglio (2020) and Zhang et al. (2020) further consider the privacy protection in frameworks. Additionally, incorporating Internet of Things (IoT) (Tsang et al. 2019) and radio-frequency identification (RFID) (Toyoda et al. 2017) into blockchain systems to realize effective tracking has also gained increasing attention.

Identifying products' provenance has emerged in numerous studies by integrating blockchain and traditional technologies. Most of these studies created frameworks or systems to trace original sources, which helped alleviate consumer concerns. However, the specific and quantifiable benefits of traceable origins are neglected. Future research can explore how consumers' perceptions about clear origins revealed by blockchain influence consumers' willingness to pay, firms' strategic and operational decisions, economic profitability, and social performance. If amplification of benefits is captured, it can motivate more members to join in provenance identification.

4.1.2. Inventory optimization

Blockchain-supported transparent information is beneficial to forecast demand (Carvalho and Karimi 2021), thus better controlling inventory (Chang et al. 2021; Choi 2020a) and reducing inventory stockout risks (Choi et al. 2021; Kittipanya-ngam and Tan 2020). Some literature leverages blockchain to share inventory information and therefore improve SC performance. Specifically, both Guggenberger, Schweizer, and Urbach (2020) and Omar et al. (2022b) proposed information-security frameworks to promote inventory information exchange among stakeholders to optimize SC performance. Omar et al. (2020) created a blockchain-supported framework to allow suppliers to access inventory information, which improves inventory management.

The above analysis presents that transparent information can reduce the risks of inventory imbalance. However, organizations worry that sharing inventory information among partners may undermine their own competitive advantages (Sodhi and Tang 2019). This raises research questions: what are internal organizational and external environmental factors that prevent organizations from sharing inventory information? How does inventory information-sharing affect firms' inventory management strategy? Does blockchain-enabled inventory information-sharing lead to the change from individual decision-making to joint decision-making?

4.1.3. Logistics status monitoring

Typically, RFID and IoT are employed to monitor and verify products' status (Bamakan et al. 2021; Biswas et al. 2022). However, there are difficulties for consumers to gain details due to centralized control (Helo and Hao 2019). Additionally, opaque logistics is a non-ignorable factor causing low inefficiency (De Giovanni 2020; Khan et al. 2022). Hence, blockchain-supported systems have been developed to trace logistics (Chang, Chen, and Lu 2019; Zhang and Liu 2022). The tracking systems have expanded from IoT, RFID, and physical internet systems to further incorporate blockchain (Azzi, Chamoun, and Sokhn 2019; Bumblauskas et al. 2020; Hasan et al. 2019; Meyer, Kuhn, and Hartmann 2019; Paul et al. 2022; Tian 2016).

The existing literature has demonstrated that blockchain application in SCM can opportunely display the true status of physical goods (Centobelli et al. 2021; Chen et al. 2020; Zhong, Zhang, and Gu 2021). This identification enables members to identify potential business risks (Choi et al. 2019; Chowdhury et al. 2022; Narwane et al. 2021), such as delays in delivery (Kshetri 2018), or the propagation of disruptions (Lohmer, Bugert, and Lasch 2020; Manupati et al. 2022), thereby achieving high-quality delivery. Furthermore, a transparent logistics status can improve delivery efficiency (Gurtu and Johny 2019; Yang, Ni, and Ng 2022; Yoon et al. 2020), lower transportation costs (Xu and Yang, 2021), and generate product premiums (Wu, Fan, and Cao 2021).

From above analyses, logistics status monitoring by incorporating blockchain into traditional tracking systems has been widely investigated. However, diverse products require different parameters to guarantee appropriate tracking and monitoring. Furthermore, organizations will use different tracking systems to achieve production status monitoring. It is therefore worthwhile to investigate how to establish general standards or protocols allowing interactivity among different systems. Logistics status monitoring requires every member's cooperation. It is critical to investigate interplays between blockchain applications and members' relationships. Specifically, to what extent, will blockchain applications promote horizontal and vertical partnerships? Additionally, how changes in members' relationships influence blockchain's adoption should be investigated.

4.1.4. Logistics process optimization

The logistics process focuses on the entire operation of logistics, whereas logistics status concentrates on certain states and locations of logistics. Logistics efficiency affects overall logistics costs. To improve logistics process efficiency, some authors argue that blockchain can optimize delivery routes (Xia et al. 2021), achieve flow workshop scheduling optimization (Dolgui et al. 2020), optimize delivery time (Manupati et al. 2020), and enhance logistics capabilities (Wang et al. 2021a) through mathematical models. Tozanlı, Kongar, and Gupta (2020) created frameworks to explore the blockchain's capability to achieve an efficient recovery process for an intelligent good.

Tian et al. (2021) discussed logistics optimization based on urban logistics via introducing a blockchain-established assessment method to evaluate customer satisfaction. Blockchain's role in the logistics process has also been tested in empirical studies showing that blockchain can connect consumers and suppliers directly to achieve transparency (Quayson, Bai, and Sarkis 2021), better process decisions (Sundarakani, Ajaykumar, and Gunasekaran 2021), and quality compliance process improvement (Nandi et al. 2020). Although blockchain can optimize the process, technology immaturity may prohibit its adoption in SCM (Hackius and Petersen 2020; Mathivathanan et al. 2021; Xu et al. 2022).

Process optimization provides a foundation for improving SC performance. Future studies can explore whether blockchain's features moderate relationships between process optimization and SC performance. Most logistics companies manage the entire process of conveying goods from merchants to consumers. Future research can explore how to incentivize firms to join in blockchain networks and cooperate for segmented delivery to improve transportation efficiency.

Table 4. Summary of key literature on supply chain logistics management

Themes	Role of blockchain	Key findings/contributions	References
Product provenance identification	Traceability	Develop blockchain-based systems or frameworks to trace products' origins	Lu and Xu (2017); Toyoda et al. (2017); Zhang et al. (2020)
		Analyze the elements influencing blockchain's deployment in the SCM	Kamble, Gunasekaran, and Sharma (2020)
	Visibility and transparency	Investigate blockchain's deployment in SCM and demonstrate that it can achieve visibility and transparency	Kumar, Liu and Shan (2020); Wang, Chen, and Zghari-Sales (2021)
	Trust	Use a conjoint analysis to indicate trust is a driver factor of adopting blockchain	Saurabh and Dey (2021)
Inventory optimization	Risk reduction	Demonstrate that blockchain-enabled SC can achieve lower inventory and less operational risk through analyzing a newsvendor model in the fashion SC	Choi (2020)
	Trust	Propose a scoring rule based on smart contracts that could reduce trust issues and align the interests of newsvendors and demand forecasters	Carvalho and Karimi (2021)
	Information exchange	Investigate optimal adoption levels of blockchain in optimizing order quantities	Guggenberger, Schweizer, and Urbach (2020); Chang et al. (2021); Choi et al. (2021)
Logistics status monitoring	Traceability	Propose blockchain-enabled systems or frameworks to track and monitor logistics status	Tian (2016); Hasan et al. (2019); Helo and Hao (2019); Meyer, Kuhn, and Hartmann (2019); Centobelli et al. (2021)
		Use case studies to show that blockchain has advantages in achieving SCM objectives of quality management, efficiency, dependability, cost, and flexibility	Kshetri (2018)
	Visibility and transparency	Evaluate advantages and challenges of blockchain for SCM	Azzi, Chamoun, and Sokhn (2019)
	Risk reduction	Use simulation models to reveal that smart contracts can improve SC resilience	Lohmer, Bugert, and Lasch (2020)
Logistics process optimization	Transparency	Explore whether blockchain allows for delivery routes optimization, flexible shop floor scheduling, process improvement, and optimizing operational decisions	Dolgui et al. (2020); Manupati et al. (2020); Tian et al. (2021); Xia et al. (2021)
	Trust	Propose a blockchain-enabled SC architecture that is agile and dynamic and can facilitate sustainable SCs	Tozanlı, Kongar, and Gupta (2020)

4.2. Supply chain information flow management

Rigorously competitive market environment promotes firms' eagerness for accurate information and adjust strategies (Chen, Wang, and Xia 2019; Wong et al. 2020b). Information often transfers inefficiently due to a lack of transparency, which will cause bullwhip effect (Babich and Hilary, 2020), high costs (Fu and Zhu 2019), and negative effects on SC. Additionally, participants may hesitate to share information out of concern about commercial data leakage. Blockchain can solve many information problems associated to traditional SCs (Gong et al. 2022), such as information asymmetry (Xu and Choi 2021), security, traceability, and transparency (Vu, Ghadge, and Bourlakis 2021). SC transparency is correlated with the level of traceability, visibility, and disclosure (Rao et al. 2021). According to the literature clustering, we have identified three themes: (1) information sharing, (2) information security, and (3) information transparency. The key literature is summarized in Table 5.

4.2.1. Information sharing

Information sharing among participants is critical for improving SC performance (Cui et al. 2021; Li, Ji, and Huang 2022; Agrawal et al. 2022). Upstream suppliers control production capacity, whereas downstream retailers can detect market trends and consumer preferences. Moreover, exchanging information effectively contributes to satisfying consumer demands and lowering operational costs (Longo et al. 2019; Wang et al. 2020b; Wang et al. 2021c). However, poor trust (Ghode et al. 2020, 2021; Zhu, Kouhizadeh, and Sarkis 2022) and information inaccuracy (Xue, Dou, and Shang 2021) often hinder firms from sharing information. Interestingly, blockchain enables trust establishment among stakeholders (Agrawal et al., 2021; Cai, Choi, and Zhang 2021; Queiroz and Wamba 2019; Yousefi and Tosarkani, 2022), real-time information sharing (van Hoek 2020a; Yadav et al. 2021; Zeng, Sadeghzadeh, and Xiong 2022), and secure information sharing (Bader et al., 2021; Li, Shen, and Huang 2019; Queiroz et al. 2021; Wang et al., 2020b). Accurate information is helpful in reducing operational costs (Asante et al. 2021; Niu, Xu, and Dai 2022), promote collaboration (Li et al. 2020a), improving visibility (Kamble, Gunasekaran, and Gawankar 2020), and achieving sustainability (Kouhizadeh, Saberi, and Sarkis 2021; Chen, Wang, and Xia 2021; Chen, Wang, and Zhou 2019).

Moreover, information-sharing mechanisms based on blockchain can create other advantages, such as enhancing product innovation ability (Benzidia, Makaoui, and Subramanian 2021; Rahmanzadeh, Pishvaee, and Rasouli 2020; Xing et al. 2021) and optimizing the products' quality (Behnke and Janssen 2020; Chen et al. 2017; Karamchandani et al. 2021).

Some factors (e.g., business privacy and advantages) may hinder participants from sharing information (Karakas, Acar, and Kucukaltan 2021). Future research can identify the information-sharing boundary by examining questions such as how industrial sectors and business environments affect the boundary conditions. Does the boundary condition of information-sharing have an evolutionary process? Additionally, different regions have different information protection laws. It is essential to verify that the transferred information meets regional legislative requirements. Thus, while constructing blockchain-based SC information networks, it is valuable to develop unified data management standards, emergency measures, and laws on information sharing.

