Annals of Operations Research
https://doi.org/10.1007/s10479-022-05069-5

ORIGINAL RESEARCH

Blockchain technology in supply chain management: an organizational theoretic overview and research agenda

Rizwan Manzoor[1] · **B. S. Sahay**[1] · **Sujeet Kumar Singh**[1]

Accepted: 7 November 2022

Abstract
Blockchain technology is touted as a game-changer. Many experts consider blockchain technology as one of the disruptive innovations. Following significant success in the banking and finance sector, blockchain technology has found significant success in all fields, including health, manufacturing, transportation, disaster relief operations, and many others. Recently, the academician has contributed significantly towards understanding blockchain technology and its application in the management field. To understand how the literature on blockchain technology in the supply chain has progressed, we undertook an extensive review of the literature published in peer-reviewed journals using databases such as SCOPUS. We have further classified our literature into four stages (pre-adoption, adoption, implementation, and application). Finally, we synthesized the findings of the study and proposed a research framework to explain how an organization can build supply chain resilience and enhance supply chain performance with the help of blockchain technology. Finally, we have noted the limitations of the study and future research directions.

Keywords Blockchain technology · Supply chain management · Supply chain resilience · Systematic literature review · Sustainability · Traceability · Trust

1 Introduction

Blockchain Technology (BT) is a technology blessed with a decentralised storage system that is distributed, contracts that are digital and smart and asymmetric encryption whilst enabling visibility, transparency, traceability, and security to a network employing BT (Dutta et al., 2020; Katsaliaki et al., 2021). As a result of its decentralised, verifiable, and immutable

✉ Rizwan Manzoor
rizwanmanzoor484@gmail.com

B. S. Sahay
bssahay@iimj.ac.in

Sujeet Kumar Singh
sksinghma209@gmail.com

[1] Operations and Supply Chain Area, Indian Institute of Management Jammu, Jammu 180016, India

Published online: 24 November 2022

character, it has already disrupted or is on the path to disrupt a wide range of industries/areas/sectors such as banking, copyright, energy (renewable), healthcare, insurance, operations, real estate, and supply chains in general (Fosso Wamba et al., 2020a; Hald & Kinra, 2019; Pandey et al., 2022; Tandon et al., 2021). The enormous potential of blockchain to alter every step of SC, from the acquisition of raw materials to the delivery to customers, is well known (Babich & Hilary, 2020). The buzz around blockchain applications is still there, and we may be a few years away from their commercialization, but the future of this technology is bright (Pournader et al., 2020).

Previous studies by Hald and Kinra (2019) focused on BT's effect on supply chain performance by conducting a systematic literature review (SLR) on 48 articles. Through this study, they were able to report different blockchain identities. Similarly, Pournader et al. (2020) conducted SLR along with bibliometric and co-citation analysis on 48 articles to study BT applications in SCs, transport and logistics. They discussed emerging themes along with the application of BT in SC, transportation, and logistics. Taking it further, Dutta et al. (2020) conducted SLR on 178 articles to study BT integration, application, and challenges in SC operations. They pertinently mentioned that all the major industries could be revamped with BT by targeting business process management and visibility.

However, this study stands different from past literature by exploring and conducting an in-depth investigation on BT adoption, implementation and future application through a self-developed guiding framework that specifically categorizes articles into four themes/perspectives and provides a fresh outlook on the literature by identifying and establishing the four distinct themes. Therefore, the present study provides the following contributions. First, as one of the first studies to attempt the categorization of BT literature in supply chain (SC) for understanding the perspectives of technology adoption and implementation, this study enlists key theories, and BT features utilised in each of the themes identified. Second, this study develops a relationship between blockchain and its impact on supply chain resilience (SCRES) by exploring the studies reviewed as per the review protocol. Past studies also indicate that BT plays a pivotal role in enhancing the SCRES (Dubey et al., 2020; Iftikhar et al., 2022) while SCRES itself presents as an area of interest for many scholars and industry experts since its strategies provide ways to thwart disruptive events (Tukamuhabwa et al., 2015). Third, the study proposes research agenda based on Whetten (1989) "5W and 1H approach" i.e., "what, who, why, when, where and how" and develops a comprehensive research framework for BT and its identified features from the literature. The framework lays the foundation for the future empirical testing.

There has been a dramatic increase in the amount of research being done in this field from 2017 onwards (Dutta et al., 2020), while research projects focused on BT's impact on SC started to pick up by 2018 (Zhang et al., 2022). Thus, this study develops a comprehensive dataset of literature published from the year 2017–2022 based on a systematic literature search process. This study provides fresh insights on the current state of blockchain in SC and sets the stage for future research. Hence, the following objectives have been framed to execute this literature review study.

RO1 To identify the themes, areas, and industries discussed in the BT in SC literature.
RO2 To study if and how blockchain impacts SC Resilience (SCRES).
RO3 To develop future research agenda and a comprehensive framework of BT and identified themes for future empirical testing.

We develop and follow a guiding framework that divides the study into four themes Refer Table 1.

Table 1 Guiding framework

Pre-adoption	Adoption	Implementation implication	Application
What are the pre-requisites for BT adoption? Do you require any pilot projects? Are SC Managers eager to undertake the change?	What are the factors that enable or create barriers to adoption? Which areas have been the first to adopt the BT? How do managers take decisions of adoption?	What have been the implications of adopting BT? Are the expected implications in favour? Are the expectations being fulfilled when compared to the pre-adoption mindset?	What more could be achieved by implementing BT? Would BT be integrated with newer technologies for efficient use? Can BT be used for prolonged resilience and sustainability?

2 Methodology

The study conducted a systematic literature review (SLR) as per the Denyer and Tranfield (2009) and Tranfield et al. (2003) protocol and consequently adapted Dutta et al. (2020) search methodology. We established a rigorous procedure to include and exclude the articles starting with a set of search strings by evaluating the previous literature. The initial search keyword resulted in the generation of 2934 articles conducted in the Scopus database which is considered to be one of the world's most reliable and comprehensive database for peer-reviewed journals (Tandon et al., 2021; Varriale et al., 2021). On further filtering, we set certain inclusion criteria. We only included articles that include discussion about BT in SC domain, and are published in top-peer reviewed journals, and the number was reduced to 1,382 and by selecting "English" as the only, the number went down to 1346. By limiting the subject areas to Business, Management and Accounting; Computer Science and Decision Sciences, the number went down to 1019. We then limited the journals to the top peer-reviewed journals. We arrived at a list of 390 articles upon this search category (as of 31 May 2022). Upon ensuring the availability and reading of full text articles, we arrived at the final count of 292 articles. Figure 1 represents the search methodology. Table 2 presents the inclusion and exclusion criteria.

3 Descriptive analyses

This section contains descriptive regarding year-wise classification, country-wise classification (country of focus and country of origin), methods utilised, most publishing journals, citation count, and industries in focus.

3.1 Year-wise classification

The study observed a boom in BT in SC research from the year 2017. It can be observed that there is a substantial increase in publications year to year with an almost twofold increase. This indicates that both academia and industry have started to put their eye on BT with seriousness. Figure 2 shows the trend of publications.

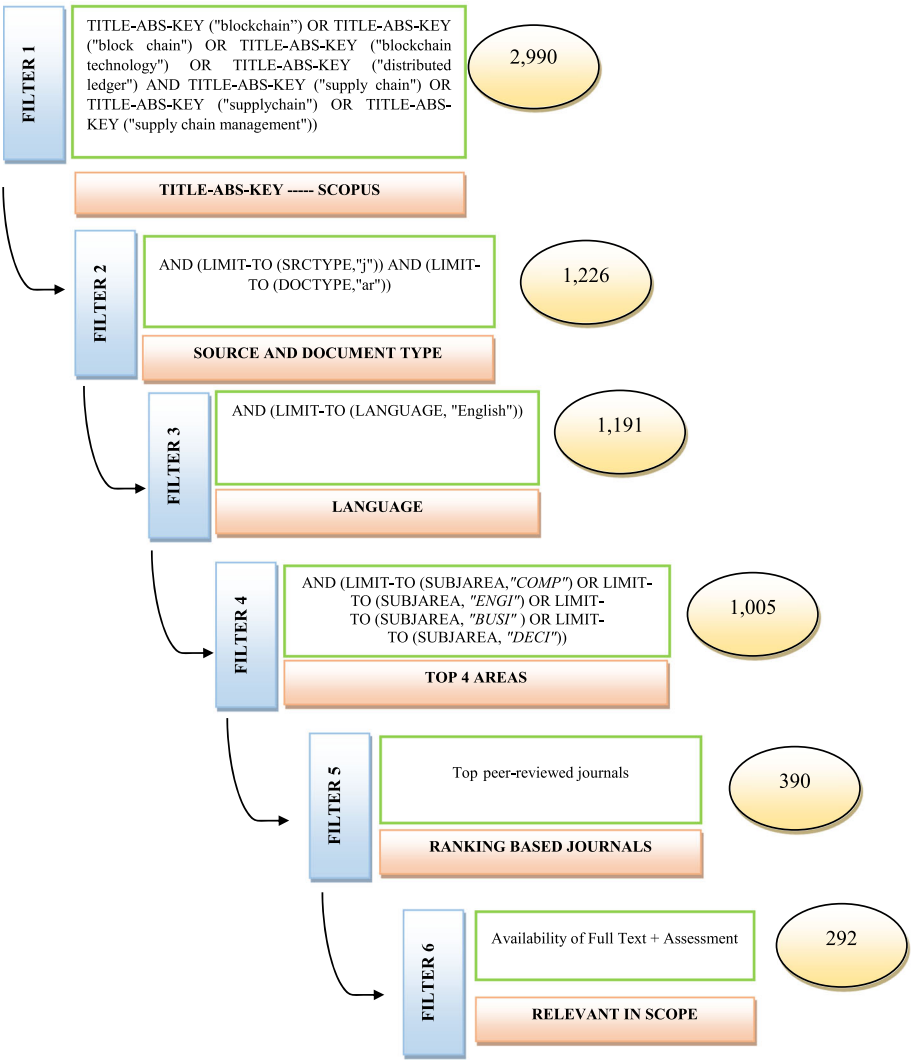

Fig. 1 Search methodology

Table 2 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria	Rationale
Papers that discuss BT in SC domain	Papers that discuss BT in domains not related to SC	Aim of the study is to review papers focused on BT in SC
Published in English language	Not published in English	Dominant language in the BT and SC field
Published in top-peer review journals (ABDC listed)	Conference papers, book chapters	Rigorous peer-review ensures quality work

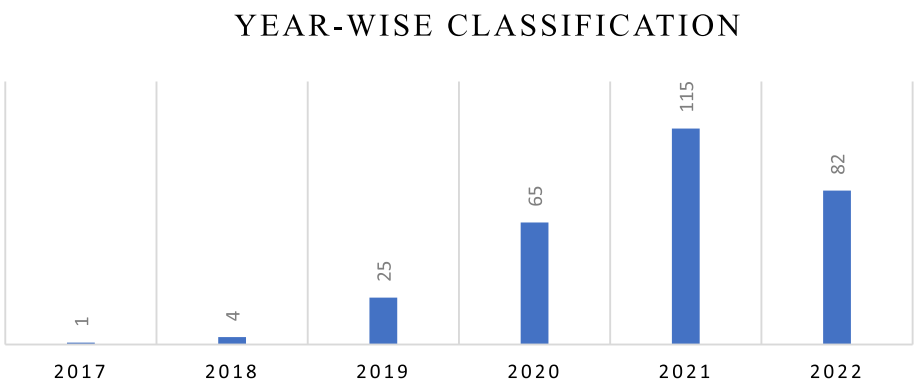

Fig. 2 Year-wise classification

3.2 Year-wise Journal classification

We list the top 12 publishing journals year-wise in Table 3. We observe that IJPR (36) has published the most articles, followed by IJPE (17), CIE (16), IJIM (14), ANOR (12) and so on. This indicates that this research area has the attention of most of the top-rated journals in this domain.

Table 3 Year-wise journal classification

	2018	2019	2020	2021	2022	Total
International Journal of Production Research (IJPR)		3	13	14	6	36
International Journal of Production Economics (IJPE)		1	3	7	6	17
Computers and Industrial Engineering (CIE)		4	2	7	3	16
International Journal of Information Management (IJIM)		1	11	1	1	14
Annals of Operations Research (ANOR)			1	7	4	12
IEEE Transactions on Engineering Management (ITEM)			6	5	1	12
Journal of Cleaner Production (JCP)		1	2	6	3	12
Transportation Research Part E: Logistics and Transportation Review		4	2	5	1	12
Production Planning and Control (PPC)			2	2	7	11
Supply Chain Management (SCM)	1	1	5	1	2	10
Industrial Management and Data Systems (IMDS)			1	3	4	8
Journal of Enterprise Information Management (JEIM)			3	5		8
Total	1	15	51	63	38	168

Table 4 Industry-wise classification

Industries	Total
Food (fish, wine, tea, dairy, milk, etc.)	52
Multiple	26
Manufacturing	16
Supply chain (3), logistics (11), transportation (1)	15
Agriculture	12
Fashion, textile (2), apparel (1)	12
Healthcare (4), pharmaceuticals (4), drug (1), vaccine (1)	10
Shipping (4), freight (2)	6
Banking/finance	5
Construction	5

3.3 Industry-wise classification

Based on the data, we observed that food industry that includes fish, wine, tea, dairy, etc. had the most interest of authors followed by a combination of multiple industries; manufacturing; supply chain and logistics; agriculture; fashion and healthcare. Food SCs have been the focal application area of blockchain when it comes to traceability and transparency (Casino et al., 2021; Kittipanya-ngam & Tan, 2020; Treiblmaier & Garaus, 2022; Vu et al., 2021). Table 4 lists industry-wise classification.

3.4 Country-wise classification

We establish two tables for country-wise classification. Table 5 represents the Country of Origin which mentions the origin of research being published while Table 6 represents Country of Focus which mentions the country in which research has been conducted. China followed by UK, USA and India are four most publishing nations while India followed by China, USA and UK are the countries in which has been conducted.