4.2.2. Information security

Typical storage structures make it difficult to maintain data security with risks of falsification and complicate verification of data reliability (Epiphaniou et al. 2020; Tian 2017). Blockchain is the solution to the issue since each data must be verified (Luo and Choi 2022), which prohibits altering data and ensures information security (Choi, Guo, and Luo 2020). Furthermore, secure information enhances trust among members and facilitates information-sharing (Constantinides, Henfridsson, and Parker 2018; Li et al. 2020b). Notably, one of key drivers behind blockchain's deployment in SCM is its information security feature (Bai, Quayson, and Sarkis 2022; Orji et al. 2020; van Hoek 2020b).

Although information security is a crucial feature of blockchain's adoption in SCM, limited research has explored the relationship between information security and SC efficiency. Future research can study how information security facilitated by blockchain affects SC performance and whether there are intermediate factors. Information security is one of the facilitating factors for members to share information. It is worth examining how stakeholders' perceived levels of information security affect their willingness to share information via a blockchain application.

4.2.3. Information transparency

Transparency means that information is readily accessible for participants (Reddy et al. 2021) and occupies a significant position in evaluating SC performance (Wamba, Queiroz, and Trinchera 2020). Existing research has revealed that blockchain is a useful way to achieve information transparency (Bai et al. 2021; Erol, Ar, and Peker 2022; Montecchi, Plangger, West 2021). Based on achieving transparency, blockchain has advantages of enhancing resilience (Dubey et al. 2020), reducing costs (Ko, Lee, and Ryu 2018), price matching for consumers (Choi et al. 2020), increasing operational efficiency (Bai, Zhu, and Sarkis 2021), achieving effective service composition (Shi, Yao, and Luo 2021), accelerating the promotion of the circular economy (Wang et al. 2020a), and realizing sustainable SCs (Cao and Shen 2022; Khan et al. 2021; Paul et al. 2021). Moreover, information transparency supported by blockchain technology can enhance consumers' utility (Fan, Wu, and Cao 2022; Xu and Duan, 2022; Xu et al., 2021; Zhang, Li, and Wang 2021), and even increase market share (Niu, Dong, and Liu 2021; Niu et al. 2022). However, blockchain is not a panacea to solve all information problems for SCs (van Hoek 2019). More transparency may cause privacy leakage, weaken market demand (Zhang et al. 2022), and hinder blockchain applications (Sternberg, Hofmann, and Roeck 2021). Therefore, organizations must balance the benefits and disadvantages while adopting blockchain.

Traceability, an essential feature of transparency, originates from data immutability (Hald and Kinra 2019; Sunny, Undralla, and Pillai 2020), which can be achieved through blockchain (Ali et al. 2021; Köhler and Pizzol 2020; Liu et al. 2020; Liu, Tan, and Zhao 2021; Mangla et al. 2021). The blockchain-supported traceability can locate contaminated food and recall unqualified products (Maity et al. 2021; Rogerson and Parry 2020). Many scholars integrate blockchain (Casino et al. 2021; George et al. 2019; Zhu et al. 2020;) with IoT (Liu et al. 2021a), machine learning (Yong et al. 2020), and 5G (Dolgui and Ivanov 2022) to achieve traceability.

Information disclosure, another perspective of information transparency, enables guaranteeing information quality (Guo, Sun, and Lam 2020; Niu, Xu, and Chen 2022; Choi and Siqin 2022).

Adopting blockchain to disclose product quality can identify and combat counterfeiting (Pun, Swaminathan, and Hou 2021; Li et al. 2021b; Shen, Dong, and Minner 2022), as well as lower dangers to social health (Shen et al. 2021). Most studies scrutinized the effects of disclosing information on consumer utility (Liu, Zhang, and Wu 2021; Song et al. 2022), demand (Choi, Feng, and Li 2020; Wang, Tao, and Wang 2021), pricing strategies (Shen, Xu, and Yuan 2020; Xu and He, 2021; Zhou et al. 2022), social welfare (Choi and Luo 2019) through relevant mathematical models.

Achieving transparency is a critical enabler for blockchain adoption (Karamchandani, Srivastava, and Srivastava 2020). It is necessary to figure out how to evaluate the effectiveness of blockchain-supported transparency. Furthermore, future research can scrutinize how the transparency level influences the relationship between participants' and consumers' attitudes towards consumption. How does the blockchain-enabled transparency level evolve as the business circumstance changes?

Table 5. Summary of key literature on supply chain information flow management

Themes	Role of blockchain	Key findings/contributions	References
Information-sharing	Information-sharing and trust	Design blockchain-based software connectors, prototypes, frameworks, or mechanisms to allow information-sharing and improve trust	Longo et al. (2019); Rahmanzadeh, Pishvaee, and Rasouli (2020); Wang et al. (2020b); Agrawal et al. (2021); Wang et al. (2021c)
		Explore factors that blockchain's influence on information-sharing for the SC	Behnke and Janssen (2020); Kamble, Gunasekaran, and Gawankar (2020); Yadav et al. (2021); Yousefi and Tosarkani (2022)
Information security	Information security and traceability	Conduct reviews or interviews to discuss values and challenges of blockchain adoption in SCM	Queiroz, Telles, and Bonilla (2020); van Hoek (2020b)
	Information authenticity	Propose a production capacity valuation method that incorporates IoT, machine learning, and blockchain to achieve information authenticity and security	Li et al. (2020b)
Information transparency	Information transparency	Explore blockchain's role in achieving transparency, performance improvement, and sustainability	Köhler and Pizzol (2020); Wamba, Queiroz, and Trinchera (2020); Reddy et al. (2021); Montecchi, Plangger, West (2021)
	Traceability	Design a blockchain-based framework that can achieve traceability for food SC.	Tian (2017); Ali et al. (2021); Liu et al. (2021a)
	Anti-counterfeit and information disclosure	Explore how blockchain discloses product information and combats counterfeits	Pun, Swaminathan, and Hou (2021); Shen et al. (2021); Shen, Dong, and Minner (2022)
	Enhancement of resilience	Use hypothesis testing to investigate how blockchain influences SC transparency and resilience	Dubey et al. (2020)

4.3. Supply chain financial flow management

Financial flow refers to the money flowing back from end consumers to upstream members. Blockchain has a crucial role in managing financial flow and the prevalent application is in SC finance (Kucukaltan et al. 2022; Ivanov and Dolgui 2022). With a peer-to-peer distributed network, transaction information cannot be altered due to the consensus mechanism, increasing transaction security and reducing the risk of being modified (Treiblmaier 2018). After scrutinizing the relevant literature, we highlight two themes: (1) transaction process tracking and (2) transaction process simplification and further lists vital references in Table 6.

4.3.1. Transaction process tracking

Although transaction records are currently electronic, not all participants have easy access to them since each participant keeps their own transaction records (Raj et al. 2022). The permanent record supported by blockchain can help to supervise and manage financial flow (Cho et al. 2021; Hendershott et al. 2021), achieve transaction tracking (Chod et al. 2020; Liu and Li 2020), guarantee financial security (Liu, Zhang, and Zhen 2021; Mehta et al. 2021; Wang et al. 2021b), and eliminate distrust (Du et al. 2020). Using blockchain to track transactions can achieve transaction transparency and visibility and provide reliable information support for small and medium-sized firms in financing (Cao et al. 2022; Dong et al. 2021; Liu, Li, and Jiang 2021; Yu, Huang, and Guo 2021).

Tracking the entire transaction process and identifying possible transaction hazards can increase the efficiency of companies' operations and enhance SC resilience (Malhotra, O'Neill, and Stowell 2022). Future research can study whether transparent transactions will promote cooperation or trigger intense competition among participants. Most existing papers concentrate on using blockchain to track transactions for financing. When is the right time to join blockchain networks and achieve transaction traceability? In practice, mistaken transactions occurring in blockchain networks cannot be modified, which is a critical factor hindering blockchain adoption (Vafadarnikjoo et al. 2021). Once mistaken transactions happen, how to maintain the traceability of normal transactions and use them for business decisions needs to be addressed.

4.3.2. Transaction process simplification

Blockchain-backed crowdfunding financing projects are emerging, which have enormous impacts on firms' operations (Choi 2021b) and trade in worldwide market (Saberi et al. 2019). End-to-end transactions can be achieved using cryptocurrency, which directly weakens the intermediary position of banks (Min 2019; Salah et al. 2019). However, since cryptocurrency has highly volatile value, SC members' attitude toward cryptocurrency is a crucial factor in using blockchain (Choi 2021). International transactions often involve participants from different industries. The complex transaction process is based on multiple document certifications (Kamble, Gunasekaran, and Arha 2019), which is difficult to achieve on-time delivery (Balci and Surucu-Balci 2021). The advantages of decentralized and smart transactions over traditional modes include high efficiency (Büyüközkan, Tüfekçi, and Uztürk 2021; Li et al. 2021a); transaction cost reduction (Agi and Jha 2022; Jabbar and Dani 2020; Wamba et al. 2020; Wu and Yu 2022); asset turnover enhancement (Pan et al., 2020); transaction reliability improvement (Roeck, Sternberg, and Hofmann; 2020); as well as more secure and smart transactions (Zheng, Zhang, and Gauthier 2022).

Although extant literature emphasizes that blockchain adoption can lower transaction service costs paid to intermediaries, future research can deeply investigate the difference in the amount of cost reduction across different participants. Moreover, what impact does transaction process simplification have on firms apart from cost reduction for transaction service? How does the power relationship of SC participants change after achieving transaction process simplification by adopting blockchain?

Table 6. Summary of key literature on supply chain financial flow management

Themes	Role of blockchain	Key findings/contributions	References
Transaction process tracking	Transparency	Explore applications, value, and benefits of blockchain in SC finance	Chod et al. (2020); Wang et al. (2021b); Dong et al. (2021)
	Trust	Investigate whether blockchain can be applied in SC to tracking transactions to solve trust issues and information asymmetry and improve finance efficiency	Du et al. (2020); Liu, Li, and Jiang (2021); Cao et al. (2022); Yu, Huang, and Guo (2021)
	Security	Propose a blockchain-backed system that supports reliable, secure, and efficient royalty transactions	Mehta et al. (2021); Raj et al. (2022)

Transaction process simplification	Enhancement of resilience	Demonstrate that blockchain can improve SC resilience due to its peer-to-peer network	Min (2019)
	Disintermediation	Demonstrate that blockchain can avoid banks using cryptocurrency and reduce transaction costs	Roeck, Sternberg, and Hofmann (2020); Wamba et al. (2020); Choi (2021b)

5. Discussion

5.1. Theoretical contributions

This paper has twofold contributions. Firstly, this paper reveals that scholars' investigations are often limited to general concepts or some specific aspects of SCM. There is a lack of dissecting blockchain's impacts on SCM from the perspective of three flows. Hence, we combine bibliometric and systematic review analysis to understand how blockchain affects SCM from three flows. To our knowledge, this is the first study to explore blockchain's role from three flows. Secondly, a range of important topics within three categorized themes was further identified and followed by a detailed discussion of some future research directions. Based on thematic analysis, we envisage a conceptual framework (illustrated in Figure 5) to holistically sketch and demonstrate the effects of blockchain on the three critical flows in SCM. Specifically, as Figure 5 shows, the logistics flow (and financial flow) is conveyed from upstream (downstream) to downstream (upstream), while all information is transparent, tracked, and secure in the blockchain-supported SCs. Using blockchain for logistics can eliminate uncertainty about product origin and control product quality. Due to its enhanced transparency, blockchain can relieve the pressure of maintaining safety stock while meeting production and demand needs. Throughout the entire logistics process, the product distribution status and logistics activities can be monitored and further optimized. For information flow, all members in the blockchain-based SC can share valuable information to enhance operational efficiency. Furthermore, compared with traditional SCs, information is more secure in blockchain-supported SCs because changing the inputs completely changes the outputs, resulting in tamper-proof and secure data. Once a member publishes information, all members in the SC are informed of it, which differs from conveying information level-to-level as in traditional SCs. In addition, all transactions can be traced due to the records of the distributed ledger. Moreover, a blockchain-supported system facilitates the digitalization of documents of transactions, which reduces paperwork, simplifies the transaction process, and enhances transaction efficiency.