Table 5 Country of origin

Country of origin	Articles
China	109
UK	66
USA	60
India	53
France	29
Italy	14
Turkey	14
Germany	11
Malaysia	10
UAE	10

Table 6 Country of focus

Country of focus	Articles
India	38
China	30
USA	22
UK	13
Italy	10
Malaysia	9
Europe	8
France	6
Turkey	6
Germany	5

3.5 Methodological classification

We adapt Saunders et al. (2019) onion model for methodological classification along with adaptation of Sharma et al. (2017). Figure 3 presents the methodology-based classification of the selected research papers. It can be observed that 19% are modelling-based studies (employing Stackelberg game-theoretical analysis, stochastic optimization, Nash bargaining, mixed-integer programming, etc.), 15% are case studies (employing interview, content analysis, etc.), 15% are conceptual or theoretical works, 15% are exploratory or interpretive in nature (employing MCDM tools such as ISM, DEMATEL, BWM, etc.), 12% are surveys followed by 11% of mixed methodology-based studies. Figure 3 shows the methodological classification.

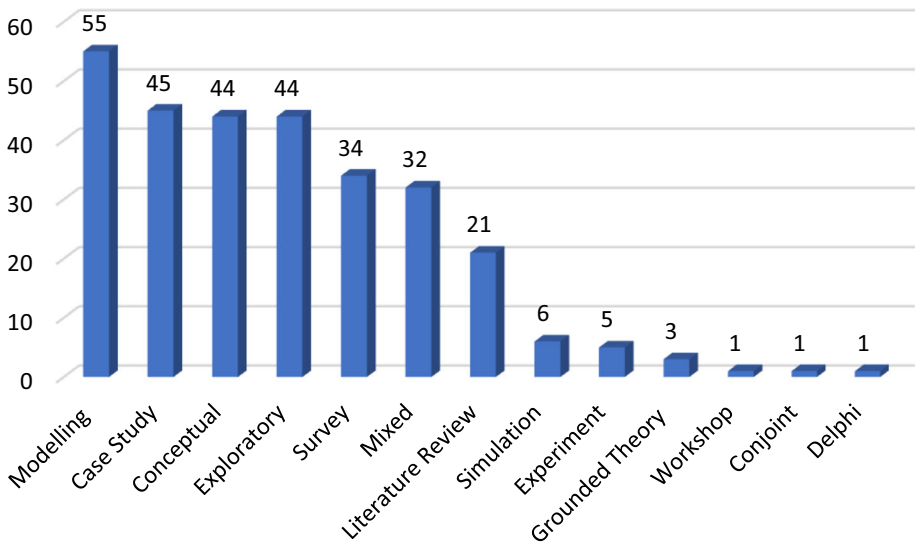

Fig. 3 Methodological classification

4 Findings

In this section, we discuss the content analysis of the selected articles. This section henceforth leads to the findings from the content analysis and then the discussion as a subsequent section. In the findings, we construct tables for citations based on themes, the BT features explored in that theme and the theories utilised in the themes.

4.1 Classification of articles based on identified themes

This section classifies the articles as per the perspectives regarding conceptualization, designing, adoption, implications, and future applications, and hence, generates four major themes or perspectives viz a viz pre-adoption, adoption, implication of implementing and applications of blockchain technology in SC. Table 21 summarises the four themes.

4.1.1 Pre-adoption theme/perspective

This theme/perspective relates to the pre-requisites/requirements for the adoption of BT, designing and execution of any pilot projects and to understand the intentions of SC managers whether they are eager to undertake the adoption of BT in SC. Under this theme, we have classified 62 articles as shown in Table 7. Table 8 represents theories utilised under pre-adoption theme. Table 9 represents BT features explored under pre-adoption theme.

Treiblmaier (2018) discussed about structurisation and management of SC that would incorporate BT. The study utilised principal agent theory (PAT), transaction cost analysis (TCA), resource-based view (RBV) and network theory (NT) for recommending BT integration in a SC. Chang et al. (2019) provided conceptual guidelines concerned with designing and implementation of practical business system design. The study proposed a novel BT based real-time process and tracking of logistics that would reduce costs related to cash backlogs. Thus, study presented an opportunity of mitigating inefficiencies by improving transparency, speedy payments, tracking, and improved convenience. Queiroz and Fosso Wamba (2019) utilised unified theory of acceptance and use of technology (UTAUT) to understand BT adoption behaviour and usage of individuals. The survey identified a distinct

Table 7 Studies under pre-adoption theme

Pre-adoption	Kim and Laskowski (2018), Sander et al. (2018), Treiblmaier (2018), Azzi et al. (2019), Chang et al. (2019), O'Leary (2019), Hartley and Sawaya (2019), Kamble et al. (2019, 2021), Queiroz and Fosso Wamba (2019), Van Hoek (2019,), Bai and Sarkis (2020), Dolgui et al. (2020), Epiphaniou et al. (2020), Garrard and Fielke (2020), Guggenberger et al. (2020), Ghode et al. (2020), Hastig and Sodhi (2020), Hew et al. (2020), Jabbar and Dani (2020), Jain et al. (2020), Karamchandani et al. (2020), Kumar et al. (2020), Rashideh (2020), Wong et al. (2020a, 2020b), Yong et al. (2020), Albizri and Appelbaum (2021), Büyüközkan et al. (2021), Casino et al. (2021), Danese et al. (2021), Diniz et al. (2021), Erol et al. (2021), Kamran et al. (2021), Giri and Manohar (2021), Oropallo et al. (2021), Queiroz et al. (2021), Saurabh and Dey (2021), Tsolakis et al. (2021), Tezel et al. (2021), Vivaldini and de Sousa (2021), Vivaldini (2021a, 2021b), Wang et al. (2021a, 2021b, 2021c, 2021d, 2021e), Xue et al. (2021), David et al. (2022), Faasolo and Sumarliah (2022), Martins et al. (2022), Mangla et al. (2022), Nath et al. (2022), Oguntegbe et al. (2022), Chowdhury et al. (2022), Kayikci et al. (2022a, 2022b), Li et al. (2022), Oh et al. (2022), Sodhi et al. (2022), Hamdan et al. (2022), Hartley et al. (2022), Sumarliah et al. (2022), Wamba and Queiroz (2022)

Table 8 Theories utilised under pre-adoption theme

Theory/model/paradigm	Citations
Affordance theory	Albizri and Appelbaum (2021)
Behavioural Reasoning Theory	Oguntegbe et al. (2022)
Design Science Research (DSR)	Kim and Laskowski (2018), O'Leary (2019), Guggenberger et al. (2020), Jabbar and Dani (2020), Albizri and Appelbaum (2021), Diniz et al. (2021), Tezel et al. (2021)
Dynamic Control theory (DCT)	Dolgui et al. (2020)
Dynamic Capability (DC)	Wamba and Queiroz (2022)
Fit For Purpose Theoretical Framework	Kamran et al. (2021)
Fuzzy Set Theory	Bai and Sarkis (2020), Büyüközkan et al. (2021)
Grey Theory	Ghode et al. (2020)
Innovation Diffusion Theory (IDT)/Diffusion of Innovation (DOI)	Hew et al. (2020), Hartley et al. (2022), Nath et al. (2022), Sumarliah et al. (2022), Wamba and Queiroz (2022)
Institutional Theory (IT)	Hew et al. (2020), Hartley et al. (2022), Sumarliah et al. (2022), Wamba and Queiroz (2022)
Network Theory (NT)	Treiblmaier (2018), Tsolakis et al. (2021)
Organizational Information Processing theory (OIPT)	Giri and Manohar (2021)
People, process, & technology model (PPT)	Kayikci et al. (2022a, 2022b)
Principal-Agent Theory (PAT)	Treiblmaier (2018), Tsolakis et al. (2021)
Resource Based View (RBV)	Treiblmaier (2018), Tsolakis et al. (2021), Wamba and Queiroz (2022)
Technology Acceptance Model (TAM)	Kamble et al. (2019), Karamchandani et al. (2020), Jain et al. (2020), Giri and Manohar (2021), Kamble et al. (2021), Hamdan et al. (2022), Wamba and Queiroz (2022)
Theory of Planned Behaviour (TPB)	Kamble et al. (2019)
Technology Organisation and Environment (TOE)	Wong et al. (2020a, 2020b), Kamble et al. (2021), Faasolo and Sumarliah (2022), Hamdan et al. (2022), Nath et al. (2022), Oguntegbe et al. (2022)
Transaction Cost Analysis (TCA)	Treiblmaier (2018), Tsolakis et al. (2021)
Sensemaking Theory	Wang et al. (2021d)
Stakeholder Theory	Sander et al. (2018)
Synergetic Theory	Xue et al. (2021)
System Dynamics Model	Xue et al. (2021)
UTAUT	Wong et al. (2020b), Queiroz and Fosso Wamba (2019), Queiroz et al. (2021)

Table 9 BT features explored under pre-adoption theme

BT features	Citations
Immutability	Wong et al. (2020a, 2020b), Ghode et al. (2020)
Privacy	Li et al. (2022)
Provenance	Kim and Laskowski (2018), Garrard and Fielke (2020)
Traceability/tracking	Kim and Laskowski (2018), Sander et al. (2018), Azzi et al. (2019), Chang et al. (2019), O'Leary (2019), Queiroz and Fosso Wamba (2019), Garrard and Fielke (2020), Hastig and Sodhi (2020), Hew et al. (2020) Casino et al. (2021), Diniz et al. (2021), Giri and Manohar (2021), Kamran et al. (2021), Oropallo et al. (2021), Saurabh and Dey (2021), Tsolakis et al. (2021), Vivaldini (2021a, 2021b), Wang et al. (2021e), Hartley et al. (2022), Sumarliah et al. (2022)
Transparency/visibility	Sander et al. (2018), Queiroz and Fosso Wamba (2019), Bai and Sarkis (2020), Ghode et al. (2020), Jain et al. (2020), Wong et al. (2020a, 2020b), Diniz et al. (2021), Giri and Manohar (2021), Kamran et al. (2021), Oropallo et al. (2021), Tezel et al. (2021), Tsolakis et al. (2021), Vivaldini (2021a, 2021b), Hartley et al. (2022), Nath et al. (2022), Wamba and Queiroz (2022)
Trust	Queiroz and Fosso Wamba (2019), Garrard and Fielke (2020), Ghode et al. (2020), Casino et al. (2021), Oropallo et al. (2021), Queiroz et al. (2021), Saurabh and Dey (2021), Tezel et al. (2021), Wang et al. (2021e), Nath et al. (2022), Wamba and Queiroz (2022)
Smart contract	Kim and Laskowski (2018), Dolgui et al. (2020), Epiphaniou et al. (2020), Yong et al. (2020), Albizri and Appelbaum (2021), Kamran et al. (2021), Vivaldini (2021a, 2021b), Wang et al. (2021d), Martins et al. (2022),
Security	Epiphaniou et al. (2020), Wong et al. (2020a, 2020b), Kamran et al. (2021), Kamble et al. (2021), Wang et al. (2021e), Li et al. (2022), Nath et al. (2022)

existence of differences in adoption behaviours of individuals from India and USA. Following this study, Queiroz et al. (2021) empirically validated UTAUT proposed model in Brazil and found effort expectancy, facilitating conditions, social influence, and trust are the most critical constructs that directly affect behavioural intention to adopt BT. Kamble et al. (2019) statistically validated a model based on technological acceptance model (TAM), theory of planned behaviour (TPB) and technology readiness index (TRI) to understand perception of users on BT adoption. The study found that constructs of TRI have no significant effect on TAM constructs of perceived ease of use and usefulness while behavioural intention was significantly affected by perceived usefulness, perceived behavioural control and attitude. Similarly, Karamchandani et al. (2020) analysed perception of enterprise BT among service industry professionals using technological acceptance model (TAM) theory. The results were promising as the professionals of Indian Service Industry believed in practicality of enterprise BT especially in quality of information, quality of service, reliability of delivery, mass customisation and customer relationship. The study by Jain et al. (2020) tested the effect TAM theory constructs on the behavioural intentions of online consumers towards BT. The study found a direct impact of three constructs of TAM on the behavioural intention which further had direct impact on actual behaviour towards using BT. Moving away from TAM, study by) adopted technology, organisation and environment (TOE) framework to study behavioural intention of users in Malaysian Small-Medium Enterprises (SMEs). The study

found out that complexity, cost, competitive pressure, and relative advantage had significant effects on behavioural intention. Innovation diffusion theory (IDT) and institutional theory (IT) too have been utilised to check the intention to use the BT in industries (Hartley et al., 2022; Hew et al., 2020). Wamba and Queiroz (2022) applied a set of five theories to empirically study intention to adopt BT. They empirically validated that there were differences in variables affecting adoption intention of users from India and USA. The study by Kamble et al. (2021) used machine learning to predict BT adoption in SC. Hastig and Sodhi (2020) identified six major business requirements and six critical success factors for successful implementation of SC Traceability systems in pharmaceutical and cobalt mining industries. Identification of such factors would help in conducting case based research and inspire many other empirical works. Van Hoek (2019) adopted Reyes et al. (2016) framework and reported that factors from the framework are indeed relevant when it came to BT consideration for SC. The study found leadership engagement, customer demand, leadership commitment, etc. to be the factors that favour pilot development projects in case of BT implementation in SC. Kayikci et al. (2022a, 2022b) in their review paper reported that under the umbrella of PPT (people, process, and technology), there were clear opportunities and impediments in case of people and technology. Massive benefits that arose out of implementing BT in SC especially in Food SC outweighed the risks. The study outrightly mentioned security and need of massive infrastructure as the boosters of usage and implementation of BT. Van Hoek (2020a, 2020b) adopted multiple case study method to explore the knowledge gained by the early adopters of BT in SC. Insights gained from case studies indicated possibility of developing pilot projects with a concern for swift launches by scoping existing pilots in a planned manner with engagement of all stakeholders. Erol et al. (2021) evaluated the feasibility of BT using fifteen indicators while comparing between seven industries using AHP and TOPSIS. The study found that industries of logistics and SC along with healthcare and finance were the most feasible options for BT projects while need for improved traceability, visibility and reduced fraud turned out to be the most important indicators. Wang et al. (2021a, 2021b, 2021c, 2021d, 2021e) reported a 2-year study of smart contract initiative by engaging in DSR (design science research). The study further utilised theory of business model along with sensemaking theory to give shape to future BT deployment in SC and addressed problems SC transparency and provenance. Oropallo et al. (2021) designed circular BT platform using integrated Triple Retry Framework. The study utilised in-depth case study and conducted face-to-face interviews along with direct observation and results highlighted role of BT as a technological capability which could improve the controlled waste movement and activities related to product return. Chowdhury et al. (2022) proposed a BT decision framework that would be used to assess the feasibility of BT adoption in contexts related to risk management. For such a framework, the study used TAM predictors, VUCA constructs and resilience to understand their effect on intention to adopt BT. The survey results showed that all the constructs positively affected the managers intention to adopt BT. Oh et al. (2022) proposed a framework based on seven dimensions that offer conceptual guidance on designing a BT enabled SC. The seven dimensions network, governance, data processing, database, data, value transfer and platform were stacked into 3 different design decision perspectives: configural, operational and strategic. Büyüközkan et al. (2021) proposed a customer-focused BT design by utilising group decision making (GDM) approach. The study was conducted in a qualitative way and generated critical factors to help in design of an effective BT enabled SC structure. However, a study by Sodhi et al. (2022) explained the adoption experience of emerging technologies (such as BT) by studying the perception of managers utilising affordance theory. The study reported there is no connection between the characteristics of the

technology and the users' expectations at the early stages of adoption. Such an initial disconnect between characteristics of technology and the expectations of managers could explain inflated expectations that were followed by a low of disappointment concerning emerging technology as explained in the Gartner Hyper Cycle since most of the users of emerging technology focus on attainment of similar benefits for SC like the old ones.

It is important to note that pre-adoption theme has predominantly mentioned TAM, DSR, TOE theories that are related to either intention to adopt or to the designing of BT based SC in case of DSR. Since, BT is still in its nascent stage, and studies on intention to adopt are very scant. Hence, it becomes pertinent to study the perception and intention of its users before adopting the technology to understand the expectations it has generated among the masses.

4.1.2 Adoption theme/perspective

This theme/perspective relates to the early adoption projects, enablers of adoption, barriers of adoption and the decisions related to adoption of BT. A total of 78 papers have been classified under this category as shown in Table 10. Table 12 presents theories utilised under adoption theme. Table 13 presents BT Features explored under adoption theme.

Saberi et al. (2019) identified and categorised four types of barriers to adoption of BT i.e., intra-organizational barriers, inter-organizational barriers, system-related barriers, and external barriers. The study focused on successful adoption of BT for tracing sustainable practices in a SC. Kamble et al. (2020) identified and established relationships between thirteen enablers of BT adoption in agriculture supply chains (ASCs). They employed interpretive logic on the BT enablers and used Interpretive Structural Modelling (ISM) and Decision-Making Trial and Evaluation Laboratory (DEMATEL) methodology (Samad et al., 2022; Yadav et al., 2021) to establish otherwise complicated causal relationships. They found traceability (Sharma et al., 2021a, 2021b) to be the most important enabler followed by immutability and provenance. Kouhizadeh et al. (2021) utilised TOE and force-field theories along with DEMATEL to identify, classify and establish barriers to BT adoption. The study found technological barriers to

Table 10 Studies under adoption theme

Adoption	Saberi et al. (2019), Fosso Wamba et al. (2020b), Chod et al. (2020), Farooque et al. (2020), Papathanasiou et al. (2020), Shoaib et al. (2020), Kamble et al. (2020), Sahebi et al. (2020, 2022), Schuetz and Venkatesh (2020), van Hoek (2020b), Yadav and Singh (2020), Ali et al. (2021), Balci and Surucu-Balci (2021), Bag et al. (2021), Caldarelli et al. (2021), Baharmand et al. (2021), Dede et al. (2021), Dong et al. (2021), Ghode et al. (2021), Guo et al. (2021), Gupta et al. (2021), He et al. (2021), Karakas et al. (2021), Karuppiah et al. (2021), Kouhizadeh et al. (2021), Li et al. (2021b, 2021d), Mathivathanan et al. (2021), Liu et al. (2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g), Nandi et al. (2021), Narwane et al. (2021), Niu et al. (2021a, 2021b), Pun et al. (2021), Patil et al. (2021), Rainero and Modarelli (2021), Razak et al. (2021), Sharma et al. (2021a, 2021b), Shen et al. (2021), Sundarakani et al. (2021), Suwanposri et al. (2021), Tan and Sundarakani (2021), Vafadarnikjoo et al. (2021), Vu et al. (2021), Yadav et al. (2021), Wu et al. (2021, 2022), Xiong et al. (2021), Yang et al.(2021), Agi and Jha (2022), Anastasiadis et al. (2022), Bai et al. (2022), Benstead and Moradlou (2022), Çolak and Kağnicioğlu (2022), Fan et al. (2022), Galati (2022), Govindan (2022), Huang et al. (2022), Ji et al. (2022), Han and Rani (2022), Kayikci et al. (), Khan et al. (2022a, 2022b, 2022c), Kumar et al. (2022a), Moretto and Macchion (2022), Naef et al. (2022), Omar et al. (2022), Samad et al. (2022), Sislian and Jaegler (2022), Song et al. (2022), Xu et al. (2022), Yi et al. (2022), Yousefi and Mohamadpour Tosarkani (2022), Zhou et al. (2022)

have the most prominence specifically security, negative perception and immaturity to be the prominent barriers. Fosso Wamba et al. (2020b)through a survey established that BT adoption is significantly affected by trading partner pressure and the knowledge sharing while BT adoption significantly improves transparency and hence, SC performance. van Hoek (2020b) empirically studied the adoption rates, drivers, and barriers by conducting a series of workshops. This study went beyond the normal exploration of pilots and uncovered the adoption progress of BT in industry. Improving data and product security, visibility and SC processes were the top-rated drivers while lack of understanding about integration, potential benefits and costs including ROI were the top-rated barriers. Guo et al. (2021) explored early adoption determinants and found opportunistic behaviour of managers to be the reason for early adoption. Mathivathanan et al. (2021) identified and analysed BT adoption barriers using Total Interpretive Structural Modelling (TISM) and Cross-Impact Matrix Multiplication Applied to Classification (MICMAC) analysis. The study identified lack of familiarity with BT and lack of business awareness as the top-most influential barriers to adoption. Vafadarnikjoo et al. (2021) analysed BT adoption barriers in manufacturing SC and found transaction- level uncertainties as the most prominent barrier. Ali et al. (2021) utilised multiple case studies in Malaysian Halal Food SC to build a framework related to BT adoption opportunities/drivers and challenges. The study found complexity and capability, cost, and competitive advantage, change management and external pressure, and regulatory capability as key challenges to BT adoption. In a survey by Nayal et al. (2021), the influence of factors such as SC risk, SC integration, cost, top management support, etc. was tested using SEM and all the factors positively influenced the adoption of BT. Baharmand et al. (2021) investigated enablers and barriers to BT adoption in humanitarian SC. The study also utilised a case study to reveal that BT added value by increased traceability, visibility which meant increased transparency. Bai et al. (2022) evaluated BT enablers in African Cocoa industry by utilising TOE framework and best–worst method (BWM) and found smart contracts, security and tracking as major enablers. Galati (2022) explored the role of social capital in adopting BT. The study utilised multiple case studies and identified BT adoption to be dependent on relational capital as a necessary but not a sufficient condition.

However, Wu et al. (2021) analysed strategies for BT adoption in case of fresh product SC. They found that BT adoption isn't an optimal decision as it depends on traceability cost proportion allocation between SC members, product deterioration rate and consumers product acceptance degree without BT. He et al. (2021) in a similar setting found BT adoption non-beneficial to supplier and retailer. Li et al. (2021b) showed that the decision to adopt BT for authentication purposes in a luxury SC depended on the cost difference between a manual technology and BT. The results showed that decision to adopt BT was positive when the cost difference was small. Anastasiadis et al. (2022) proposed that a decision to adopt BT as a traceability system could stir the adoption of circular economy and sustainability practices (Tsolakis et al., 2022). Ji et al. (2022) found that decision to adopt BT in SC if and only if sensitivity of consumer exceeds the minimum requirement level along with the consideration of reaping big profits in the manufacturers case who will adopt the BT. Wu et al. (2022) further proposed that BT adoption depends on consumers awareness about traceability and cost-sharing of BT-based traceability between manufacturer and retailer. Fan et al. (2022) reiterated that BT adoption depends on consumers awareness about traceability and the cost of using BT along with production cost of supplier and manufacturer. Naef et al. (2022) argued that for successful adoption of BT in a bigger network of SC, centralised leadership was the key. Kumar et al. (2022a) proposed a BT 4.0 based framework for an agricultural SC. The study focused on enhancing transparency, traceability, and sustainability of SC by adopting BT. Song et al. (2022) utilised game theory to understand BT adoption behaviour

Table 11 BT studies exploring enablers and barriers to adoption theme

Context	Citations
Barriers to adoption	Saberi et al. (2019), Farooque et al. (2020), Sahebi et al. (2020), Papathanasiou et al. (2020), Schuetz and Venkatesh (2020), van Hoek (2020b), Balci and Surucu-Balci (2021), Bag et al. (2021), Caldarelli et al. (2021), Baharmand et al. (2021), Narwane et al. (2021), Mathivathanan et al. (2021), Patil et al. (2021), Kouhizadeh et al. (2021), Karuppiah et al. (2021), Ghode et al. (2021), Vafadarnikjoo et al. (2021), Vu et al. (2021), Govindan (2022), Han and Rani (2022), Khan et al. (2022a, 2022b, 2022c), Moretto and Macchion (2022), Samad et al. (2022), Xu et al. (2022)
Enablers of adoption	Kamble et al. (2020), van Hoek (2020b), Yadav and Singh (2020), Papathanasiou et al. (2020), Shoaib et al. (2020), Baharmand et al. (2021), Gupta et al. (2021), Sharma et al. (2021a, 2021b), Suwanposri et al. (2021), Yadav et al. (2021), Vu et al. (2021), Agi and Jha (2022), Bai et al. (2022), Kayikci et al. (2022a, 2022b), Moretto and Macchion (2022), Sahebi et al. (2022), Samad et al. (2022), Yousefi and Mohamadpour Tosarkani (2022)

of firms under risk. The found that firms will adopt BT when there is low trust in information or BT adoption cost is low.

A total of 23 studies have focused on barriers of adoption while 15 are focused on enablers. Table 11 lists the studies exploring enablers and barriers to Adoption Theme.

4.1.3 Implication of implementing theme/perspective

This theme/perspective relates to the outcomes of implementing BT either through virtual platform, a simulation or in real word scenario. This sub-section also discusses whether the outcomes are positive and whether they meet or go beyond the expectations at pre-adoption and adoption stage. A total of 87 studies falls under this theme as listed in Table 14. Table 15 lists theories utilised in implication of implementing theme. Table 16 lists BT features explored under implication of implementing theme.

Choi (2019) utilised game theory while comparing the traditional retail jewellery operations with the BT backed ones and found that BT generated higher benefit to both manufacturer and consumer by utilising diamond authentication and certification. Martinez et al. (2019) investigated effect of BT through resource base view lens while being implemented on customer order management process and found that BT improved process efficiency, order traceability, and further reduced the number of operations while saving average order time. Ivanov et al. (2019) analysed the impact of BT as a track and trace technology on SC. The study found that an advanced track and trace system like BT increased SC visibility, enhanced real-time identification of events which lead to a decrease in disruption risk and hence, reduced chances of ripple effect. Choi (2020) proved that BT-enabled SC considerably faced lower operational risk (Chaudhuri et al., 2021) than the normal SC. Dubey et al. (2020) argued that BT could be successfully utilised to enhance transparency, swift trust, and further improve collaboration along with improved supply chain resilience (SCRES) in a humanitarian SC. In line with the effect of BT on SCRES and ripple effect, Lohmer et al. (2020) utilised agent-based simulation model to analyse the impact of BT on disruptions and SCRES. The simulation indicated that BT successfully promotes SCRES and its aligned strategies if smart contracts were employed for collaboration under risk. Manupati et al. (2020) while being focused on the sustainability developed a BT based distributed