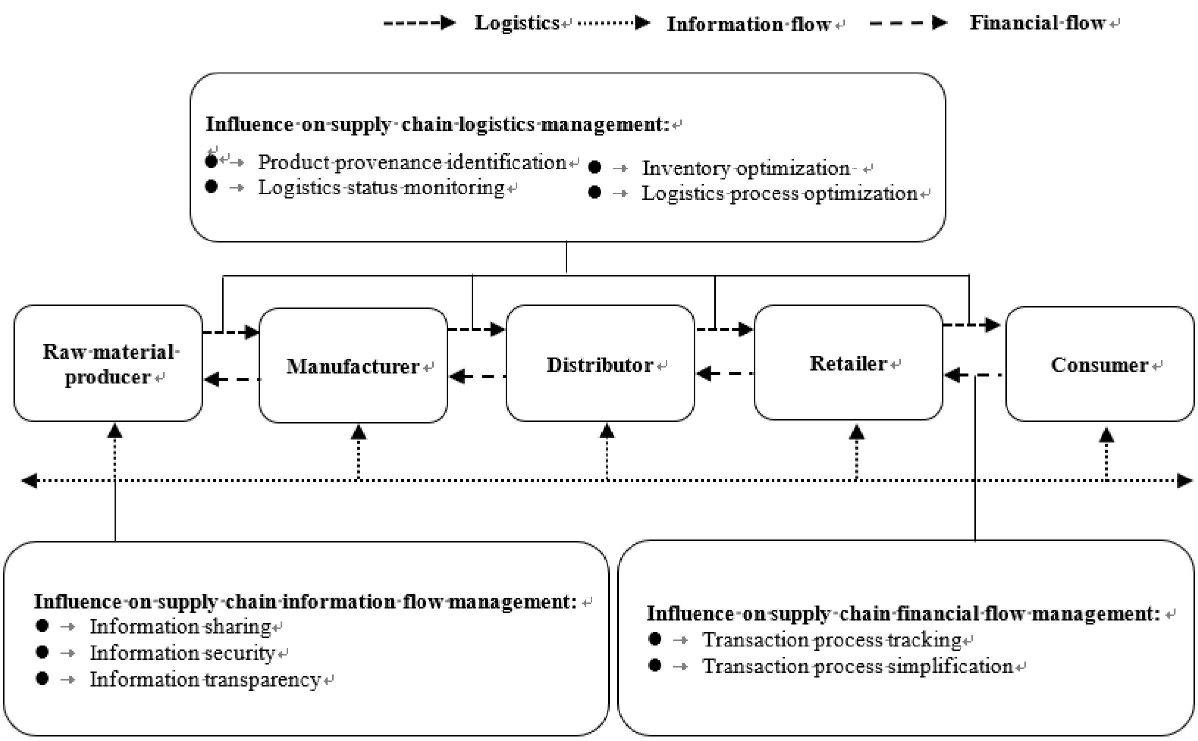

Figure 5. Influence of blockchain on SC three-flows management

Figure 5 Alt Text: The influence includes nine clusters according to subthemes in Section 4.

5.2. Implication for policymakers

Policymakers' decisions are critical in promoting blockchain's adoption in SCM. Firstly, policymakers should raise public awareness and enrich knowledge among practitioners. Secondly, policymakers should consider members' economic performance and implement policies to encourage stakeholder adoption of blockchain, which can connect whole SC systems. Additionally, it is challenging to enforce regulatory activities due to the low prevalence of automation and lots of paperwork, so it is urgent to accelerate digitalization in regulatory activities. Finally, blockchain's adoption in SCM may cause issues such as information leakage, which require authorities' regulation.

5.3. Implications for the practitioners

Blockchain creates opportunities and challenges for the transformation and upgrading of SCM. Practically speaking, this study offers some suggestions for practitioners to address problems in SCM by adopting blockchain from the perspectives of three flows. On the one hand, blockchain's adoption can realize the traceability and transparency for three flows while also fostering trust among members. Furthermore, decentralization speeds up transaction processes and enhances SCM efficiency. On the other hand, practitioners should focus on some challenges. Technical barriers, high adoption costs and risks of business privacy leakage are important barriers for practitioners (Karakas, Acar, and Kucukaltan 2021; Ghadge et al. 2022). Hence, when considering whether to embrace blockchain, practitioners should comprehensively assess firms' internal resources and market environment.

5.2. Implication for policymakers

Policymakers' decisions are critical in promoting blockchain's adoption in SCM. Firstly, policymakers should raise public awareness and enrich knowledge among practitioners. Secondly, policymakers should consider members' economic performance and implement policies to encourage stakeholder adoption of blockchain, which can connect whole SC systems. Additionally, it is challenging to enforce regulatory activities due to the low prevalence of automation and lots of paperwork, so it is urgent to accelerate digitalization in regulatory activities. Finally, blockchain's adoption in SCM may cause issues such as information leakage, which require authorities' regulation.

5.4. Future research agenda

This study emphasizes that blockchain has great impacts on SC three flows. To summarize the future research agenda according to subthemes in Section 4, we use the "5W and 1H" approach, following Lumineau, Wang, and Schilke (2021) and Dubey, Gunasekaran, and Foropon (2022).

Scholars can explore internal and external factors affecting members' adoption of blockchain to address what blockchain adoption drivers and barriers are. As to "why" of motivation for adopting blockchain, institutional theory, stakeholder theory, and agency theory can be effective explanations (Zhu, Bai, and Sarkis 2022). As for "how" questions, scholars should concentrate on how blockchain affects consumers' attitudes, SC members' relationships, operational decisions, and economic and social performance. Regarding the positions of "who", a question should be considered: "Which members would be most affected by the introduction of blockchain in SCs?" Additionally, it is also worth exploring which members should take the lead in developing blockchain systems to maximize profits for all members. Scholars could thoroughly study questions of "when" and "where" by comprehensively exploring when is the best moment to join a blockchain network and in what environment (internal and external) blockchain's adoption can create greater results for members.

6. Conclusion

The deployment of blockchain in the SC is currently a hot topic. To thoroughly understand the comprehensive impact of blockchain on SCM, this paper first scrutinizes 251 academic papers published between 2016 and 2022 from the viewpoint of three critical flows (i.e., logistics, information, and financial flows). After sketching the current research status, we summarize nine subthemes and propose future research opportunities. To clarify blockchain's impacts on three flows, we present a visualized framework. Furthermore, our findings can provide policymakers and practitioners some valuable implications and insights. Finally, we admit that this paper has some limitations, that is, we only focus on English papers. Hence, it is meaningful to explore other language papers that complement the findings of this paper in the future.

Declaration of interest statement

No potential conflict of interest was reported by the authors.

Data availability statement

The data that support the findings of this study are available in the following database: [https://www.scopus.com/search/form.uri?display=basic#basic; https://www.webofscience.com/wos/alldb/basic-search; https://www.sciencedirect.com/; https://www.emerald.com/insight/; https://taylorandfrancis.com/; https://onlinelibrary.wiley.com/; https://www.springer.com/cn; https://ieeexplore.ieee.org/Xplore/home.jsp].

References

Agi, M. A. N., and A. K. Jha. 2022. "Blockchain Technology in the Supply Chain: An Integrated Theoretical Perspective of Organizational Adoption." *International Journal of Production Economics* 247: 108458.

Agrawal, T. K., V. Kumar, R. Pal, L. Wang, and Y. Chen. 2021. "Blockchain-Based Framework for Supply Chain Traceability: A Case Example of Textile and Clothing Industry." *Computers & Industrial Engineering* 154: 107130.

Agrawal, T. K., J. Angelis, W. A. Khilji, R. Kalaiarasan, and M. Wiktorsson. 2022. "Demonstration of a Blockchain-Based Framework Using Smart Contracts for Supply Chain Collaboration." *International Journal of Production Research.* DOI:10.1080/00207543.2022.2039413.

Ali, M. H., L. Chung, A. Kumar, S. Zailani, and K. H. Tan. 2021. "A Sustainable Blockchain Framework for the Halal Food Supply Chain: Lessons from Malaysia." *Technological Forecasting and Social Change* 170: 120870.

Asante, M., G. Epiphaniou, C. Maple, H. Al-Khateeb, M. Bottarelli, and K. Z. Ghafoor. 2021. "Distributed Ledger Technologies in Supply Chain Security Management: A Comprehensive Survey." *IEEE Transactions on Engineering Management*. DOI:10.1109/TEM.2021.3053655

Azzi, R., R. K. Chamoun, and M. Sokhn. 2019. "The Power of a Blockchain-Based Supply Chain." *Computers & Industrial Engineering* 135: 582-592.

Babich, V., and G. Hilary. 2020. "Distributed Ledgers and Operations: What Operations Management Researchers Should Know about Blockchain Technology." *Manufacturing and Service Operations Management* 22(2): 223-240.

Bader, L., J. Pennekamp, R. Matzutt, D. Hedderich, M. Kowalski, V. Lücken, and K. Wehrle. 2021. "Blockchain-Based Privacy Preservation for Supply Chains Supporting Lightweight Multi-Hop Information Accountability." Information Processing and Management 58(3): 102529.

Bai, C., and J. Sarkis. 2020. "A Supply Chain Transparency and Sustainability Technology Appraisal Model for Blockchain Technology." *International Journal of Production Research* 58(7): 2142-2162.

Bai, C., M. Quayson, and J. Sarkis. 2022. "Analysis of Blockchain's Enablers for Improving Sustainable Supply Chain Transparency in Africa Cocoa Industry." *Journal of Cleaner Production* 358: 131896.

Bai, C., Q. Zhu, and J. Sarkis. 2021. "Joint Blockchain Service Vendor-Platform Selection Using Social Network Relationships: A Multi-Provider Multi-User Decision Perspective." *International Journal of Production Economics* 238: 108165.

Bai, Y., K. Fan, K. Zhang, X. Cheng, H. Li, and Y. Yang. 2021. "Blockchain-Based Trust Management for Agricultural Green Supply: A Game Theoretic Approach." *Journal of Cleaner Production* 310: 127407.

Balci, G., and E. Surucu-Balci. 2021. "Blockchain Adoption in the Maritime Supply Chain: Examining Barriers and Salient Stakeholders in Containerized International Trade." *Transportation Research Part E: Logistics and Transportation Review* 156: 102539.

Bamakan, S. M. H., S. G. Moghaddam., S. D. Manshadi, and J. J. Klemes. 2021. "Blockchain-Enabled Pharmaceutical Cold Chain: Applications, Key Challenges, and Future Trends." *Journal of Cleaner Production* 302, 127021.

Behnke, K., and M. F. W. H. A. Janssen. 2020. "Boundary Conditions for Traceability in Food Supply Chains Using Blockchain Technology." *International Journal of Information Management* 52: 101969.

Benzidia, S., N. Makaoui, and N. Subramanian. 2021. "Impact of Ambidexterity of Blockchain Technology and Social Factors on New Product Development: A Supply Chain and Industry 4.0 Perspective." *Technological Forecasting and Social Change* 169: 120819.

Biswas, D., H. Jalali, A. H. Ansaripoor, and P. De Giovanni. 2023. “Traceability vs. Sustainability in Supply Chains: The Implications of Blockchain.” *European Journal of Operational Research*, 305(1): 128-147.

Brookbanks, M., and G. Parry. 2022. “The Impact of a Blockchain Platform on Trust in Established Relationships: A Case Study of Wine Supply Chains.” *Supply Chain Management* 27 (7): 128-146.

Bumblauskas, D., A. Mann, B. Dugan, and J. Rittmer. 2020. “A Blockchain Use Case in Food Distribution: Do You Know Where Your Food Has Been?” *International Journal of Information Management* 52: 102008.

Büyüközkan, G., G. Tüfekçi, and D. Uztürk. 2021. “Evaluating Blockchain Requirements for Effective Digital Supply Chain Management.” *International Journal of Production Economics* 242: 108309.

Cai, Y. J., T. M. Choi, and J. Zhang. 2021. “Platform Supported Supply Chain Operations in the Blockchain Era: Supply Contracting and Moral Hazards.” *Decision Sciences*, 52(4), 866-892.

Cao, Y., and B. Shen. 2022. “Adopting Blockchain Technology to Block Less Sustainable Products’ Entry in Global Trade.” *Transportation Research Part E: Logistics and Transportation Review* 161: 102695.

Cao, Y., C. Yi, G. Wan, H. Hu, Q. Li, and S. Wang. 2022. “An Analysis on the Role of Blockchain-Based Platforms in Agricultural Supply Chains.” *Transportation Research Part E: Logistics and Transportation Review* 163: 102731.

Carvalho, A., and M. Karimi. 2021. “Aligning the Interests of Newsvendors and Forecasters Through Blockchain-Based Smart Contracts and Proper Scoring Rules.” *Decision Support Systems* 151: 113626.

Casino, F., V. Kanakaris, T. K. Dasaklis, S. Moschuris, S. Stachtiaris, M. Pagoni, and N. P. Rachaniotis. 2021. “Blockchain-Based Food Supply Chain Traceability: A Case Study in the Dairy Sector.” *International Journal of Production Research* 59(19): 5758-5770.

Centobelli, P., R. Cerchione, P. Del Vecchio, E. Oropallo, and G. Secundo. 2021. “Blockchain Technology for Bridging Trust, Traceability and Transparency in Circular Supply Chain.” *Information and Management* 103508.

Chang, J. (Aichih), M. N. Katehakis, J. (Junmin) Shi, and Z. Yan. 2021. “Blockchain-Empowered Newsvendor Optimization.” *International Journal of Production Economics* 238: 108144.

Chang, S. E., Y. C. Chen, and M. F. Lu. 2019. “Supply Chain Re-Engineering Using Blockchain Technology: A Case of Smart Contract Based Tracking Process.” *Technological Forecasting and Social Change* 144: 1-11.

Chang, Y., E. Iakovou, and W. Shi. 2020. “Blockchain in Global Supply Chains and Cross Border Trade: A Critical Synthesis of the State-of-the-Art, Challenges and Opportunities.” *International Journal of Production Research* 58(7): 2082-2099.

Chaudhuri, A., M. S. Bhatia, Y. Kayikci, K. J. Fernandes, and S. F. Wamba. 2021. “Improving Social Sustainability and Reducing Supply Chain Risks through Blockchain Implementation: Role of Outcome and Behavioural Mechanisms.” *Annals of Operations Research*. DOI:10.1007/s10479-021-04307-6.

Chen, X., X. Wang, H. K. Chan. 2017. “Manufacturer and Retailer Coordination for Environmental and Economic Competitiveness: A Power Perspective.” *Transportation Research Part E: Logistics and*

Transportation Review, 97: 268-281.

Chen, X., X. Wang, M. Zhou. 2019. “Firms’ Green R&D Cooperation Behaviour in a Supply Chain: Technological Spillover, Power and Coordination.” *International Journal of Production Economics* 218: 118-134.

Chen, X., X. Wang, Y. Xia. 2019. “Production Coopetition Strategies for Competing Manufacturers that Produce Partially Substitutable Products.” *Production and Operations Management*, 28(6): 1446-1464.

Chen, X., X. Wang, Y. Xia. 2022. “Low-Carbon Technology Transfer between Rival Firms under Cap-and-Trade Policies.” *IISE Transactions*, 54(2): 105-121.

Chen, Y. J., T. Dai, C. G. Korpeoglu, E. Körpeo, O. Sahin, C. S.Tang, S. Xiao. 2020. “Innovative Online Platforms: Research Opportunities.” *Manufacturing & Service Operations Management* 22(3): 430-445.

Chen, S., R. Shi, Z. Ren, J. Yan, Y. Shi, and J. Zhang. 2017. “A Blockchain-Based Supply Chain Quality Management Framework.” In: *Proceedings of the 14th IEEE International Conference on E-Business Engineering* 172-176.

Cho, S., K. Lee, A. Cheong, W. G. No, and M. A. Vasarhelyi. 2021. Chain of Values: Examining the Economic Impacts of Blockchain on the Value-Added Tax System. *Journal of Management Information Systems* 38(2): 288-313.

Chod, J., N. Trichakis, G. Tsoukalas, H. Aspegren, and M. Weber. 2020. “On the Financing Benefits of Supply Chain Transparency and Blockchain Adoption.” *Management Science* 66(10): 4378-4396.

Choi, T. M. 2019. “Blockchain-Technology-Supported Platforms for Diamond Authentication and Certification in Luxury Supply Chains.” *Transportation Research Part E: Logistics and Transportation Review* 128: 17-29.

Choi, T. M. 2020a. “Supply Chain Financing Using Blockchain: Impacts on Supply Chains Selling Fashionable Products.” *Annals of Operations Research*. DOI:10.1007/s10479-020-03615-7.

Choi, T. M. 2020b. “Financing Product Development Projects in the Blockchain Era: Initial Coin Offerings Versus Traditional Bank Loans.” *IEEE Transactions on Engineering Management*. DOI:10.1109/TEM.2020.3032426.

Choi, T. M. 2021. “Creating All-Win by Blockchain Technology in Supply Chains: Impacts of Agents’ Risk Attitudes Towards Cryptocurrency.” *Journal of the Operational Research Society* 72(11): 2580-2595.

Choi, T. M., and S. Luo. 2019. “Data Quality Challenges for Sustainable Fashion Supply Chain Operations in Emerging Markets: Roles of Blockchain, Government Sponsors and Environment Taxes.” *Transportation Research Part E: Logistics and Transportation Review* 131: 139-152.

Choi, T. M., and T. Siqin. 2022. “Blockchain in Logistics and Production from Blockchain 1.0 to Blockchain 5.0: An Intra-Inter-Organizational Framework.” *Research Part E: Logistics and Transportation Review,* 160, 102653.

Choi, T. M., and X. Ouyang. 2021. “Initial Coin Offerings for Blockchain Based Product Provenance Authentication Platforms.” *International Journal of Production Economics* 233: 107995.

Choi, T. M., L. Feng, and R. Li. 2020. “Information Disclosure Structure in Supply Chains with Rental Service

Platforms in the Blockchain Technology Era." *International Journal of Production Economics*, 221, 107473.

Choi, T. M., S. Guo, and S. Luo. 2020. "When Blockchain Meets Social-Media: Will the Result Benefit Social Media nalytics for Supply Chain Operations Management?" *Transportation Research Part E: Logistics and Transportation Review* 135: 101860.

Choi, T. M., S. Guo, N. Liu, and X. Shi. 2020. "Optimal Pricing in on-Demand-Service-Platform-Operations with Hired Agents and Risk-Sensitive Customers in the Blockchain Era." *European Journal of Operational Research* 284(3): 1031-1042.

Choi, T. M., S. H. Chung, X. Sun, and X. Wen. 2021. "Using Blockchain to Improve Buffer-Stock-Sharing and Combat Cheating Behaviors Under Virtual Pooling." *IEEE Transactions on Engineering Management*, DOI:10.1109/TEM.2021.3108175.

Choi, T. M., X. Wen, X. Sun, and S. H. Chung. 2019. "The Mean-Variance Approach for Global Supply Chain Risk Analysis with Air Logistics in the Blockchain Technology Era." *Transportation Research Part E: Logistics and Transportation Review* 127: 178-191.

Chowdhury, S., O. Rodriguez-Espindola, P. Dey, and P. Budhwar. 2022. "Blockchain Technology Adoption for Managing Risks in Operations and Supply Chain Management: Evidence from the UK." *Annals of Operations Research*. DOI:10.1007/s10479-021-04487-1.

Cole, R., M. Stevenson, and J. Aitken. 2019. "Blockchain Technology: Implications for Operations and Supply Chain Management." *Supply Chain Management* 24(4): 469-483.

Constantinides, P., O. Henfridsson, and G. G. Parker. 2018. "Platforms and Infrastructures in the Digital Age." *Information Systems Research* 29(2): 381-400.

Cui, P., J. Dixon, U. Guin, and D. Dimase. 2019. "A Blockchain-Based Framework for Supply Chain Provenance." *IEEE Access* 7: 157113-157125.

Cui, T. H., A. Ghose, H. Halaburda, R. Iyengar, K. Pauwels, S. Sriram, C. Tucker, and S. Venkataraman. 2021. "Informational Challenges in Omnichannel Marketing: Remedies and Future Research." *Journal of Marketing* 85(1): 103-120.

de Boissieu, E., G. Kondrateva, P. Baudier, and C. Ammi. 2021. "The Use of Blockchain in the Luxury Industry: Supply Chains and the Traceability of Goods." Journal of Enterprise Information Management 34(5): 1318-1338.

De Giovanni, P. 2020. "Blockchain and Smart Contracts in Supply Chain Management: A Game Theoretic Model." *International Journal of Production Economics* 228: 107855.

Di Vaio, A., and L. Varriale. 2020. "Blockchain Technology in Supply Chain Management for Sustainable Performance: Evidence from the Airport Industry." *International Journal of Information Management* 52: 102014.

Ding, Q., S. Gao, J. Zhu, and C. Yuan. 2020. "Permissioned Blockchain-Based Double-Layer Framework for Product Traceability System." *IEEE Access* 8: 6209-6225.

Dong, C., C. Chen, X. Shi, and C. T. Ng. 2021. "Operations Strategy for Supply Chain Finance with Asset-

Backed Securitization: Centralization and Blockchain Adoption." *International Journal of Production Economics* 241: 108261.

Dolgui, A., D. Ivanov, S. Potryasaev, B. Sokolov, M. Ivanova, and F. Werner. 2020. "Blockchain-Oriented Dynamic Modelling of Smart Contract Design and Execution in the Supply Chain." *International Journal of Production Research* 58(7): 2184-2199.

Dolgui, A., and D. Ivanov. 2022. "5G in Digital Supply Chain and Operations Management: Fostering Flexibility, End-to-End Connectivity and Real-Time Visibility through End-to-End Connectivity and Real-Time Visibility through Internet-of-Everything." *International Journal of Production Research*. DOI:10.1080/00207543.2021.2002969.