Table 12 Theories utilised under adoption theme

Theory/model/paradigm	Citations
Force-field theory	Kouhizadeh et al. (2021)
Fuzzy set theory	Bag et al. (2021), Karuppiah et al. (2021), V. S. Yadav et al. (2021)
Game theory	Liu et al. (2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g), Liu et al. (2021d), Niu et al. (2021a, 2021b), Pun et al. (2021), Shen et al. (2021), Wu et al. (2021), Yang et al.(2021), Fan et al. (2022), Ji et al. (2022), Song et al. (2022), Wu et al. (2022), Zhou et al. (2022)
Grey theory	Dong et al. (2021), Karuppiah et al. (2021), Narwane et al. (2021)
Grounded theory	Suwanposri et al. (2021)
Information processing theory (IPT)	Sislian and Jaegler (2022)
Innovation adoption theory	Vu et al. (2021)
Innovation diffusion theory (IDT)/diffusion of innovation (DOI)	Guo et al. (2021), Agi and Jha (2022), Çolak and Kağnicioğlu (2022), Yi et al. (2022)
Mean-risk theory	Choi (2021)
Network theory	Yousefi and Mohamadpour Tosarkani (2022)
Resource based view (RBV)	Baharmand et al. (2021), Nandi et al. (2021), Sundarakani et al. (2021), Benstead and Moradlou (2022)
Resource dependence theory (RDT)	Nandi et al. (2021)
Technology acceptance model (TAM)	Liu et al. (2021d), Tan and Sundarakani (2021),
Technology organisation and environment (TOE)	Caldarelli et al. (2021), Kouhizadeh et al. (2021), Nayal et al. (2021), Patil et al. (2021), Suwanposri et al. (2021), Bai et al. (2022), Xu et al. (2022)
Social capital theory	Galati (2022)
Social network theory	Bai et al. (2022)
Stakeholder theory	Balci and Surucu-Balci (2021)
UTAUT	Nayal et al. (2021)

ledger for monitoring SC performance and further aimed at optimising operational costs and emission levels. The study utilised Mixed Integer Non-Linear Programming (MINLP) model and found that BT ensured the minimisation of the objectives. Pan et al. (2020) reported that BT implementation had significant effect on enterprise organisational capabilities such as asset turnover rate and reduction of sales expense rate. The study further proposed that BT introduced a trust mechanism along with an improvement in decentralized operations and data integrity. Rogerson and Parry (2020) conducted multiple case studies-based interviews from food industry. They reported empirical evidence of BT leading to an increase in SC visibility, provenance, and a protection against counterfeits. Similarly, Köhler and Pizzol (2020) utilised multiple cases based study to check impact of BT implementation in food SC. The study found that food BT had enhanced transparency, visibility traceability in SC and hence, lead to an increase in trust. Khan et al. (2021) based on a survey concluded that BT positively impacted green SC practices which lead to a positive organisational performance. Qian

Table 13 BT Features explored under adoption theme

BT features	Citations
Immutability	Saberi et al. (2019), Shoaib et al. (2020), Caldarelli et al. (2021), Ghode et al. (2021), Karuppiah et al. (2021), Niu et al. (2021a, 2021b), Sahebi et al. (2022), Samad et al. (2022)
Privacy	Saberi et al. (2019), Kamble et al. (2020), Karuppiah et al. (2021), Yadav et al. (2021), Sharma et al. (2021a, 2021b), Sahebi et al. (2022),
Provenance	Saberi et al. (2019), Kamble et al. (2020), Yadav et al. (2021), Sahebi et al. (2022), Samad et al. (2022)
Risk management	Kamble et al. (2020), Shoaib et al. (2020), Choi (2021), Karuppiah et al. (2021), Sharma et al. (2021a, 2021b), Sahebi et al. (2022), Samad et al. (2022), Song et al. (2022)
Traceability/tracking	Saberi et al. (2019), Kamble et al. (2020), Shoaib et al. (2020), Baharmand et al. (2021), Gupta et al. (2021), Niu et al. (2021a, 2021b), Rainero and Modarelli (2021), Sharma et al. (2021a, 2021b), Tan and Sundarakani (2021), Yadav et al. (2021), Vu et al. (2021), Wu et al. (2021), Yang et al.(2021), Anastasiadis et al. (2022), Bai et al. (2022), Benstead and Moradlou (2022), Fan et al. (2022), Ji et al. (2022), Ji et al. (2022), Kumar et al. (2022a), Omar et al. (2022), Sahebi et al. (2022), Samad et al. (2022), Wu et al. (2022), Xu et al. (2022), Yi et al. (2022)
Transparency/visibility	Saberi et al. (2019), Kamble et al. (2020), Chod et al. (2020), van Hoek (2020b), Fosso Wamba et al. (2020b), Gupta et al. (2021), Sahebi et al. (2020), Shoaib et al. (2020), Ali et al. (2021), Baharmand et al. (2021), Caldarelli et al. (2021), Ghode et al. (2021), Liu et al. (2021a, 2021b, 2021c, 2021d, 2021e, 2021f, 2021g), Niu et al. (2021a, 2021b), Sharma et al. (2021a, 2021b), Suwanposri et al. (2021), Vu et al. (2021), Bai et al. (2022), Benstead and Moradlou (2022), Kumar et al. (2022a), Moretto and Macchion (2022), Omar et al. (2022), Kayikci et al. (2022a, 2022b), Sahebi et al. (2022), Samad et al. (2022), Sislian and Jaegler (2022), Xu et al. (2022), Zhou et al. (2022)
Trust	Saberi et al. (2019), Shoaib et al. (2020), Baharmand et al. (2021), Ghode et al. (2021), Karuppiah et al. (2021), Rainero and Modarelli (2021), Yadav et al. (2021), Sislian and Jaegler (2022), Bai et al. (2022), Ji et al. (2022), Kumar et al. (2022a), Omar et al. (2022), Xu et al. (2022), Yi et al. (2022),
Smart contract	Saberi et al. (2019), Kamble et al. (2020), Shoaib et al. (2020), Sundarakani et al. (2021), Tan and Sundarakani (2021), Yadav et al. (2021), Bai et al. (2022), Omar et al. (2022), Samad et al. (2022), Sislian and Jaegler (2022)
Security	Saberi et al. (2019), Kamble et al. (2020), Shoaib et al. (2020), Caldarelli et al. (2021), Rainero and Modarelli (2021), Sharma v (2021a, 2021b), Sundarakani et al. (2021), Suwanposri et al. (2021), Bai et al. (2022), Omar et al. (2022), Sahebi et al. (2022), Samad et al. (2022)

and Papadonikolaki (2021) argued that BT implementation provides solutions for enhanced contracting, data tracking and resource transferring in SC which in turn enhance trust from various sources in a SC. Keeping a hold onto trust is crucial for any SC Finance firm and BT can help in that direction removing information asymmetry and inequality (Du et al., 2020). Brookbanks and Parry (2022) argued that BT implementation doesn't introduce trustless disintermediation. Instead, the study argued that new trustworthy intermediaries had to be introduced who could be trusted. In sync with the information sharing issues, Nandi et al. (2020) reported that firms implementing BT are focused on improving operational-level capabilities such as coordination and information sharing capabilities) rather than on

Table 14 Studies under implication of implementing theme

Implication of implementing/adopting	Choi (2019, 2020), Choi and Luo (2019), George et al. (2019), Ivanov et al. (2019), Longo et al. (2019), Martinez et al. (2019), Sheel and Nath (2019), De Giovanni (2020), Du et al. (2020), Dubey et al. (2020), Gourisetti et al. (2020), Hayrutdinov et al. (2020), Li et al. (2020, 2021a, 2021c; 2022a); Lohmer et al. (2020), Guo et al. (2020), Köhler and Pizzol (2020), Manupati et al. (2020), Nandi et al. (2020), Ozdemir et al. (2020), Pan et al. (2020), Roeck et al. (2020), Rogerson and Parry (2020), Shen et al. (2020, 2022), Tönnissen and Teuteberg (2020), Tozanlı et al. (2020), Zelbst et al. (2020), Adel and Younis (2021), Bai et al. (2021), Benzidia et al. (2021), Chang et al. (2021), Chaudhuri et al. (2021), Choi et al. (2021), Hong and Hales (2021), Khan et al. (2021), Kshetri (2021, 2022), Kumar (2021a), Liu et al. (2021e), L. Liu et al. (2021b), Maity et al. (2021), Mangla et al. (2021a), Niu et al. (2021a, 2021b), Paul et al. (2021, 2022a, 2022b), Qian and Papadonikolaki (2021), Quayson et al. (2021), Treiblmaier and Sillaber (2021), Wang et al. (2021a, 2021b), Westerlund et al. (2021), Xia et al. (2021), Xu et al. (2021a, 2021b), Xu and Choi (2021), Xing et al. (2021), Yu et al. (2021, 2022), Babu et al. (2022), Brookbanks and Parry (2022), Dang et al. (2022), Ghode et al. (2022), Erol et al. (2022), Kusi-Sarpong et al. (2022), Liu (2022), Ning and Yuan (2021), Philsoophian et al. (2022), Tan et al. (2022a, 2022b), Tian et al. (2022), Tao et al. (2022), Raj et al. (2022), Treiblmaier and Garaus (2022), Wu and Yu (2022), Xu and Duan (2022), Xu and He (2022), Yang et al. (2022), Zeng et al. (2022)

strategic ones such as collaboration and integration as such improvements lead to better SC performance parameters based on the type of industry such as reduced cost, quality improvement, increased flexibility and process improvement. Liu et al. (2021b) through their case study method argued that IoT and BT together (Gopal et al., 2022) were more effective in mitigating information asymmetry issues and hence, dilute SC finance risks leading to appraised value creation as well as value appropriation (Ning & Yuan, 2021). In a surprise turn of events, Shen et al. (2020) reported that on an online marketplace platform BT was preferred for selling second-hand products that are low in uniqueness and low in quality but not for high quality products. BT also reportedly improved horizontal integration which improved SC's overall profit. However, Niu et al. (2021a, 2021b) utilised mathematical modelling to understand impact of BT and reported BT to be double-edged sword. On one hand, it increased firms wholesale profit but reduced its retailing profit and tax benefits on the other. Mangla et al. (2021) investigated societal impact of BT in context of sustainable milk SC using systems theory. The study argued that BT had positive impact on social parameters related to milk SC such as improved food security, decreasing food fraud, assisting healthy food access, etc. Xu et al. (2021b) argued that BT made products greener, and brought about SC coordination whilst bringing manufacturer and the platform more profits. Wang et al. (2021a) through their multimethod study comprising of an experiment and case study found that BT adoption specifically as tracing system improved product sales, SC transparency, process management and significantly decreased product returns. In a very unique study by Bai et al. (2021), results indicated a huge improvement in trust and transparency when trust values from sensors were recorded in BT in the green SC. Erol et al. (2022) argued that BT's traceability, improved coordination and collaboration along with improved trust alleviate the

effect of barriers to circular economy (CE) adoption i.e., BT could act as an enabler of CE. Kshetri (2022) analysed multiple case studies of BT in mineral/metal industry and found that BT increased the flow of authentic information in the SC. Shen et al. (2022) modelled a situation aimed at combating copycats. It was found that the firm deploying BT tended to reduce the quality of products (Tao et al., 2022) as more quality didn't bring more profits as the consumer already differentiated between an imitation and a genuine product as a consequence of BT. Paul et al. (2022a) via their event study reported that BT enabled SC firms during Covid-19 pandemic stayed safe from significant valuation loss and volatility of market. Paul et al. (2022a, 2022b) through their survey in tea industry found BT impacted transparency, traceability positively which further improved goal of having circular SC and high performance. Philsoophian et al. (2022) surveyed about the impact of BT on SC performance. The study found that two features of BT transparency and security highly impacted mediating role of BT between knowledge sharing and SC performance. Kusi-Sarpong et al. (2022) also reported BT successfully mediated between intellectual capital and sustainable production. Tan et al. (2022a) employed case-study method with underlying theoretical base of agency and institutional theories in case of Halal SC in Malaysia. They found out that the firms utilising BT were able to ensure transparency and traceability throughout SC as BT helped firms within the SC to access and manage transaction details without any delays. In addition to that, firms ensured that halal religious requirements were met using a smart contract and sensors or RFID tags. Tian et al. (2022) conducted field experiments and found that BT solved issues related to operational efficiency by utilising features of immutability and traceability. Treiblmaier and Garaus (2022) conducted two experiments in food SC and identified that BT's traceability helped to establish product quality in consumers perception and lead to a purchase intention.

This theme has seen several works focused on game theoretical modelling, simulations, experiments, real word case studies from industry and results have been extremely promising. From improving trust, transparency, traceability to SC performance (Philsoophian et al., 2022) and increase in profits, BT provides a fresh look at how a technology can be significant by moving beyond its stereotypical features of tracking and tracing.

4.1.4 Application theme/perspective

This theme/perspective relates to the applications of BT in SC while also integrating with newer technologies. It also explores phenomena such as resilience, sustainability, green, circular SC as the future application areas. The potential SC application areas for BT discussed in the literature are Food SC (Behnke & Janssen, 2020; Bumblauskas et al., 2020; Kittipanyangam & Tan, 2020; Liu et al., 2020; Vivaldini, 2021a), Agricultural SC (Hu et al., 2021; Liu et al., 2020; Mishra & Maheshwari, 2021; Mukherjee et al., 2021), SC Risk Management (Choi et al., 2019; Manupati et al., 2022; Rauniyar et al., 2022; Shashi et al., 2020), Sustainable SC (Gong et al., 2022b; Khan et al., 2022b; Liu et al., 2021c; Wang et al., 2022; Xia et al., 2021), etc. 65 studies fall under this heading as listen in Table 17. Table 18 lists major areas to be explored under the application theme. Table 19 lists theories utilised under the application theme. Table 20 lists BT features mentioned under application theme.

Min (2019) proposed supply chain resilience (SCRES) as a potential application area According to the study, BT has the potential to alleviate risks and uncertainty and enhance SCRES with the help of its features of immutability, traceability, risk management and smart contracts. Wang et al. (2019a) argued that future research on BT application in SC would focus on extending the provision of automated visibility/transparency, traceability (track and trace) (Kumar et al., 2022b) to all the relevant stakeholders in SC to build trust by

Table 15 Theories utilised in implication of implementing theme

Theory/model/paradigm	Citations
Agency theory	Chaudhuri et al. (2021), Tan et al. (2022a)
Dynamic capability view (DCV)	Sheel and Nath (2019), Benzidia et al. (2021), Kusi-Sarpong et al. (2022)
Fuzzy set theory	Ozdemir et al. (2020),
Game theory	Choi (2019), De Giovanni (2020), Guo et al. (2020), Hayrutdinov et al. (2020), Bai et al. (2021), Niu et al. (2021a, 2021b), Xu et al. (2021b), Xu and Choi (2021), Yu et al. (2021), Liu (2022), Tao et al. (2022), Wu and Yu (2022), Xu and Duan (2022), Li et al. (2022a), Yang et al. (2022)
Grounded theory	Qian and Papadonikolaki (2021)
Information processing theory (IPT)	Martinez et al. (2019),
Institutional theory (IT)	Tan et al. (2022a)
Mean-risk theory	Choi (2020),
Network theory (NT)	Paul et al. (2021), Tan et al. (2022b)
Organizational information processing theory (OIPT)	Dubey et al. (2020)
Pattern matching theory	Kshetri (2021)
Principal-agent theory (PAT)	Xing et al. (2021), L. Liu et al. (2021)
Relational view (RV)	Dubey et al. (2020), Qian and Papadonikolaki (2021), Tan et al. (2022b)
Resource based view (RBV)	Martinez et al. (2019), Sheel and Nath (2019), Nandi et al. (2020), Paul et al. (2021),
Transaction cost economics (TCE)	Roeck et al. (2020),
Signaling theory	Treiblmaier and Garaus (2022)
Social exchange theory	Wang et al. (2021b)
System dynamics	Mangla et al. (2021),
Systems theory	Zelbst et al. (2020)

removing any disintermediation especially in SC's related to crucial artifacts such as vaccine, diamonds, luxury items, etc. This is because as the implementation scale increases so does the need to be transparent and traceable. Behnke and Janssen (2020) propounded BT as a highly efficient information traceability system. The study proposed a set of boundary conditions so that the implementation of BT becomes practical. Schmidt and Wagner (2019) suggested to explore the effect of BT implementation on relationship structures, disintermediation through various theoretical lenses such as agency theory and network theory. Cole et al. (2019) listed out numerous application areas such as product safety and security, quality management, reduction of counterfeiting, automation of contracts, new product development, and reduction of intermediaries. Pournader et al. (2020) in line with Saberi et al. (2019) and Babich snd Hilary (2020) proposed few application areas such as procurement, contracting, trust in buyer–supplier relationship, SC governance, SC risk management, sustainable SC, etc. Bumblauskas et al. (2020) suggested that food distribution as the target area of application specifically the egg SC in case of Europe. The study proposed use of Hyperledger Sawtooth by utilising proof of elapsed time consensus mechanism and thus,

Table 16 BT features explored under implication of implementing theme

BT features	Citations
Immutability	Ozdemir et al. (2020), Kshetri (2021), Maity et al. (2021), Tian et al. (2022)
Privacy	Maity et al. (2021), Shen et al. (2022)
Provenance	Roeck et al. (2020), Rogerson and Parry (2020), Babu et al. (2022)
Risk management	Ivanov et al. (2019), Choi (2020), De Giovanni (2020), Lohmer et al. (2020), Chaudhuri et al. (2021), Babu et al. (2022), Dang et al. (2022)
Traceability/tracking	George et al. (2019), Ivanov et al. (2019), Gourisetti et al. (2020), Köhler and Pizzol (2020), Ozdemir et al. (2020), Tönnissen and Teuteberg (2020), Kshetri (2021), Mangla et al. (2021), Wang et al. (2021a), Westerlund et al. (2021), Babu et al. (2022), Erol et al. (2022), Kshetri (2022), Paul et al. (2022a, 2022b), Tan et al. (2022a), Tian et al. (2022), Treiblmaier and Garaus (2022), Xu and He (2022), Yang et al. (2022)
Transparency/visibility	George et al. (2019), Ivanov et al. (2019), De Giovanni (2020), Dubey et al. (2020), Gourisetti et al. (2020), Guo et al. (2020), Köhler and Pizzol (2020), Ozdemir et al. (2020), Roeck et al. (2020), Rogerson and Parry (2020), Kshetri (2021), Li et al. (2021c), Maity et al. (2021), Mangla et al. (2021), Paul et al. (2021), Tan et al. (2022a), Tönnissen and Teuteberg (2020), Tozanlı et al. (2020), Zelbst et al. (2020), Xu et al. (2021a), Wang et al. (2021a), Yu et al. (2021), Babu et al. (2022), Brookbanks and Parry (2022), Liu (2022), Kshetri (2022), Paul et al. (2022a, 2022b), Philsoophian et al. (2022), Raj et al. (2022), Tan et al. (2022b), Wu and Yu (2022), Xu and He (2022)
Trust	Longo et al. (2019), De Giovanni (2020), Du et al. (2020), Dubey et al. (2020), Gourisetti et al. (2020), Köhler and Pizzol (2020), Ozdemir et al. (2020), Roeck et al. (2020), Rogerson and Parry (2020), Tönnissen and Teuteberg (2020), Li et al. (2021c), Paul et al. (2021), Qian and Papadonikolaki (2021), Raj et al. (2022), Treiblmaier and Sillaber (2021), Erol et al. (2022)
Smart contract	De Giovanni (2020), Lohmer et al. (2020), Manupati et al. (2020), Roeck et al. (2020), Kshetri (2021), Raj et al. (2022), Tan et al. (2022a), Xu and He (2022)
Security	De Giovanni (2020), Nandi et al. (2020), Li et al. (2020), Ozdemir et al. (2020), Li et al. (2021a), Maity et al. (2021), Xu et al. (2021a), Babu et al. (2022), Philsoophian et al. (2022), Raj et al. (2022), Xu and He (2022)

Table 17 Studies explored under application theme

Applications	O'Leary (2017), Tan et al. (2018), Cole et al. (2019), Choi et al. (2019), Hald and Kinra (2019), Hasan et al. (2019), Helo and Hao (2019), Min (2019), Montecchi et al. (2019), Schmidt and Wagner (2019), Wang et al. (2019b, 2021c, 2022), Yang (2019), Batwa and Norrman (2020), Bumblauskas et al. (2020), Behnke and Janssen (2020), Chang et al. (2020), Di Vaio and Varriale (2020), Dutta et al. (2020), Filimonau and Naumova (2020), Kittipanya-ngam and Tan (2020), Kopyto et al. (2020), Liu et al. (2021c; 2021f); ; ; 2020, , , J. Liu et al. (2021b), Liu and Li (2020), Pournader et al. (2020), Rodríguez-Espíndola et al. (2020), Fosso Wamba et al. (2020a), Sunny et al. (2020, 2022), Agrawal et al. (2021), Asante et al. (2021), Bechtsis et al. (2021), de Boissieu et al. (2021), Hu et al. (2021), Karamchandani et al. (2021), Kumar et al. (2021), McGrath et al. (2021), Menon and Jain (2021), Mishra and Maheshwari (2021), Mukherjee et al. (2021), Raj Kumar Reddy et al. (2021), Rejeb et al. (2021), Sharma et al. (2021a), Sivula et al. (2021), Tandon et al. (2021), Varriale et al. (2021), Vivaldini (2021b), Ahmad et al. (2022), Friedman and Ormiston (2022), Gong et al. (2022a, 2022b), Grida and Mostafa (2022), Hrouga et al. (2022), Jiang et al. (2022), Khan et al. (2022a, 2022b), Manupati et al. (2022), Zhu et al. (2022)

hopes to contribute to food traceability domain. Montecchi et al. (2019) argued enhancing provenance could be a potential application area as it focuses on reducing the uncertainty about authenticity, custody, intergrity and orgin. Dutta et al. (2020) through their literature review identified various industries that could be revamped by implementing BT such as agriculture, energy, finance, food, shipping, etc. They argued that improvements in transparency, traceability, business processes, etc. would revamp the listed industries. Counterfeits, clones are a huge problem in cross border e-commerce trade and as such present an application area for BT to solve the problem (de Boissieu et al., 2021; Liu & Li, 2020). Hald and Kinra (2019) posit that BT can solve the problems related to contract management, SC governance, structural complexity, SC coordination, and data inconsistencies. Rodríguez-Espíndola et al. (2020) explored the possibility of applying BT along with other technologies such as artificial intelligence in humanitarian logistics. The study suggested that BT due to its features of immutability, decentralised character, smart contracts present a very attractive application area along with other leading technologies while having a strong case of improving data accuracy needs, accountability, tracking ability and real-time transparency. Kopyto et al. (2020) predicted that by the year 2035 BT will be applied to SC. The study discussed how BT will be applied to SC by developing and discussing the projections that were rated by Delphi experts depending on factors such as probability of desirability, impact, and occurrence. Asante et al. (2021) argued that BT demonstrates huge potential to improve cyber-resilience, traceability, transparency, trust while integrating with other technologies in data-driven operations. Bechtsis et al. (2021) argued that data-driven technology such as BT provide an impetus to improve SC operations, security, resilience, and sustainability. Kayikci et al. (2021) proposed that BT application of immutability, traceability, transparency, and smart contracts could lead to operational excellence, effective collaboration, reduction of risks (Rauniyar et al., 2022), increased responsiveness and flexibility. Rejeb et al. (2021) argued facilitating accountability, auditability, data consistency, transparency and traceability are the main focal application areas of BT in future SC's. The study pointed out a need for enhanced collaboration while overcoming vulnerabilities related to legacy technologies. Continuing with vulnerabilities and disruptions, Raj Kumar Reddy et al. (2021) pointed out that BT could address issues related to uncertainties in automotive SC by enabling and enhancing traceability, transparency, visibility for an effiicient automotive SC. Karamchandani et al. (2021) conducted a survey in manufacturing SC and found that blockchain would play a greater role in reliable delivery and mass customisation of products. Friedman and Ormiston (2022) posit that BT favours sustainability and fairer SC with better food traceability. However, Khan et al. (2022b) reported that BT doesn't directly impact SC sustainability but could be indirectly achieved through SC Integration (Wang et al., 2022) and SC Mapping. Hrouga et al. (2022) assert that BTs features of immutability, transparency and smart contract would impact strategic SC partnership efficiency and growth which would further impact the SC performance and, hence, report SC partnerships as an area of application of BT. Khan et al. (2022a) reported that BT application in agricultural SC could enable integrity and trust, fraud and counterfeit prevention, traceability and transparency along with reliable data retrieval. Gong et al. (2022a) argued that BT presents a potential application in recycling SC for debris management and sustainability as its features of high traceability and transparency with the application of smart contract would be effective in establishing a global recycling network.

Table 18 Major areas to be explored under application theme

Major application/substantive area	Citations
Food SC	Behnke and Janssen (2020), Bumblauskas et al. (2020), Kittipanya-ngam and Tan (2020), Liu et al. (2020), Bechtsis et al. (2021), Vivaldini (2021a, 2021b), Kayikci et al. (2021), Menon and Jain (2021), Mishra and Maheshwari (2021), Friedman and Ormiston (2022), Pandey et al. (2022)
Agriculture SC	Liu et al. (2020), Agrawal et al. (2021), Hu et al. (2021), Menon and Jain (2021), Mishra and Maheshwari (2021), Mukherjee et al. (2021), Khan et al. (2022a)
SC risk management	Choi et al. (2019), Min (2019), Montecchi et al. (2019), Helo and Hao (2019), Kopyto et al. (2020), Bechtsis et al. (2021), Varriale et al. (2021), Manupati et al. (2022), Pandey et al. (2022), Rauniyar et al. (2022)
Sustainable SC	Di Vaio and Varriale (2020), Bechtsis et al. (2021), McGrath et al. (2021), Xia et al. (2021), Gong et al. (2022a, 2022b), Khan et al. (2022b), Wang et al. (2022)
SC finance	O'Leary (2017), Fosso Wamba et al. (2020a), Liu et al. (2021c), Jiang et al. (2022),
Logistics	Tan et al. (2018), Pournader et al. (2020), Tönnissen and Teuteberg (2020), Ajay Kumar et al. (2021), Hrouga et al. (2022),

Table 19 Theories utilised under application theme

Theory/model/paradigm	Citations
Fuzzy set theory	Sharma et al. (2021a)
Game theory	Liu et al. (2020; 2021c); Grida and Mostafa (2022),
Grounded theory	de Boissieu et al. (2021)
Mean–variance theory	Choi et al. (2019),
Network theory (NT)	Gong et al. (2022a, 2022b),
Resource based view (RBV)	Bechtsis et al. (2021), Karamchandani et al. (2021)
Technology acceptance model (TAM)	Yang (2019)
Transaction cost analysis (TCA)	Schmidt and Wagner (2019), Bechtsis et al. (2021)
Relational view	Zhu et al. (2022)
Sensemaking theory	Wang et al. (2019a)

4.2 Blockchain technology and SC resilience (SCRES)

PONOMAROV and Holcomb (2009) define supply chain resilience (SCRES) as the "adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions, and recover from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function". Tukamuhabwa et al. (2015) summarised a set proactive and reactive strategies of SCRES. Among the most prominent SCRES strategies

Table 20 BT features mentioned under application theme

BT features	Citations
Immutability	Cole et al. (2019), Hald and Kinra (2019), Min (2019), Chang et al. (2020), Fosso Wamba et al. (2020a), Asante et al. (2021), Hu et al. (2021), Karamchandani et al. (2021), Kayikci et al. (2021), J. Liu et al. (2021), Mishra and Maheshwari (2021), Mukherjee et al. (2021), Sharma et al. (2021a), Varriale et al. (2021), Wang et al. (2021c), Ahmad et al. (2022), Hrouga et al. (2022)
Privacy	Fosso Wamba et al. (2020a), Menon and Jain (2021), Mukherjee et al. (2021), Varriale et al. (2021), Ahmad et al. (2022),
Provenance	Helo and Hao (2019), Montecchi et al. (2019), Batwa and Norrman (2020), Menon and Jain (2021), Vivaldini (2021a, 2021b), Ahmad et al. (2022)
Risk management	Choi et al. (2019), Min (2019), Montecchi et al. (2019), Helo and Hao (2019), Kopyto et al. (2020), Bechtsis et al. (2021), Varriale et al. (2021), Manupati et al. (2022), Pandey et al. (2022), Rauniyar et al. (2022)
Traceability/tracking	Tan et al. (2018), Cole et al. (2019), Hald and Kinra (2019), Helo and Hao (2019), Min (2019), Montecchi et al. (2019), Batwa and Norrman (2020), Behnke and Janssen (2020), Bumblauskas et al. (2020), Chang et al. (2020), Kittipanya-ngam and Tan (2020), Liu et al. (2020), Liu and Li (2020), Pournader et al. (2020), Rodríguez-Espíndola et al. (2020), Sunny et al. (2020), Agrawal et al. (2021), Asante et al. (2021), Bechtsis et al. (2021), de Boissieu et al. (2021), Hu et al. (2021), Karamchandani et al. (2021), Yasanur Kayikci et al. (2021), Ajay Kumar et al. (2021), Liu et al. (2021f), Menon and Jain (2021), Mishra and Maheshwari (2021), Raj Kumar Reddy et al. (2021) Rejeb et al. (2021), Sharma et al. (2021a), Vivaldini (2021b), Varriale et al. (2021), Ahmad et al. (2022), Friedman and Ormiston (2022), Gong et al. (2022a, 2022b), Hrouga et al. (2022), Khan et al. (2022a), Pandey et al. (2022), Zhu et al. (2022)