Du, M., Q. Chen, J. Xiao, H. Yang, and X. Ma. 2020. "Supply Chain Finance Innovation Using Blockchain." *IEEE Transactions on Engineering Management* 67(4): 1045-1058.

Dubey, R., A. Gunasekaran, and C. R.H. Foropon. 2022. "Improving Information Alignment and Coordination in Humanitarian Supply Chain through Blockchain Technology." *Journal of Enterprise Information Management*. DOI:10.1108/JEIM-07-2022-0251.

Dubey, R., A. Gunasekaran, D. J. Bryde, Y. K. Dwivedi, and T. Papadopoulos. 2020. "Blockchain Technology for Enhancing Swift-Trust, Collaboration and Resilience within a Humanitarian Supply Chain Setting." *International Journal of Production Research* 58(11): 3381-3398.

Dubey, R., M. Gupta., P. Mikalef., and S. Akter. 2022. "Incorporating Blockchain Technology in Information Systems Research". *International Journal of Information Management*, 102573.

Dutta, P., T. M. Choi, S. Somani, and R. Butala. 2020. "Blockchain Technology in Supply Chain Operations: Applications, Challenges and Research Opportunities." *Transportation Research Part E: Logistics and Transportation Review* 142: 102067.

Epiphaniou, G., P. Pillai, M. Bottarelli, H. Al-Khateeb, M. Hammoudesh, and C. Maple. 2020. "Electronic Regulation of Data Sharing and Processing Using Smart Ledger Technologies for Supply-Chain Security." *IEEE Transactions on Engineering Management* 67(4): 1059-1073.

Erol, I., I. M. Ar, and I. Peker. 2022. "Scrutinizing Blockchain Applicability in Sustainable Supply Chains through an Integrated Fuzzy Multi-Criteria Decision Making Framework." *Applied Soft Computing* 116: 108331.

Fan, Z. P., X. Y. Wu, and B. B. Cao. 2022. "Considering the Traceability Awareness of Consumers: Should the Supply Chain Adopt the Blockchain Technology?" *Annals of Operations Research* 309(2): 837-860.

Feng, H., X. Wang, Y. Duan, J. Zhang, and X. Zhang. 2020. "Applying Blockchain Technology to Improve Agri-Food Traceability: A Review of Development Methods, Benefits and Challenges." *Journal of Cleaner Production* 260: 121031.

Ferdousi, T., D. Gruenbacher, and C. M. Scoglio. 2020. "A Permissioned Distributed Ledger for the US Beef Cattle Supply Chain." *IEEE Access* 8: 154833-154847.

Frizzo-Barker, J., P. A. Chow-White, P. R. Adams, J. Mentanko, D. Ha, and S. Green. 2020. "Blockchain as A Disruptive Technology for Business: A Systematic Review." *International Journal of Information*

Management 51: 102029.

Fu, Y., and J. Zhu. 2019. “Big Production Enterprise Supply Chain Endogenous Risk Management Based on Blockchain.” *IEEE Access* 7: 15310-15319.

Galvez, J. F., J. C. Mejuto, and J. Simal-Gandara. 2018. “Future Challenges on the Use of Blockchain for Food Traceability Analysis.” *TrAC-Trends in Analytical Chemistry* 107: 222-232.

George, R. V., H. O. Harsh, P. Ray, and A. K. Babu. 2019. “Food Quality Traceability Prototype for Restaurants Using Blockchain and Food Quality Data Index.” *Journal of Cleaner Production* 240: 118021.

Ghadge, A., M. Bourlakis, S. Kamble, and S. Seuring. 2022. “Blockchain Implementation in Pharmaceutical Supply Chains: A review and Conceptual Framework.” *International Journal of Production Research*. DOI:10.1080/00207543.2022.2125595.

Ghode, D., V. Yadav, R. Jain, and G. Soni. 2020. “Adoption of Blockchain in Supply Chain: An Analysis of Influencing Factors.” *Journal of Enterprise Information Management* 33(3): 437-456.

Ghode, D. J., V. Yadav, R. Jain, and G. Soni. 2021. “Blockchain Adoption in the Supply Chain: An Appraisal on Challenges.” *Journal of Manufacturing Technology Management* 32(1): 42-62.

Gong, Y., Y. Wang, R. Frei, B. Wang, and C. Zhao. 2022. “Blockchain Application in Circular Marine Plastic Debris Management.” *Industrial Marketing Management* 102: 164-176.

Guggenberger, T., A. Schweizer, and N. Urbach. 2020. “Improving Interorganizational Information Sharing for Vendor Managed Inventory: Toward A Decentralized Information Hub Using Blockchain Technology.” *IEEE Transactions on Engineering Management* 67(4): 1074-1085.

Guo, S., X. Sun, and H. K. S. Lam. 2020. “Applications of Blockchain Technology in Sustainable Fashion Supply Chains: Operational Transparency and Environmental Efforts.” *IEEE Transactions on Engineering Management*.” DOI:10.1109/TEM.2020.3034216.

Gurtu, A., and J. Johny. 2019. “Potential of Blockchain Technology in Supply Chain Management: A Literature Review.” *International Journal of Physical Distribution and Logistics Management* 49(9): 881-900.

Hackius, N., and M. Petersen. 2020. “Translating High Hopes into Tangible Benefits: How Incumbents in Supply Chain and Logistics Approach Blockchain.” *IEEE Access* 8: 34993-35003.

Hald, K. S., and A. Kinra. 2019. “How the Blockchain Enables and Constrains Supply Chain Performance.” *International Journal of Physical Distribution and Logistics Management*, 49(4): 376-397.

Hasan, H., E. AlHadhrami, A. AlDhaheri, K. Salah, and R. Jayaraman. 2019. “Smart Contract-Based Approach for Efficient Shipment Management.” *Computers & Industrial Engineering* 136: 149-159.

Hastig, G. M., and M. S. Sodhi. 2020. “Blockchain for Supply Chain Traceability: Business Requirements and Critical Success Factors.” *Production and Operations Management* 29(4): 935-954.

Helo, P., and Y. Hao. 2019. “Blockchains in Operations and Supply Chains: A Model and Reference Implementation.” *Computers & Industrial Engineering* 136: 242-251.

Hendershott, T., X. Zhang, J. Leon Zhao, and Z. Zheng. 2021. “Fintech as a Game Changer: Overview of Research Frontiers.” *Information Systems Research* 32(1): 1-17.

Howson, P. 2020. “Building Trust and Equity in Marine Conservation and Fisheries Supply Chain Management with Blockchain." *Marine Policy*, 115, 103873.

Ivanov, D., and A. Dolgui. 2022. "The Shortage Economy and its Implications for Supply Chain and Operations Management." *International Journal of Production Research*. DOI:10.1080/00207543.2022.2118889.

Jabbar, A., and S. Dani. 2020. "Investigating the Link Between Transaction and Computational Costs in a Blockchain Environment." *International Journal of Production Research* 58(11): 3423-3436.

Ji, G., S. Zhou, K. H. Lai, K. H. Tan, and A. Kumar. 2022. "Timing of Blockchain Adoption in a Supply Chain with Competing Manufacturers." *International Journal of Production Economics* 247: 108430.

Kamble, S., A. Gunasekaran, and H. Arha. 2019. "Understanding the Blockchain Technology Adoption in Supply Chains-Indian Context." *International Journal of Production Research* 57(7): 2009-2033.

Kamble, S. S., A. Gunasekaran, and R. Sharma. 2020. "Modeling the Blockchain Enabled Traceability in Agriculture Supply Chain." *International Journal of Information Management* 52: 101967.

Kamble, S. S., A. Gunasekaran, and S. A. Gawankar. 2020. "Achieving Sustainable Performance in a Data-Driven Agriculture Supply Chain: A Review for Research and Applications." *International Journal of Production Economics*, 219, 179-194.

Kamble, S. S., A. Gunasekaran, N. Subramanian, A. Ghadge, A. Belhadi, and M. Venkatesh. 2021. "Blockchain Technology's Impact on Supply Chain Integration and Sustainable Supply Chain Performance: Evidence from the Automotive Industry." *Annals of Operations Research*. DOI:10.1007/s10479-021-04129-6.

Karakas, S., A. Z. Acar, and B. Kucukaltan. 2021. "Blockchain Adoption in Logistics and Supply Chain: A Literature Review and Research Agenda." *International Journal of Production Research*. DOI:10.1080/00207543.2021.2012613.

Karamchandani, A., S. K. Srivastava, S. Kumar, and A. Srivastava. 2021. "Analysing Perceived Role of Blockchain Technology in SCM Context for the Manufacturing Industry." *International Journal of Production Research*, 59(11), 3398-3429.

Karamchandani, A., S. K. Srivastava, and R. K. Srivastava. 2020. "Perception-Based Model for Analyzing the Impact of Enterprise Blockchain Adoption on SCM in the Indian Service Industry." *International Journal of Information Management*, 52, 102019.

Katsikouli, P., A. S. Wilde, N. Dragoni, and H. Høgh-Jensen. 2021. "On the Benefits and Challenges of Blockchains for Managing Food Supply Chains." *Journal of the Science of Food and Agriculture* 101(6): 2175-2181.

Kayikci, Y., N. Subramanian, M. Dora, and M. S. Bhatia. 2022. "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." *Production Planning and Control* 33 (2–3): 301-321.

Khan, S. A. R., D. I. Godil, C. J. C. Jabbour, S. Shujaat, A. Razzaq, and Z. Yu. 2021. "Green Data Analytics, Blockchain Technology for Sustainable Development, and Sustainable Supply Chain Practices: Evidence from Small and Medium Enterprises." *Annals of Operations Research*. DOI:10.1007/s10479-021-04275-x.

Khan, H. H., M. N. Malik, Z. Konečná, A. Gholamzadeh C., F. A. Goni, and J. J. Klemeš. 2022. "Blockchain Technology for Agricultural Supply Chains during the COVID-19 Pandemic: Benefits and Cleaner Solutions." *Journal of Cleaner Production* 347: 131268.

Kittipanya-ngam, P., and K. H. Tan. 2020. "A Framework for Food Supply Chain Digitalization: Lessons from Thailand." *Production Planning and Control* 31(2-3): 158-172.

Ko, T., J. Lee, and D. Ryu. 2018. "Blockchain Technology and Manufacturing Industry: Real-Time Transparency and Cost Savings." *Sustainability* 10(11): 1-20.

Koh, L., A. Dolgui, and J. Sarkis. 2020. "Blockchain in Transport and Logistics-Paradigms and Transitions." *International Journal of Production Research* 58(7): 2054-2062.

Köhler, S., and M. Pizzol. 2020. "Technology Assessment of Blockchain-Based Technologies in the Food Supply Chain." *Journal of Cleaner Production* 269: 122193.

Kouhizadeh, M., and J. Sarkis. 2018. "Blockchain Practices, Potentials, and Perspectives in Greening Supply Chains." *Sustainability* 10(10): 3652.

Kouhizadeh, M., S. Saberi., and J. Sarkis. 2021. "Blockchain Technology and the Sustainable Supply Chain: Theoretically Exploring Adoption Barriers." *International Journal of Production Economics* 231*,* 107831.

Kshetri, N. 2018. "1 Blockchain's Roles in Meeting Key Supply Chain Management Objectives." *International Journal of Information Management* 39: 80-89.

Kshetri, N. 2021. "Blockchain and Sustainable Supply Chain Management in Developing Countries." *International Journal of Information Management* 60: 102376.

Kucukaltan, B., R. Kamasak, B. Yalcinkaya, and Z. Irani. 2022. "Investigating the Themes in Supply Chain Finance: The Emergence of Blockchain as a Disruptive Technology." *International Journal of Production Research*. DOI:10.1080/00207543.2022.2118886.

Kumar, A., R. Liu, and Z. Shan. 2020. "Is Blockchain a Silver Bullet for Supply Chain Management? Technical Challenges and Research Opportunities." *Decision Sciences* 51(1): 8-37.

Li, G., J. Xue., N. Li, and D. Ivanov. 2022. "Blockchain-Supported Business Model Design, Supply Chain Resilience, and Firm Performance." *Transportation Research Part E: Logistics and Transportation Review* 163: 1-18.

Li, G., Z. P. Fan, and X. Y. Wu. 2021. "The Choice Strategy of Authentication Technology for Luxury E-Commerce Platforms in the Blockchain Era." *IEEE Transactions on Engineering Management*. DOI:10.1109/TEM.2021.3076606.

Li, J., Maiti, A., Springer, M., and Gray, T. 2020a. "Blockchain for Supply Chain Quality Management: Challenges and Opportunities in Context of Open Manufacturing and Industrial Internet of Things." *International Journal of Computer Integrated Manufacturing*, 33(12), 1321-1355.

Li, K., J. Y. Lee, and A. Gharehgozli. 2021. "Blockchain in Food Supply Chains: A Literature Review and Synthesis Analysis of Platforms, Benefits and Challenges." *International Journal of Production Research*. DOI:10.1080/00207543.2021.1970849.

Li, M., L. Shen, and G. Q. Huang. 2019. "Blockchain-Enabled Workflow Operating System for Logistics

Resources Sharing in E-Commerce Logistics Real Estate Service." *Computers & Industrial Engineering* 135: 950-969.

Li, Q., H. Ji, and Y. Huang. 2022. "The Information Leakage Strategies of the Supply Chain under the Block Chain Technology Introduction." *Omega* 110: 102616.

Li, Y., S. Jiang, J. Shi, and Y. Wei. 2021a. "Pricing Strategies for Blockchain Payment Service under Customer Heterogeneity." *International Journal of Production Economics*, 242, 108282.

Li, Z., H. Guo, A. V. Barenji, W. M. Wang, Y. Guan, and G. Q. Huang. 2020b. "A Sustainable Production Capability Evaluation Mechanism Based on Blockchain, LSTM, Analytic Hierarchy Process for Supply Chain Network." *International Journal of Production Research* 58(24): 7399-7419.

Li, Z., X. Xu, Q. Bai, X. Guan, and K. Zeng. 2021b. "The Interplay between Blockchain Adoption and Channel Selection in Combating Counterfeits." *Transportation Research Part E: Logistics and Transportation Review*, *155*(September), 102451.

Lim, M. K., Y. Li, C. Wang, and M. L. Tseng. 2021. "A Literature Review of Blockchain Technology Applications in Supply Chains: A Comprehensive Analysis of Themes, Methodologies and Industries." *Computers & Industrial Engineering* 154: 107133.

Liu, H. 2022. "Combating Unethical Producer Behavior: The Value of Traceability in Produce Supply Chains." *International Journal of Production Economics* 244, 108374.

Liu, J., H. Zhang, and L. Zhen. 2021. "Blockchain Technology in Maritime Supply Chains: Applications, Architecture and Challenges." *International Journal of Production Research*. DOI:10.1080/00207543.2021.1930239.

Liu, L., Y. Li, and T. Jiang. 2021. "Optimal Strategies for Financing a Three-level Supply Chain through Blockchain Platform Finance." *International Journal of Production Research*. DOI:10.1080/00207543.2021.2001601.

Liu, M., X. Zhang, and H. Wu. 2021. "The Impact of Platform Restriction on Manufacturer Quality Transparency in the Blockchain Era." *International Journal of Production Research*. DOI:10.1080/00207543.2021.1972180.

Liu, P., Y. Long, H. C. Song, and Y. D. He. 2020. "Investment Decision and Coordination of Green Agri-Food Supply Chain Considering Information Service based on Blockchain and Big Data." *Journal of Cleaner Production* 277: 123646.

Liu, R., C. Tan, and C. Zhao. 2021. "Pricing and Coordination of Vaccine Supply Chain Based on Blockchain Technology." *Internet Research* 31(6): 2096-2119.

Liu, X., A. V. Barenji, Z. Li, B. Montreuil, and G. Q. Huang. 2021a. "Blockchain-Based Smart Tracking and Tracing Platform for Drug Supply Chain." *Computers & Industrial Engineering* 161: 107669.

Liu, Y., D. Ma, J. Hu, and Z. Zhang. 2021b. "Sales Mode Selection of Fresh Food Supply Chain based on Blockchain Technology under Different Channel Competition." *Computers & Industrial Engineering* 162: 107730.

Liu, Z., and Z. Li. 2020. "A Blockchain-Based Framework of Cross-Border E-Commerce Supply Chain."

International Journal of Information Management 52: 102059.

Lohmer, J., N. Bugert, and R. Lasch. 2020. "Analysis of Resilience Strategies and Ripple Effect in Blockchain-Coordinated Supply Chains: An Agent-Based Simulation Study." *International Journal of Production Economics* 228: 107882.

Longo, F., L. Nicoletti, A. Padovano, G. d'Atri, and M. Forte. 2019. "Blockchain-Enabled Supply Chain: An Experimental Study." *Computers & Industrial Engineering* 136: 57-69.

Lu, Q., and X. Xu. 2017. "Adaptable Blockchain-Based Systems: A Case Study for Product Traceability." *IEEE Software* 34(6): 21-27.

Lumineau, F., W. Wang, and O. Schilke. 2021. "Blockchain Governance — A New Way of Organizing Collaborations?" *Organization Science* 32 (2): 500-521.

Luo, S., and T. M. Choi. 2022. "E-commerce Supply Chains with Considerations of Cyber-Security: Should Governments Play a Role?" *Production and Operations Management*, 31(5): 2107-2126.

Maity, M., A. Tolooie, A. K. Sinha, and M. K. Tiwari. 2021. "Stochastic Batch Dispersion Model to Optimize Traceability and Enhance Transparency Using Blockchain." *Computers & Industrial Engineering* 154: 107134.

Malhotra, A., H. O'Neill, P. Stowell. 2022. "Thinking Strategically about Blockchain Adoption and Risk Mitigation." *Business Horizons*, 65(2): 159-171.

Mangla, S. K., Y. Kazancoglu, E. Ekinci, M. Liu, M. Özbiltekin, and M. D. Sezer. 2021. "Using System Dynamics to Analyze the Societal Impacts of Blockchain Technology in Milk Supply Chainsrefer." *Transportation Research Part E: Logistics and Transportation Review*, 149, 102289.

Manupati, V. K., T. Schoenherr, M. Ramkumar, S. M. Wagner, S. K. Pabba, and R. I. R. Singh. 2020. "A Blockchain-Based Approach for a Multi-Echelon Sustainable Supply Chain." *International Journal of Production Research* 58(7): 2222-2241.

Manupati, V. K., T. Schoenherr, M. Ramkumar, S. Panigrahi, Y. Sharma, and P. Mishra. 2022. "Recovery Strategies for a Disrupted Supply Chain Network: Leveraging Blockchain Technology in Pre- and Post-Disruption Scenarios." *International Journal of Production Economics* 245: 108389.

Martinez, V., M. Zhao, C. Blujdea, X. Han, A. Neely, and P. Albores. 2019. "Blockchain-Driven Customer Order Management." *International Journal of Operations and Production Management* 39(6): 993-1022.

Mathivathanan, D., K. Mathiyazhagan, N. P. Rana, S. Khorana, and Y. K. Dwivedi. 2021. "Barriers to the Adoption of Blockchain Technology in Business Supply Chains: A Total Interpretive Structural Modelling (TISM) Approach." *International Journal of Production Research* 59(11): 3338-3359.

Mehta, D., S. Tanwar, U. Bodkhe, A. Shukla, and N. Kumar. 2021. "Blockchain-Based Royalty Contract Transactions Scheme for Industry 4.0 Supply-Chain Management." *Information Processing and Management* 58(4): 102586.

Menon, S., and K. Jain. 2021. "Blockchain Technology for Transparency in Agri-Food Supply Chain: Use Cases, Limitations, and Future Directions." *IEEE Transactions on Engineering Management*. DOI:10.1109/TEM.2021.3110903.

Mentzer, J. T., W. DeWitt, J. S. Keebler, S. Min, N. W. Nix, C. D. Smith, and Z. G. Zacharia. 2001. "Defining Supply Chain Management." *Journal of Business Logistics* 22(2): 1-25.

Meyer, T., M. Kuhn, and E. Hartmann. 2019. "Blockchain Technology Enabling the Physical Internet: A Synergetic Application Framework." *Computers & Industrial Engineering* 136: 5-17.

Min, H. 2019. "Blockchain Technology for Enhancing Supply Chain Resilience." *Business Horizons* 62(1): 35-45.

Montecchi, M., K. Plangger., and D. C. West. 2021. "Supply Chain Transparency: A Bibliometric Review and Research Agenda." *International Journal of Production Economics* 238, 108152.

Müßigmann, B., H. von der Gracht, and E. Hartmann. 2020. "Blockchain Technology in Logistics and Supply Chain Management: A Bibliometric Literature Review from 2016 to January 2020." *IEEE Transactions on Engineering Management* 67(4): 988-1007.

Nandi, M. L., S. Nandi, H. Moya, and H. Kaynak. 2020. "Blockchain Technology-Enabled Supply Chain Systems and Supply Chain Performance: A Resource-Based View." *Supply Chain Management* 25(6): 841-862.

Narwane, V. S., R. D. Raut., S. K. Mangla, M. Dora, and B. E. Narkhede. 2021. "Risks to Big Data Analytics and Blockchain Technology Adoption in Supply Chains." *Annals of Operations Research*. DOI:10.1007/s10479-021-04396-3.

Nayal, K., R. D. Raut, B. E. Narkhede, P. Priyadarshinee, G. B. Panchal, and V. V. Gedam. 2021. "Antecedents for Blockchain Technology-Enabled Sustainable Agriculture Supply Chain." *Annals of Operations Research*. DOI:10.1007/s10479-021-04423-3.

Niknejad, N., W. Ismail, M. Bahari, R. Hendradi, and A. Z. Salleh. 2021. "Mapping the Research Trends on Blockchain Technology in Food and Agriculture Industry: A Bibliometric Analysis." *Environmental Technology and Innovation* 21: 101272.

Niu, B., J. Dong, and Y. Liu. 2021. "Incentive Alignment for Blockchain Adoption in Medicine Supply Chains." *Transportation Research Part E: Logistics and Transportation Review* 152: 102276.

Niu, B., J. Dong, Z. Dai, and J. Y. Jin. 2022. "Market Expansion vs. Intensified Competition: Overseas Supplier's Adoption of Blockchain in a Cross-Border Agricultural Supply Chain." *Electronic Commerce Research and Applications* 51: 101113.

Niu, B., H. Xu, and L. Chen. 2022. "Creating All-Win by Blockchain in a Remanufacturing Supply Chain with Consumer Risk-Aversion and Quality Untrust." *Transportation Research Part E: Logistics and Transportation Review* 163: 102778.