Table 20 (continued)

BT features	Citations
Transparency/visibility	Tan et al. (2018), Cole et al. (2019), Hald and Kinra (2019), Min (2019), Montecchi et al. (2019), Yang (2019), Batwa and Norrman (2020), Bumblauskas et al. (2020), Dutta et al. (2020), Chang et al. (2020), Kittipanya-ngam and Tan (2020), Kopyto et al. (2020), Rodríguez-Espíndola et al. (2020), Fosso Wamba et al. (2020a), Pournader et al. (2020), Sunny et al. (2020), Asante et al. (2021), Bechtsis et al. (2021), de Boissieu et al. (2021), Hu et al. (2021), J. Liu et al. (2021), Karamchandani et al. (2021), McGrath et al. (2021), Menon and Jain (2021), Yasanur Kayikci et al. (2021), Mishra and Maheshwari (2021), Mukherjee et al. (2021), Raj Kumar Reddy et al. (2021) Rejeb et al. (2021), Sharma et al. (2021a), Varriale et al. (2021), Vivaldini (2021a, 2021b), Wang et al. (2021c), Ahmad et al. (2022), Friedman and Ormiston (2022), Gong et al. (2022a, 2022b), Hrouga et al. (2022), Khan et al. (2022a), Pandey et al. (2022), Wang et al. (2022), Zhu et al. (2022)
Trust	Helo and Hao (2019), Batwa and Norrman (2020), Chang et al. (2020), Liu et al. (2020), Pournader et al. (2020), Fosso Wamba et al. (2020a), Agrawal et al. (2021), Asante et al. (2021), Hu et al. (2021), Karamchandani et al. (2021), Menon and Jain (2021), Rejeb et al. (2021), Sharma et al. (2021a), Varriale et al. (2021), Wang et al. (2021c), Ahmad et al. (2022), Gong et al. (2022a, 2022b), Hrouga et al. (2022), Jiang et al. (2022), Khan et al. (2022a), Pandey et al. (2022), Zhu et al. (2022)
Smart contract	Cole et al. (2019), Hald and Kinra (2019), Hasan et al. (2019), Helo and Hao (2019), Min (2019), Bumblauskas et al. (2020), Chang et al. (2020), Agrawal et al. (2021), Karamchandani et al. (2021), Menon and Jain (2021), Yasanur Kayikci et al. (2021), Ajay Kumar et al. (2021), J. Liu et al. (2021), Menon and Jain (2021), Mukherjee et al. (2021), Sharma et al. (2021a), Varriale et al. (2021), Vivaldini (2021b), Wang et al. (2021c), Grida and Mostafa (2022), Hrouga et al. (2022), Manupati et al. (2022), Zhu et al. (2022)
Security	Cole et al. (2019), Min (2019), Batwa and Norrman (2020), Chang et al. (2020), Dutta et al. (2020), Liu et al. (2020), Fosso Wamba et al. (2020a), Bechtsis et al. (2021), Ajay Kumar et al. (2021), Yasanur Kayikci et al. (2021), J. Liu et al. (2021b), Sharma et al. (2021a), Varriale et al. (2021), Vivaldini (2021b), Wang et al. (2021c), Ahmad et al. (2022), Friedman and Ormiston (2022)

Table 21 Summary of four themes

	Pre-adoption	Adoption	Implementation implication	Application
Focus	1. Pre-requisites of adoption 2. Intention of SC Managers 3. Planning of adoption 4. Pilot Projects	1. Current BT adoption scenario—enablers and barriers 2. Resistance to adoption	Effects of BT on 1. SC 2. SC performance 3. SC Integration 4. SC Collaboration, etc.	Future applications and integration with other technology with additional exploration in sustainability and resilience
Prominent TheorIES	TAM, TOE, DSR	Game theory, TOE	Game theory	Game theory
Prominent BT-featureS	Traceability, transparency, trust	Transparency, traceability, security, trust	Transparency, traceability, trust, security	Transparency, traceability, trust, smart contract, immutability, security
No of papers	62	78	87	65

use of information technology to enhance connectivity, visibility, collaboration, flexibility, agility, creating risk management culture, building security, and creating appropriate contractual agreements were discussed. Table 22 lists 12 studies that have explored BT in context of SCRES.

Min (2019) proposed SCRES as a potential application area of blockchain technology (BT). According to the study, BT has the potential to alleviate risks and uncertainty and enhance SCRES with the help of its features of immutability, traceability, risk management

Table 22 Studies exploring blockchain and SC resilience

Citation	Journal	Theme
Min (2019)	Business Horizons	Application
Dubey et al. (2020)	International Journal of Production Research	Implication
Lohmer et al. (2020)	International Journal of Production Economics	Implication
Casino et al. (2021)	International Journal of Production Research	Pre-Adoption
Nandi et al. (2021)	Industrial Management and Data Systems	Adoption
Mukherjee et al. (2021)	Operations Management Research	Application
Vivaldini and de Sousa (2021)	Benchmarking	Pre-Adoption
Sharma et al. (2021a)	Operations Management Research	Application
Razak et al. (2021)	Production Planning and Control	Adoption
Bechtsis et al. (2021)	International Journal of Production Research	Application
Narwane et al. (2021)	Annals of Operations Research	Adoption
Chowdhury et al. (2022)	Annals of Operations Research	Pre-Adoption

and smart contracts (Iftikhar et al., 2022). Dubey et al. (2020) argued that BT could be successfully utilised to enhance transparency, swift trust (Shayganmehr et al., 2021), and further improve collaboration along with improved supply chain resilience (SCRES) in a humanitarian SC. Lohmer et al. (2020) utilised agent-based simulation model to analyse the impact of BT on disruptions and SCRES. The simulation indicated that BT successfully promotes SCRES and its aligned strategies if smart contracts were employed for collaboration under risk. Casino et al. (2021) proposed a BT-enabled traceability framework. The study implied that utilising BT had several benefits that include efficiency (minimisation of cost, more automation, and less paperwork); trust (accountability, auditability, and immutability); quality (process, product, and verifiability) and resilience (business continuity, decentralisation, and security). The study further accounts for SCRES by offering more benefits such as removing systemic and geographic boundaries while also enabling integration of different traceability data in SC. Nandi et al. (2021) call for creating BT capabilities and resources to improve SCRES. The study aims at developing L–A–D capabilities (localization, agility, and digitalization) by integrating BT-enabled circular economy system. The L–A–D capabilities then help in establishing SCRES as it provides a mechanism to respond to disruptions. Mukherjee et al. (2021) listed building SCRES as one of the benefits of BT-enabled SC. For SC to be resilient, accurate forecasting capabilities, visibility and real-time information sharing (Wong et al., 2021) are necessary and it in this respect, BT is instrumental in establishing enhanced anticipation, visibility and adaptable capabilities among stakeholders in SC (Pan et al., 2020). Vivaldini and de Sousa (2021) enlisted BT connectivity inhibitors that affect SCRES and SC interaction. In this aspect, the study lists 3 major inhibitors: coordination, technology understanding, and resources involved, and called for improving SCRES via BT enabled SC Interaction. Sharma et al. (2021a) derived twelve BT-enabled resilient strategies from the literature to enhance efficiency, survivability, and performance of food SC. The study found that BT based strategies such as flexibility, visibility and the change in network structure are the most effective strategies to fight disruption and enhance SCRES. Razak et al. (2021) propounded traceability system such as BT as an enabler of SCRES. The study mentioned the direct and indirect impacts of traceability on SCRES. In the direct impact case, BT-enabled traceability could be used as risk-identification tool while as BT-enabled traceability exhibits indirect role by enhancing formative elements of SCRES such as collaboration, flexibility, velocity and visibility. Bechtsis et al. (2021) argued that data-driven technology such as BT provide an impetus to improve SC operations, security, sustainability, and ultimately SCRES (Kazancoglu et al., 2022). Narwane et al. (2021) identified improving SCRES as one of the enablers of BT adoption. This is due to the fact that BT is a risk minimising disruptive technology (Ivanov & Dolgui, 2021). This was further supported by Chowdhury et al. (2022) who mentioned SCRES as one of the constructs that creates managers behavioural intention to adopt BT for managing risks.

Through this discussion, the study argues that there is a huge opportunity to empirically explore effect of BT on SCRES, and explore how SCRES can act as one of the motivations to implement BT in SC. This can be achieved by conducting empirical investigations to fill void in the literature.

5 Discussion

This study aimed at providing a comprehensive overview of the literature by conducting systematic literature review (SLR) on the lens of blockchain (BT) application in supply

chain. While conducting the review, it was found that blockchain in SC research has recently evolved as a highly researched area from 2017 (Dutta et al., 2020). The study shortlisted all the relevant studies based on the set review protocol and hence, developed a profile of top peer-reviewed journals along with the articles published in such journals. The study conducted descriptive analyses along with a rigorous content analysis of the articles to showcase the knowledge in a comprehensive yet in-depth manner. Hence, this led to a synthesis of knowledge that encapsulates journey of BT in SC from ideation to the implementation and the future application. Furthermore, the study explored the probable effects of BT on SC integration, collaboration, resilience, sustainability, and performance that provide directions for significant research opportunities to the researchers while also shedding light on significant managerial implications.

5.1 Theoretical contributions

This study contributes by proposing a guiding framework to identify studies that involve latest technologies such as blockchain (BT) and fitting them to a set of four specific themes or perspectives of the evolution of research in the domain. Such classification could be critical to understand the state of technology in academia and industry i.e., whether the technology is still in its nascent stage or if it has matured into an industry-wide accepted and implemented technology. In case of BT, the technology is still in its initial acceptance and implementation phase and promises to be an industry disruptive technology (Pournader et al., 2020). The study also identified top peer-reviewed publishing journals which also ensures the relevance of the research domain as most of the top journals are publishing the content on BT in SC. The study further contributes by identifying the leading industries of the world employing BT in their SC. It was identified that food industry has found its application in traceability, provenance, food security and establishing trust and transparency. The study established that very less empirical based survey studies have been conducted. This identification of gap has led to propositions and a conceptual framework for the future empirical testing and hence, provides a future research direction as well at the conclusion of the article. While many articles have talked about BT enablers/drivers and barriers, and explored them using interpretive logic, it becomes pertinent to understand the actual impact of these factors on BT enabled SC. So, the study proposes an industry wide organizational point of view to study the impact of such factors and go beyond just identification. Furthermore, the study identified theories utilised in the literature as well as the features of blockchain that are most talked about in articles. While going through the theories, it was found game theory, TAM, TOE, etc. as the most utilised theories and they have been utilised in context of adoption and possible implications of implementing BT in SC. This indicates that BT in SC research is attracting researchers apply a diverse set of theories and stimulates further research by applying theories to understand the impact of BT on SC Integration, SC Collaboration, SC Resilience (Cui et al., 2022) and ultimately SC Performance. In case of features, traceability, transparency, and trust are the most talked about ones. While traceability and transparency are usual suspects in case of food SC, trust happens to be the epitome of the BT enabled SC (Yavaprabhas et al., 2022).

5.2 Managerial implications

Our study has the following managerial implications: first, it provides an insight and direction to practitioners to understand the state of their industry in case of BT adoption and hence,

utilise four perspectives ranging from pre-adoption perspective (focused on intention of managers and the requirements of adoption) to the future research applications (focused on future research empirical studies, industries, features, sustainability, resilience and performance). Second, it provides impetus to exploring industry wide BT enabled trust mechanisms for managers while exploring applications in traceability, risk management, and transparency. Third, it enables managers to take the decision of adoption based on their requirements and critical success factors (the drivers or the barriers) along with the focus on reducing their adoption costs and increasing profits from utilising the BT while increasing the SC Performance, and SC Resilience to act as an anti-disruption technology. Fourth, the study contributes by enabling managers to understand whether the BT features identified in the four themes match their industry requirements and hence, provide a direction towards the adoption and implementation of BT in their firms.

6 Conclusion and limitations

This study provides a thorough review of 292 articles over a period of 5 years (2017–2022) by utilising SLR. The main objective of this was to identify the state of articles published in leading journals in context of BT in SC with year wise, journal wise, industry wise classifications, etc. while offering the future research direction as well. The study proposed four theme/perspective framework. This framework helps to understand the state of BT in SC both academically and industry wise. The study identified that very few pilot projects have been undertaken in industry while food industry has been the leading industry to employ BT in their SC for traceability and transparency purposes. Furthermore, the nature of findings highlights a need to have studies focused on trust, risk management, and development and implementation of smart contracts in SC. Each of the four themes summarises the BT features explored, theories discussed and utilised and the findings of the articles under each theme. Application theme itself caters to the future research possibilities and lends a good direction to scholars in identifying future key BT features as well as their application in critical SC areas. This study also adds value by summarising the possible application areas such as SC risk management, SC Integration, SC Collaboration, Circular Economy, Sustainability, SC Resilience and SC Performance. However, our study has a few limitations. The study didn't consider grey literature, conference papers and books which at times could also contain advanced knowledge regarding the blockchain. The self-developed guiding framework is not absolute. However, it provides a pathway to understand the evolution and application of any new technology in industry and research.