Niu, B., H. Xu, and Z. Dai. 2022. "Check Only Once? Health Information Exchange between Competing rivate Hospitals." *Omega* 107: 102556.

Niu, B., Z. Mu, B. Cao, and J. Gao. 2021. "Should Multinational Firms Implement Blockchain to Provide Quality Verification?" *Transportation Research Part E: Logistics and Transportation Review* 145: 102121.

Niu, B., Z. Shen, and F. Xie. 2021. "The Value of Blockchain and Agricultural Supply Chain Parties'

Participation Confronting Random Bacteria Pollution." *Journal of Cleaner Production* 319: 128579.

Omar, I. A., M. Debe, R. Jayaraman, K. Salah, M. Omar, and J. Arshad. 2022a. "Blockchain-Based Supply Chain Traceability for COVID-19 Personal Protective Equipment." *Computers and Industrial Engineering* 167.: 107995.

Omar, I. A.., R. Jayaraman., K. Salah., M. Debe., M. Omar. 2020. "Enhancing Vendor Managed Inventory Supply Chain Operations Using Blockchain Smart Contracts". *IEEE Access* 182704- 182719.

Omar, I. A., R. Jayaraman, M. S. Debe, H. R. Hasan, K. Salah, and M. Omar. 2022b. "Supply Chain Inventory Sharing Using Ethereum Blockchain and Smart Contracts." *IEEE Access* 102345-102356.

Orji, I. J., S. Kusi-Sarpong, S. Huang, and D. Vazquez-Brust. 2020. "Evaluating the Factors that Influence Blockchain Adoption in the Freight Logistics Industry." *Transportation Research Part E: Logistics and Transportation Review* 141: 102025.

Raj, P. V. R. P., S. K. Jauhar, M. Ramkumar, and S. Pratap. 2022. "Procurement, Traceability and Advance Cash Credit Payment Transactions in Supply Chain Using Blockchain Smart Contracts." *Computers and Industrial Engineering* 167: 108038.

Pan, X., X. Pan, M. Song, B. Ai, and Y. Ming. 2020. "Blockchain Technology and Enterprise Operational Capabilities: An Empirical Test." *International Journal of Information Management* 52: 101946.

Paul, T., N. Islam, S. Mondal, and S. Rakshit. 2022. "RFID-Integrated Blockchain-Driven Circular Supply Chain Management: A System Architecture for B2B Tea Industry." *Industrial Marketing Management* 101: 238-257.

Paul, T., S. Mondal, N. Islam, and S. Rakshit. 2021. "The Impact of Blockchain Technology on the Tea Supply Chain and Its Sustainable Performance." *Technological Forecasting and Social Change* 173: 121163.

Pournader, M., Y. Shi, S. Seuring, and S. C. L. Koh. 2020. "Blockchain Applications in Supply Chains, Transport and Logistics: A Systematic Review of the Literature." *International Journal of Production Research* 58(7): 2063-2081.

Pun, H., J. M. Swaminathan, and P. Hou. 2021. "Blockchain Adoption for Combating Deceptive Counterfeits." *Production and Operations Management* 30(4): 864-882.

Quayson, M., C. Bai, and J. Sarkis. 2021. "Technology for Social Good Foundations: A Perspective from the Smallholder Farmer in Sustainable Supply Chains." *IEEE Transactions on Engineering Management* 68(3): 894-898.

Queiroz, M. M., R. Telles, and S. H. Bonilla. 2020. "Blockchain and Supply Chain Management Integration: A Systematic Review of the Literature." *Supply Chain Management 25*(2): 241-254.

Queiroz, M. M., and S. F. Wamba. 2019. "Blockchain Adoption Challenges in Supply Chain: An Empirical Investigation of the Main Drivers in India and the USA." *International Journal of Information Management* 46: 70-82.

Queiroz, M. M., S. F. Wamba, M. De Bourmont, and R. Telles. 2021. "Blockchain Adoption in Operations and Supply Chain Management: Empirical Evidence from an Emerging Economy." *International Journal of Production Research* 59(20): 6087-6103.

Rahmanzadeh, S., M. S. Pishvaee, and M. R. Rasouli. 2020. "Integrated Innovative Product Design and Supply Chain Tactical Planning within a Blockchain Platform." *International Journal of Production Research* 58(7): 2242-2262.

Rao, S., A. Gulley, M. Russell, and J. Patton. 2021. "On the Quest for Supply Chain Transparency through Blockchain: Lessons Learned from Two Serialized Data Projects." *Journal of Business Logistics* 42(1): 88-100.

Reddy, K. R. K., A. Gunasekaran, P. Kalpana, V. R. Sreedharan, and S. A. Kumar. 2021. "Developing a Blockchain Framework for the Automotive Supply Chain: A Systematic Review." *Computers & Industrial Engineering* 157: 107334.

Roeck, D., H. Sternberg, and E. Hofmann. 2020. "Distributed Ledger Technology in Supply Chains: A Transaction Cost Perspective." *International Journal of Production Research* 58(7): 2124-2141.

Rogerson, M., and G. C. Parry. 2020. "Blockchain: Case Studies in Food Supply Chain Visibility." *Supply Chain Management* 25(5): 601-614.

Saberi, S., M. Kouhizadeh, J. Sarkis, and L. Shen. 2019. "Blockchain Technology and Its Relationships to Sustainable Supply Chain Management." *International Journal of Production Research* 57(7): 2117-2135.

Salah, K., N. Nizamuddin, R. Jayaraman, and M. Omar. 2019. "Blockchain-Based Soybean Traceability in Agricultural Supply Chain." *IEEE Access* 7: 73295-73305.

Samad, T. A., R. Sharma, K. K. Ganguly, S. F. Wamba, and Geetika Jain. 2022. "Enablers to the Adoption of Blockchain Technology in Logistics Supply Chains: Evidence from an Emerging Economy." *Annals of Operations Research.* DOI:10.1007/s10479-022-04546-1.

Saurabh, S., and K. Dey. 2021. "Blockchain Technology Adoption, Architecture, and Sustainable Agri-Food Supply Chains." *Journal of Cleaner Production* 284: 124731.

Schmidt, C. G., and S. M. Wagner. 2019. "Blockchain and Supply Chain Relations: A Transaction Cost Theory Perspective." *Journal of Purchasing and Supply Management* 25(4): 100552.

Shen, B., C. Dong, and S. Minner. 2022. "Combating Copycats in the Supply Chain with Permissioned Blockchain Technology." *Production and Operations Management* 3(1): 138-154.

Shen, B., M. Cheng, C. Dong, and Y. Xiao. 2021. "Battling Counterfeit Masks during the COVID-19 Outbreak: Quality Inspection vs. Blockchain Adoption." *International Journal of Production Research*. DOI:10.1080/00207543.2021.1961038

Shen, B., X. Xu, and Q. Yuan. 2020. "Selling Secondhand Products through an Online Platform with Blockchain." *Transportation Research Part E: Logistics and Transportation Review*, 142, 102066.

Shi, X., S. Yao, and S. Luo. 2021. "Innovative Platform Operations with the Use of Technologies in the Blockchain Era." *International Journal of Production Research*. DOI:10.1080/00207543. 2021.1953182.

Sodhi, M. S., and C. S. Tang. 2019. "Research Opportunities in Supply Chain Transparency." *Production and Operations Management* 28(12): 2946-2959.

Song, Y., J. Liu, W. Zhang, and J. Li. 2022. "Blockchain's Role in E-Commerce Sellers' Decision-Making on Information Disclosure under Competition." *Annals of Operations Research*. DOI:10.1007/ s10479-021-

04276-w.
Sternberg, H. S., E. Hofmann, and D. Roeck. 2021. "The Struggle is Real: Insights from a Supply Chain Blockchain Case." *Journal of Business Logistics* 42(1): 71-87.
Sundarakani, B., A. Ajaykumar, and A. Gunasekaran. 2021. "Big Data Driven Supply Chain Design and Applications for Blockchain: An Action Research Using Case Study Approach." *Omega* 102: 102452.
Sunny, J., N. Undralla, and V. M. Pillai 2020. "Supply Chain Transparency Through Blockchain-Based Traceability: An Overview with Demonstration." *Computers & Industrial Engineering* 150: 106895.
Tan, Y. 2022. "Implications of Blockchain-Powered Marketplace of Pre-owned Virtual Goods." *Production and Operations Management*. DOI:10.1111/poms.13657.
Tandon, A., P. Kaur, M. Mäntymäki, and A. Dhir. 2021. "Blockchain Applications in Management: A Bibliometric Analysis and Literature Review." *Technological Forecasting and Social Change* 166: 120649.
Tao, F., Y. Y. Wang, and S. H. Zhu. 2022. "Impact of Blockchain Technology on the Optimal Pricing and Quality Decisions of Platform Supply Chains." *International Journal of Production Research*. DOI:10.1080/00207543.2022.2050828.
Tian, F. 2016. "An Agri-Food Supply Chain Traceability System for China Based on RFID & Blockchain Technology." *Service systems and service management (ICSSSM), 2016 13th international conference on*, June, Kunming, China. IEEE, 1-6.
Tian, F. 2017. "A Supply Chain Traceability System for Food Safety Based on HACCP, Blockchain & Internet of Things." *Service systems and service management (ICSSSM), 2017 international conference on*, June, Dalian, China. IEEE, 1-6.
Tian, Z., R. Y. Zhong, A.V. Barenji, Y. T. Wang, Z. Li, and Y. Rong. 2021. "A Blockchain-Based Evaluation Approach for Customer Delivery Satisfaction in Sustainable Urban Logistics." *International Journal of Production Research* 59(7): 2229-2249.
Tsang, Y. P., K. L. Choy, C. H. Wu, G. T. S. Ho, and H. Y. Lam. 2019. "Blockchain-Driven IoT for Food Traceability with an Integrated Consensus Mechanism." *IEEE Access* 7: 129000-129017.
Tsolakis, N., D. Niedenzu, M. Simonetto, M. Dora, and M. Kumar. 2021. "Supply Network Design to Address United Nations Sustainable Development Goals: A Case Study of Blockchain Implementation in Thai Fish Industry." *Journal of Business Research* 131: 495-519.
Tönnissen, S., and F. Teuteberg. 2020. "Analysing the Impact of Blockchain-Technology for Operations and Supply Chain Management: An Explanatory Model Drawn from Multiple Case Studies." *International Journal of Information Management* 52: 101953.
Toyoda, K., P. T. Mathiopoulos, I. Sasase, and T. Ohtsuki. 2017. "A Novel Blockchain-Based Product Ownership Management System (POMS) for Anti-counterfeits in the Post Supply Chain." *IEEE Access* 5: 17465-17477.
Tozanlı, Ö., E. Kongar, and S. M. Gupta. 2020. "Trade-in-to-Upgrade as a Marketing Strategy in Disassembly-to-Order Systems at the Edge of Blockchain Technology." *International Journal of Production Research*

58(23): 7183-7200.

Treiblmaier, H. 2018. "The Impact of the Blockchain on the Supply Chain: A Theory-Based Research Framework and a Call for Action." *Supply Chain Management,* 23(6): 545-559.