7 Future research agenda

Based on the critical analysis of literature of BT in SC, this study proposes future research agenda to continue the advancement of the discipline and to address the unanswered questions for both management scholars as well as the practitioners. Our extensive review emphasizes that BT has a huge potential in changing the way actors manage a SC especially in tracking and tracing of products, ensuring transparency, building trust, managing risks, and developing a secure SC environment. The critical review further expands the horizon of application of BT and going beyond the tracking and tracing in different industries such as construction, retail, pharmaceutical, waste management, etc.

To organize our research agenda, we utilise Whetten (1989) "5W and 1H approach" i.e., "what, who, why, when, where and how". Table 23 summarises the agenda.

- **What.** This section proposes to explore the enablers/drivers and barriers related to BT adoption and implementation specifically with regard to areas of sustainability, circular economy, resilience and SC integration (Chowdhury et al., 2022; Khan et al., 2022a; Oropallo et al., 2021; Tsolakis et al., 2021). This would address the question, "What critical factors would drive or inhibit an organization to adopt and implement BT to address the issues of sustainability, circular economy and resilience?". It also addresses the question, "What are the motivations and intentions of the SC managers to adopt BT?". Furthermore,

Table 23 Whetten (1989) "5W and 1H approach"

Dimension	Future research direction	Questions
What	To explore the factors driving or inhibiting adoption of BT in SC To explore the motivations and intention of SC managers to BT adoption in SC	1. What critical factors would drive or inhibit an organization to adopt and implement BT to address the issues of sustainability, circular economy, and resilience? 2. What are the motivations and intentions of the SC managers to adopt BT?
Why	To understand the motivational factors and their relationships behind the adoption and implementation of BT as well as the implications on socio-economic fabric and theories that address them	1. Why BT-enabled transparency and trust would lead to better SC relationships? 2. Why BT-enabled transparency and trust would lead to better SC integration? 3. Why BT-enabled transparency and trust would lead to better SC performance?
How	To explore the methods and methodologies that address the questions addressing issue of trust and risk management in BT-enabled SC	1. How do managers tackle the issue of privacy vs transparency issue arising in BT-enabled SC? 2. Does implementation of smart contracts establish trust, if yes then how? 3. How does BT enhance risk management in a SC?
Who	To address the questions related to actors such as intermediaries, BT & SC partners, stakeholders, etc	1. Who will experience a higher impact of BT adoption and implementation, intermediaries, or the rest of the stakeholders? 2. Will BT adoption and implementation adversely affect the existing relationships between the stakeholders in a SC?
When	To addresses the questions related to timing of adoption and looking beyond the stereotypical uses	1. When is it right for the firms/organisations/entities to adopt and implement BT? 2. When should BT be integrated with I4.0 technologies? 3. When will organisations look beyond tracking and tracing properties of BT?
Where	To explore context and the application areas of BT	1. Will the PESTLE dimensions influence and dictate the application of BT in SC? 2. Which new application areas are to be identified where in legacy technologies can either be replaced or supplemented with BT?

a dearth of empirical investigations on impact of BT on SC leads us to believe that there are numerous opportunities to develop constructs along with the empirical measures to characterize impact of BT constructs on SC constructs and moving beyond the exploration of drivers and barriers.

- **Why:** Through this section, the study draws up questions related to the motivational factors behind the adoption and implementation of BT as well as the implications on socio-economic fabric. One of the prime reasons to adopt and implement BT is to ensure trustworthiness to improve SC relationships and integration, no matter how debatable the topic itself is. It is further accompanied by the need of information transparency that is rather decentralized. Individuals today tend to shy away from traditional centralized scheme of authority especially in situations of crisis and are keen to get access to sensitive or well-kept information by the powerful entities (Lumineau et al., 2021). Such access to decentralized, transparent schema exudes a sense of trust that BT brings in. Another motivation to adopt and implement BT is minimization of risk and frauds. Hence, scholars can explore questions such as "Why would BT generated transparency and trust lead to better SC relationships, SC integration and SC performance?". To answer the questions, scholars can explore various theories to address the issues of "causality, explanation, prediction and generalization" from various disciplines such as information sciences and utilise theories such as social exchange theory (Wang et al., 2021b), institutional theory (Hartley et al., 2022), resource based view (Wamba & Queiroz, 2022), transaction cost economics (Roeck et al., 2020), etc. (Dubey et al., 2022).
- **How:** This section directs our attention to questions related to conduct of investigations related to underlying processes explaining impact of BT on SC i.e., methods and methodologies. There is a debate on the privacy, security, confidentiality vs transparency issue of BT (Xu et al., 2021a). Pandey et al. (2022) reported that BT helps in managing risks but didn't come up with the explanation for it. Furthermore, there is a deficit on understanding of mechanism of smart contract established trust (Oropallo et al., 2021). Thus, we propose following questions arising from this section.

  1. "How are managers going to tackle the issue of privacy vs transparency issue arising in BT-enabled SC?"
  2. "Does implementation of smart contracts establish trust, if yes then how?"
  3. "How does BT enhance risk management in a SC?".

  Clearly, we lack empirical studies that address such questions. We also see scope of utilising multiple or mixed methods to generate both qualitative as well as quantitative data to address these questions.

- **Who:** An important aspect of blockchain is that it brings those people into collaborative, trustworthy environment that are essentially strangers to build an interorganizational trust (Yavaprabhas et al., 2022). This has a huge potential for certain actors who seek enhanced cooperation, coordination and collaboration to solve crisis situations especially in case of humanitarian concerns that require swift-trust among the stakeholders (Dubey et al., 2020). Going away with the intermediaries is a benefit of BT and smart-contracts (Christidis & Devetsikiotis, 2016). Thus, first question for scholars is, "Who will feel a higher impact of BT adoption and implementation, intermediaries or the rest of the stakeholders?". Second, "Will BT adoption and implementation adversely affect the existing relationships between the stakeholders in a SC?". Such questions need to be addressed as BT could also adversely affect the existing business models.

- **When:** It is an important decision for any firm to decide on the timing of adoption and implementation and as such more critical to decide when not to. It should also be noted that BT is not necessarily a standalone technology and as such, would do better if integrated with other industry 4.0 technologies (Kamble et al., 2019). For the scholars, questions to address are 1) "When is it right for the firms/organisations/entities to adopt and implement BT?" 2) "When should BT be integrated with I4.0 technologies?". Furthermore, studies focus too much on traceability and transparency features of BT especially in food SC (Kittipanya-ngam & Tan, 2020; Razak et al., 2021). However, BT has the potential to go beyond this tracking and tracing. Hence, following question needs to be addressed as well, "When will organisations look beyond tracking and tracing properties of BT?". This question sounds more critical because BT has been touted as the "potentially disruptive technology" (Sengupta et al., 2021) which is however, yet to be established.
- **Where:** This section reflects the context and the application areas of BT while considering geographical, technological infrastructure, political, socio-economical, cultural, and legal structure influence. Montecchi et al. (2019) argued enhancing provenance could be a potential application area as it focuses on reducing the uncertainty about authenticity, custody, intergrity and orgin. In a similar way. Cole et al. (2019) listed out numerous application areas such as product safety and security, quality management, reduction of counterfeiting, automation of contracts, new product development, and reduction of intermediaries. Keeping in mind the factors that could dictate application of BT, following question needs to be addressed, "Will the PESTLE dimensions influence and dictate the application of BT in SC?". Another question that needs to be answered is, "Which new application areas are to be identified where in legacy technologies can either be replaced or supplemented with BT?".

This study also calls for and develops propositions represented as a consolidated conceptual framework/theoretical model for future empirical testing because of two reasons: (1) the infancy of BT research in this domain (Queiroz et al., 2020; Wang et al., 2019a) and (2) a lack of empirical evidence in BT in SC domain (Caldarelli et al., 2021; Chowdhury et al., 2022; Cole et al., 2019; Roeck et al., 2020).

Although, many studies have argued and proposed the benefits of implementing BT in SC, few have been able to empirically validate them. Studies have proposed that BT leads to improved traceability (Erol et al., 2022; Hald & Kinra, 2019); security (Min, 2019; Philsoophian et al., 2022); transparency/visibility (Dubey et al., 2020; Pournader et al., 2020); risk management (Lohmer et al., 2020; Pandey et al., 2022), provenance (Montecchi et al., 2019; Roeck et al., 2020); and privacy (Fosso Wamba et al., 2020a; Shen et al., 2022). Montecchi et al. (2019) argued that BT enhanced provenance reduced uncertainty about authenticity, custody, intergrity and orgin which meant an establishment of trust is achievable. It was also observed that better risk management (Laeequddin et al., 2009), improved privacy and security instill trust among the partners of a SC (Oropallo et al., 2021). Köhler and Pizzol (2020) posited that enhanced transparency and traceability lead to trust which in turn lead to increased SC Collaboration (Erol et al., 2022), SC Integration (Zhang & Huo, 2013) and SC Resilience (Dubey et al., 2020). Chunsheng et al. (2020) argued that SC integration had high effect on SC Resilience while also impacting the SC performance. M. Chowdhury et al. (2019) proposed that SC resilience is likely going to enhance SC performance. Cao and Zhang (2011) indicated that SC collaboration had a bottom-line on a firm's performance. Khan et al. (2022b) mentioned that BT doesn't directly impact SC sustainability. However, it could be indirectly achieved through SC Integration (Wang et al., 2022).

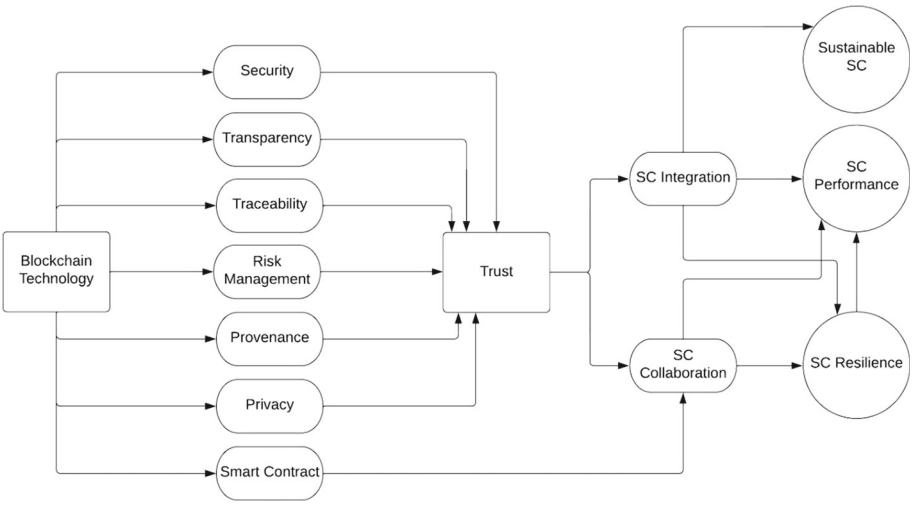

Fig. 4 Theoretical model

Since, there is a lack of empirical evidence in case of effect of BT on the features discussed and the effect of BT-enabled trust on SC integration, collaboration, sustainability, resilience, and performance, we propose the following set of propositions based on the above discussion and develop a theoretical model based on the propositions. Figure 4 presents the theoretical model.

P1: Blockchain technology (BT) implementation in SC enhances security, transparency/visibility, traceability, risk management, provenance, and privacy.
P2: BT features of immutability, security, transparency/visibility, traceability, risk management, provenance, smart contract, and privacy have a positive impact on trust.
P3: BT-enabled trust and application of smart contracts positively impact SC Collaboration.
P4: BT-enabled trust positively impacts SC Integration.
P5: SC Collaboration and SC Integration as a consequence of BT enabled trust positively impact SCRES and SC Performance.
P6: BT-enabled SCRES positively influences SC Performance.
P7: BT-enabled SC Integration can induce motivations for sustainability.