Vafadarnikjoo, A., H. Badri Ahmadi, J. J. H. Liou, T. Botelho, and K. Chalvatzis. 2021. "Analyzing Blockchain Adoption Barriers in Manufacturing Supply Chains by the Neutrosophic Analytic Hierarchy Process." *Annals of Operations Research*. DOI:10.1007/s10479-021-04048-6.

van Hoek, R. 2020a. "Developing a Framework for Considering Blockchain Pilots in the Supply Chain - Lessons from Early Industry Adopters." *Supply Chain Management*, 25(1), 115-121.

van Hoek, R. 2019. "Exploring Blockchain Implementation in the Supply Chain: Learning from Pioneers and RFID Research." *International Journal of Operations and Production Management* 39(6): 829-859.

van Hoek, R. 2020b. "Unblocking the Chain: Findings from an Executive Workshop on Blockchain in the Supply Chain." *Supply Chain Management* 25(2): 255-261.

Vu, N., A. Ghadge, and M. Bourlakis. 2021. "Blockchain Adoption in Food Supply Chains: A Review and Implementation Framework." *Production Planning and Control*. DOI:10.1080/09537287.2021. 1939902.

Wamba, S, F., J. R. K. Kamdjoug, R. E. Bawack, and J. G. Keogh. 2020. "Bitcoin, Blockchain and Fintech: A Systematic Review and Case Studies in the Supply Chain." *Production Planning and Control* 31(2–3): 115-142.

Wamba, S, F., M. M. Queiroz, and L. Trinchera. 2020. "Dynamics Between Blockchain Adoption Determinants and Supply Chain Performance: An Empirical Investigation." *International Journal of Production Economics* 229: 107791.

Wang, B., W. Luo, A. Zhang, Z. Tian, and Z. Li. 2020a. "Blockchain-Enabled Circular Supply Chain Management: A System Architecture for Fast Fashion." *Computers in Industry*, 123, 103324.

Wang, J., J. Liu, F. Wang, and X. Yue. 2021a. "Blockchain Technology for Port Logistics Capability: Exclusive or Sharing." *Transportation Research Part B: Methodological* 149: 347-392.

Wang, L., X. R. Luo, F. Lee, and J. Benitez. 2021b. "Value Creation in Blockchain-Driven Supply Chain Finance." *Information and Management* 103510.

Wang, Y., C. H. Chen, and A. Zghari-Sales. 2021. "Designing a Blockchain Enabled Supply Chain." *International Journal of Production Research* 59(5): 1450-1475.

Wang, Y., J. H. Han, and P. Beynon-Davies. 2019. "Understanding Blockchain Technology for Future Supply Chains: A Systematic Literature Review and Research Agenda." *Supply Chain Management* 24(1): 62-84.

Wang, Y., M. Singgih, J. Wang, and M. Rit. 2019. "Making Sense of Blockchain Technology: How Will it Transform Supply Chains?" *International Journal of Production Economics* 211: 221-236.

Wang, Y. Y., F., Tao, and J. Wang. 2021. "Information Disclosure and Blockchain Technology Adoption Strategy for Competing Platforms." *Information and Management*, 103506.

Wang, Z., T. Wang, H. Hu, J. Gong, X. Ren, and Q. Xiao. 2020b. "Blockchain-Based Framework for Improving Supply Chain Traceability and Information Sharing in Precast Construction." *Automation in Construction*

111: 10306.

Wang, Z., Z. Zheng, W. Jiang, and S. Tang. 2021c. "Blockchain-Enabled Data Sharing in Supply Chains: Model, Operationalization, and Tutorial." *Production and Operations Management* 30(7): 1965-1985.

Wong, L. W., G. W. H. Tan, V. H. Lee, K. B. Ooi, and A. Sohal. 2020a. "Unearthing the Determinants of Blockchain Adoption in Supply Chain Management." *International Journal of Production Research* 58(7): 2100-2123.

Wong, L. W., L. Y. Leong, J. J. Hew, G. W. H. Tan, and K. B. Ooi. 2020b. "Time to Seize the Digital Evolution: Adoption of Blockchain in Operations and Supply Chain Management among Malaysian SMEs." *International Journal of Information Management* 52: 101997.

Wu, J., and J. Yu. 2022. "Blockchain's Impact on Platform Supply Chains: Transaction Cost and Information Transparency Perspectives." *International Journal of Production Research*. DOI:10.1080/00207543.2022.2027037.

Wu, X. Y., Z. P. Fan, and B. B. Cao. 2021. "An Analysis of Strategies for Adopting Blockchain Technology in the Fresh Product Supply Chain." *International Journal of Production Research*. DOI:10.1080/00207543.2021.1894497.

Xia, Y., W. Zeng, X. Xing, Y. Zhan, K. H. Tan, and A. Kumar. 2021. "Joint Optimisation of Drone Routing and Battery Wear for Sustainable Supply Chain Development: A Mixed-Integer Programming Model Based on Blockchain-Enabled Feet Sharing." *Annals of Operations Research*. DOI:10.1007/s10479-021-04459-5.

Xing, G., Z. Duan, W. Yan, and M. Baykal-Gürsoy. 2021. "Evaluation of "Innovation Chain + Supply Chain" Fusion Driven by Blockchain Technology under Typical Scenario." *International Journal of Production Economics*, 242, 108284.

Xu, J., and Y. Duan. 2022. "Pricing and Greenness Investment for Green Products with Government Subsidies: When to Apply Blockchain Technology?" *Electronic Commerce Research and Applications* 51: 101108.

Xu, Q., and Y. He. 2021. "Optimal Information Disclosure Strategies for a Retail Platform in the Blockchain Technology Era." *International Journal of Production Research*. DOI:10.1080/00207543.2021. 1976434.

Xu, X., L. Tatge, X. Xu., and Y. Liu. 2022. "Blockchain Applications in the Supply Chain Management in German Automotive Industry." *Production Planning and Control*. DOI:10.1080/09537287. 2022.2044073.

Xu, X., and T. M. Choi. 2021. "Supply Chain Operations with Online Platforms under the Cap-and-Trade Regulation: Impacts of Using Blockchain Technology." *Transportation Research Part E: Logistics and Transportation Review* 155: 102491.

Xu, X., M. Zhang, G. Dou, and Y. Yu. 2021. "Coordination of a Supply Chain with an Online Platform Considering Green Technology in the Blockchain Era." *International Journal of Production Research*. DOI:10.1080/00207543.2021.1894367.

Xu, X., and Y. Yang. 2021. "Analysis of Logistics Port Transportation Efficiency Evaluation Based on the Block Chain Technology." *Annals of Operations Research*. DOI:10.1007/s10479-021-04379-4

Xue, X., J. Dou, and Y. Shang. 2021. "Blockchain-Driven Supply Chain Decentralized Operations-Information Sharing Perspective." *Business Process Management Journal* 27(1): 184-203.

Yadav, V. S., A. R. Singh, R. D. Raut, and U. H. Govindarajan. 2020. "Blockchain Technology Adoption Barriers in the Indian Agricultural Supply Chain: An Integrated Approach." *Resources, Conservation and Recycling* 161: 104877.

Yadav, V. S., A. R. Singh, R. D. Raut, and N. Cheikhrouhou. 2021. "Blockchain Drivers to Achieve Sustainable Food Security in the Indian Context." *Annals of Operations Research*. DOI:10.1007/s10479-021-04308-5.

Yang, C. S. 2019. "Maritime Shipping Digitalization: Blockchain-Based Technology Applications, Future Improvements, and Intention to Use." *Transportation Research Part E: Logistics and Transportation Review* 131: 108-117.

Yang, L., J. Zhang, and X. Shi. 2021. "Can Blockchain Help Food Supply Chains with Platform Operations during the COVID-19 Outbreak?" *Electronic Commerce Research and Applications* 49: 101093.

Yang, L., Y. Ni, and C. T. Ng. 2022. "Blockchain-Enabled Traceability and Producer's Incentive to Outsource Delivery." *International Journal of Production Research*. DOI:10.1080/00207543.2022. 2072785.

Yong, B., J. Shen, X. Liu, F. Li, H. Chen, and Q. Zhou. 2020. "An Intelligent Blockchain-Based System for Safe Vaccine Supply and Supervision." *International Journal of Information Management* 52: 102024.

Yoon, J., S. Talluri, H. Yildiz, and C. Sheu. 2020. "The Value of Blockchain Technology Implementation in International Trades under Demand Volatility Risk." *International Journal of Production Research* 58(7): 2163-2183.

Yousefi, S., and B. M. Tosarkani. 2022. "An Analytical Approach for Evaluating the Impact of Blockchain Technology on Sustainable Supply Chain Performance." *International Journal of Production Economics* 246: 108429.

Yu, Y., G. Huang, and X. Guo. 2021. "Financing Strategy Analysis for a Multi-Sided Platform with Blockchain Technology." *International Journal of Production Research* 59(15): 4513-4532.

Zeng, M., K. Sadeghzadeh, and T. Xiong. 2022. "A Three-Echelon Based Sustainable Supply Chain Scheduling Decision-Making Framework under the Blockchain Environment." *International Journal of Production Research*. DOI:10.1080/00207543.2022.2059719.

Zhang, T., P. Li, and N. Wang. 2021. "Multi-Period Price Competition of Blockchain-Technology-Supported and Traditional Platforms under Network Effect." *International Journal of Production Research*. DOI:10.1080/00207543.2021.1884308.

Zhang, X., P. Sun, J. Xu, X. Wang, J. Yu, Z. Zhao, and Y. Dong. 2020. "Blockchain-Based Safety Management System for the Grain Supply Chain." *IEEE Access* 8: 36398-36410.

Zhang, Y., N. Liu. 2022. "Blockchain Adoption in Serial Logistics Service Chain: Value and Challenge." *International Journal of Production Research*. DOI:10.1080/00207543.2022.2132312.

Zhang, Z., D. Ren, Y. Lan, and S. Yang. 2022. "Price Competition and Blockchain Adoption in Retailing Markets." *European Journal of Operational Research* 300(2): 647-660.

Zhao, G., S. Liu, C. Lopez, H. Lu, S. Elgueta, H. Chen, and B. M. Boshkoska. 2019. "Blockchain Technology in Agri-Food Value Chain Management: A Synthesis of Applications, Challenges and Future Research Directions." *Computers in Industry* 109: 83-99.

Zheng, K., Z. Zhang, and J. Gauthier. 2022. "Blockchain-Based Intelligent Contract for Factoring Business in Supply Chains." *Annals of Operations Research* 308: 777-797

Zhong, H., F. Zhang, and Y. Gu. 2021. "A Stackelberg Game Based Two-Stage Framework to Make Decisions of Freight Rate for Container Shipping Lines in the Emerging Blockchain-Based Market." *Transportation Research Part E: Logistics and Transportation Review* 149: 102303.

Zhou, Z., X. Liu, F. Zhong, and J. Shi. 2022. "Improving the Reliability of the Information Disclosure in Supply Chain Based on Blockchain Technology." *Electronic Commerce Research and Applications* 52: 101121.

Zhu, P., J. Hu, Y. Zhang, and X. Li. 2020. "A Blockchain Based Solution for Medication Anti-Counterfeiting and Traceability." *IEEE Access* 8: 184256-184272.

Zhu, Q., C. Bai, and J. Sarkis. 2022. "Blockchain Technology and Supply Chains: The Paradox of the Atheoretical Research Discourse." *Transportation Research Part E* 164: 102824.

Zhu, Q., M. Kouhizadeh, and J. Sarkis. 2022. "Formalising Product Deletion across the Supply Chain: Blockchain Technology as a Relational Governance Mechanism." *International Journal of Production Research* 60(1): 92-110.