References

Adel, H. M., & Younis, R. A. A. (2021). Interplay among blockchain technology adoption strategy, e-supply chain management diffusion, entrepreneurial orientation and human resources information system in banking. *International Journal of Emerging Markets*. https://doi.org/10.1108/IJOEM-02-2021-0165

Agi, M. A. N., & Jha, A. K. (2022). Blockchain technology in the supply chain: An integrated theoretical perspective of organizational adoption. *International Journal of Production Economics, 247*, 108458. https://doi.org/10.1016/j.ijpe.2022.108458

Agrawal, T. K., Kumar, V., Pal, R., Wang, L., & Chen, Y. (2021). Blockchain-based framework for supply chain traceability: A case example of textile and clothing industry. *Computers and Industrial Engineering, 154*(January), 107130. https://doi.org/10.1016/j.cie.2021.107130

Ahmad, R. W., Salah, K., Jayaraman, R., Yaqoob, I., & Omar, M. (2022). Blockchain in oil and gas industry: Applications, challenges, and future trends. *Technology in Society, 68*(August 2021), 101941. https://doi.org/10.1016/j.techsoc.2022.101941

Albizri, A., & Appelbaum, D. (2021). Trust but verify: The oracle paradox of blockchain smart contracts. *Journal of Information Systems, 35*(2), 1–16. https://doi.org/10.2308/ISYS-19-024

Ali, M. H., Chung, L., Kumar, A., Zailani, S., & Tan, K. H. (2021). A sustainable blockchain framework for the halal food supply chain: Lessons from Malaysia. *Technological Forecasting and Social Change*. https://doi.org/10.1016/j.techfore.2021.120870

Anastasiadis, F., Manikas, I., Apostolidou, I., & Wahbeh, S. (2022). The role of traceability in end-to-end circular agri-food supply chains. *Industrial Marketing Management, 104*(May), 196–211. https://doi.org/10.1016/j.indmarman.2022.04.021

Asante, M., Epiphaniou, G., Maple, C., Al-Khateeb, H., Bottarelli, M., & Ghafoor, K. Z. (2021). Distributed ledger technologies in supply chain security management: A comprehensive survey. *IEEE Transactions on Engineering Management*. https://doi.org/10.1109/TEM.2021.3053655

Azzi, R., Chamoun, R. K., & Sokhn, M. (2019). The power of a blockchain-based supply chain. *Computers and Industrial Engineering, 135*(August 2018), 582–592. https://doi.org/10.1016/j.cie.2019.06.042

Babich, V., & Hilary, G. (2020). Distributed ledgers and operations: What operations management researchers should know about blockchain technology. *Manufacturing and Service Operations Management, 22*(2), 223–240. https://doi.org/10.1287/MSOM.2018.0752

Babu, E. S., Kavati, I., Nayak, S. R., Ghosh, U., & Al Numay, W. (2022). Secure and transparent pharmaceutical supply chain using permissioned blockchain network. *International Journal of Logistics Research and Applications*. https://doi.org/10.1080/13675567.2022.2045578

Bag, S., Viktorovich, D. A., Sahu, A. K., & Sahu, A. K. (2021). Barriers to adoption of blockchain technology in green supply chain management. *Journal of Global Operations and Strategic Sourcing, 14*(1), 104–133. https://doi.org/10.1108/JGOSS-06-2020-0027

Baharmand, H., Maghsoudi, A., & Coppi, G. (2021). Exploring the application of blockchain to humanitarian supply chains: Insights from Humanitarian supply blockchain pilot project. *International Journal of Operations and Production Management, 41*(9), 1522–1543. https://doi.org/10.1108/IJOPM-12-2020-0884

Bai, C., Quayson, M., & Sarkis, J. (2022). Analysis of Blockchain's enablers for improving sustainable supply chain transparency in Africa cocoa industry. *Journal of Cleaner Production, 358*(April), 131896. https://doi.org/10.1016/j.jclepro.2022.131896

Bai, C., & Sarkis, J. (2020). A supply chain transparency and sustainability technology appraisal model for blockchain technology. *International Journal of Production Research, 58*(7), 2142–2162. https://doi.org/10.1080/00207543.2019.1708989

Bai, Y., Fan, K., Zhang, K., Cheng, X., Li, H., & Yang, Y. (2021). Blockchain-based trust management for agricultural green supply: A game theoretic approach. *Journal of Cleaner Production, 310*(April), 127407. https://doi.org/10.1016/j.jclepro.2021.127407

Balci, G., & Surucu-Balci, E. (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*. https://doi.org/10.1016/j.tre.2021.102539

Batwa, A., & Norrman, A. (2020). A framework for exploring blockchain technology in supply chain management. *Operations and Supply Chain Management, 13*(3), 294–306. https://doi.org/10.31387/OSCM0420271

Bechtsis, D., Tsolakis, N., Iakovou, E., & Vlachos, D. (2021). Data-driven secure, resilient and sustainable supply chains: Gaps, opportunities, and a new generalised data sharing and data monetisation framework. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.1957506

Behnke, K., & Janssen, M. F. W. H. A. (2020). Boundary conditions for traceability in food supply chains using blockchain technology. *International Journal of Information Management, 52*(May 2019), 101969. https://doi.org/10.1016/j.ijinfomgt.2019.05.025

Benstead, A. V., & Moradlou, H. (2022). Entering the world behind the clothes that we wear: Practical applications of blockchain technology Enter. *Production Planning and Control, 2020*, 1–18.

Benzidia, S., Makaoui, N., & Subramanian, N. (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*(May), 120819. https://doi.org/10.1016/j.techfore.2021.120819

Brookbanks, M., & Parry, G. (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. https://doi.org/10.1108/SCM-05-2021-0227

Bumblauskas, D., Mann, A., Dugan, B., & Rittmer, J. (2020). A blockchain use case in food distribution: Do you know where your food has been? *International Journal of Information Management, 52*(October 2019), 102008. https://doi.org/10.1016/j.ijinfomgt.2019.09.004

Büyüközkan, G., Tüfekçi, G., & Uztürk, D. (2021). Evaluating blockchain requirements for effective digital supply chain management. *International Journal of Production Economics*. https://doi.org/10.1016/j.ijpe.2021.108309

Caldarelli, G., Zardini, A., & Rossignoli, C. (2021). Blockchain adoption in the fashion sustainable supply chain: Pragmatically addressing barriers. *Journal of Organizational Change Management, 34*(2), 507–524. https://doi.org/10.1108/JOCM-09-2020-0299

Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management, 29*(3), 163–180. https://doi.org/10.1016/j.jom.2010.12.008

Casino, F., Kanakaris, V., Dasaklis, T. K., Moschuris, S., Stachtiaris, S., Pagoni, M., & Rachaniotis, N. P. (2021). Blockchain-based food supply chain traceability: A case study in the dairy sector. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2020.1789238

Chang, J., Katehakis, M. N., Shi, J., & Yan, Z. (2021). Blockchain-empowered newsvendor optimization. *International Journal of Production Economics, 238*(December 2020), 108144. https://doi.org/10.1016/j.ijpe.2021.108144

Chang, S. E., Chen, Y. C., & Lu, M. F. (2019). Supply chain re-engineering using blockchain technology: A case of smart contract based tracking process. *Technological Forecasting and Social Change, 144*(March 2018), 1–11. https://doi.org/10.1016/j.techfore.2019.03.015

Chang, Y., Iakovou, E., & Shi, W. (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. https://doi.org/10.1080/00207543.2019.1651946

Chaudhuri, A., Bhatia, M. S., Kayikci, Y., Fernandes, K. J., & Fosso-Wamba, S. (2021). Improving social sustainability and reducing supply chain risks through blockchain implementation: Role of outcome and behavioural mechanisms. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04307-6

Chod, J., Trichakis, N., Tsoukalas, G., Aspegren, H., & Weber, M. (2020). On the financing benefits of supply chain transparency and blockchain adoption. *Management Science, 66*(10), 4378–4396. https://doi.org/10.1287/mnsc.2019.3434

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*(June), 17–29. https://doi.org/10.1016/j.tre.2019.05.011

Choi, T. M. (2020). Supply chain financing using blockchain: Impacts on supply chains selling fashionable products. *Annals of Operations Research*. https://doi.org/10.1007/s10479-020-03615-7

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. https://doi.org/10.1080/01605682.2020.1800419

Choi, T. M., Chung, S. H., Sun, X., & Wen, X. (2021). Using blockchain to improve buffer-stock-sharing and combat cheating behaviors under virtual pooling. *IEEE Transactions on Engineering Management*. https://doi.org/10.1109/TEM.2021.3108175

Choi, T. M., & Luo, S. (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*(October), 139–152. https://doi.org/10.1016/j.tre.2019.09.019

Choi, T. M., Wen, X., Sun, X., & Chung, S. H. (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*(May), 178–191. https://doi.org/10.1016/j.tre.2019.05.007

Chowdhury, M. M. H., Quaddus, M., & Agarwal, R. (2019). Supply chain resilience for performance: Role of relational practices and network complexities. *Supply Chain Management, 24*(5), 659–676. https://doi.org/10.1108/SCM-09-2018-0332

Chowdhury, S., Rodriguez-Espindola, O., Dey, P., & Budhwar, P. (2022). Blockchain technology adoption for managing risks in operations and supply chain management: Evidence from the UK. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04487-1

Christidis, K., & Devetsikiotis, M. (2016). Blockchains and smart contracts for the internet of things. *IEEE Access, 4*, 2292–2303. https://doi.org/10.1109/ACCESS.2016.2566339

Chunsheng, L., Wong, C. W. Y., Yang, C. C., Shang, K. C., & Lirn, T. C. (2020). Value of supply chain resilience: Roles of culture, flexibility, and integration. *International Journal of Physical Distribution and Logistics Management, 50*(1), 80–100. https://doi.org/10.1108/IJPDLM-02-2019-0041

Çolak, H., & Kağnicioğlu, C. H. (2022). Acceptance of blockchain technology in supply chains: A model proposal. *Operations and Supply Chain Management, 15*(1), 17–26. https://doi.org/10.31387/Oscm0480327

Cole, R., Stevenson, M., & Aitken, J. (2019). Blockchain technology: Implications for operations and supply chain management. *Supply Chain Management, 24*(4), 469–483. https://doi.org/10.1108/SCM-09-2018-0309

Cui, L., Wu, H., Wu, L., Kumar, A., & Tan, K. H. (2022). Investigating the relationship between digital technologies, supply chain integration and firm resilience in the context of COVID-19. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04735-y

Danese, P., Mocellin, R., & Romano, P. (2021). Designing blockchain systems to prevent counterfeiting in wine supply chains: A multiple-case study. *International Journal of Operations and Production Management, 41*(13), 1–33. https://doi.org/10.1108/IJOPM-12-2019-0781

Dang, C., Wang, F., Yang, Z., Zhang, H., & Qian, Y. (2022). Evaluating and forecasting the risks of small to medium-sized enterprises in the supply chain finance market using blockchain technology and deep learning model. *Operations Management Research*. https://doi.org/10.1007/s12063-021-00252-6

David, A., Kumar, C. G., & Paul, P. V. (2022). Blockchain technology in the food supply chain: Empirical analysis. *International Journal of Information Systems and Supply Chain Management, 15*(3), 1–12. https://doi.org/10.4018/IJISSCM.290014

de Boissieu, E., Kondrateva, G., Baudier, P., & Ammi, C. (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. https://doi.org/10.1108/JEIM-11-2020-0471

De Giovanni, P. (2020). Blockchain and smart contracts in supply chain management: A game theoretic model. *International Journal of Production Economics, 228*(October 2019), 107855. https://doi.org/10.1016/j.ijpe.2020.107855

Dede, S., Köseoglu, M. C., & Yercan, H. F. (2021). Learning from early adopters of blockchain technology: A systematic review of supply chain case studies. *Technology Innovation Management Review, 11*(6), 19–31. https://doi.org/10.22215/timreview/1447

Denyer, D., & Tranfield, D. (2009). *Producing a systematic review—PsycNET*. Sage Publications Ltd.

Di Vaio, A., & Varriale, L. (2020). Blockchain technology in supply chain management for sustainable performance: Evidence from the airport industry. *International Journal of Information Management, 52*(October 2019), 102014. https://doi.org/10.1016/j.ijinfomgt.2019.09.010

Diniz, E. H., Yamaguchi, J. A., Rachael dos Santos, T., Pereira de Carvalho, A., Alégo, A. S., & Carvalho, M. (2021). Greening inventories: Blockchain to improve the GHG Protocol Program in scope 2. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2021.125900

Dolgui, A., Ivanov, D., Potryasaev, S., Sokolov, B., Ivanova, M., & Werner, F. (2020). Blockchain-oriented dynamic modelling of smart contract design and execution in the supply chain. *International Journal of Production Research, 58*(7), 2184–2199. https://doi.org/10.1080/00207543.2019.1627439

Dong, C., Chen, C., Shi, X., & Ng, C. T. (2021). Operations strategy for supply chain finance with asset-backed securitization: Centralization and blockchain adoption. *International Journal of Production Economics, 241*(August), 108261. https://doi.org/10.1016/j.ijpe.2021.108261

Du, M., Chen, Q., Xiao, J., Yang, H., & Ma, X. (2020). Supply chain finance innovation using blockchain. *IEEE Transactions on Engineering Management, 67*(4), 1045–1058. https://doi.org/10.1109/TEM.2020.2971858

Dubey, R., Gunasekaran, A., Bryde, D. J., Dwivedi, Y. K., & Papadopoulos, T. (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. https://doi.org/10.1080/00207543.2020.1722860

Dubey, R., Gupta, M., Mikalef, P., & Akter, S. (2022). Incorporating blockchain technology in information systems research. *International Journal of Information Management*. https://doi.org/10.1016/J.IJINFOMGT.2022.102573

Dutta, P., Choi, T. M., Somani, S., & Butala, R. (2020a). Blockchain technology in supply chain operations: Applications, challenges and research opportunities. *Transportation Research Part E: Logistics and Transportation Review, 142*(May), 102067. https://doi.org/10.1016/j.tre.2020.102067

Epiphaniou, G., Pillai, P., Bottarelli, M., Al-Khateeb, H., Hammoudesh, M., & Maple, C. (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. https://doi.org/10.1109/TEM.2020.2965991

Erol, I., Ar, I. M., Ozdemir, A. I., Peker, I., Asgary, A., Medeni, I. T., & Medeni, T. (2021). Assessing the feasibility of blockchain technology in industries: Evidence from Turkey. *Journal of Enterprise Information Management, 34*(3), 746–769. https://doi.org/10.1108/JEIM-09-2019-0309

Erol, I., Murat Ar, I., Peker, I., & Searcy, C. (2022). Alleviating the impact of the barriers to circular economy adoption through blockchain: An investigation using an integrated MCDM-based QFD with hesitant fuzzy linguistic term sets. *Computers and Industrial Engineering, 165*(August 2021), 107962. https://doi.org/10.1016/j.cie.2022.107962

Faasolo, M. B., & Sumarliah, E. (2022). An artificial neural network examination of the intention to implement blockchain in the supply chains of SMEs in Tonga. *Information Resources Management Journal, 35*(1), 1–27. https://doi.org/10.4018/IRMJ.287907

Fan, Z. P., Wu, X. Y., & Cao, B. B. (2022). Considering the traceability awareness of consumers: Should the supply chain adopt the blockchain technology? *Annals of Operations Research, 309*(2), 837–860. https://doi.org/10.1007/s10479-020-03729-y

Farooque, M., Jain, V., Zhang, A., & Li, Z. (2020). Fuzzy DEMATEL analysis of barriers to blockchain-based life cycle assessment in China. *Computers and Industrial Engineering, 147*(July), 106684. https://doi.org/10.1016/j.cie.2020.106684

Filimonau, V., & Naumova, E. (2020). The blockchain technology and the scope of its application in hospitality operations. *International Journal of Hospitality Management, 87*(June 2019), 102383. https://doi.org/10.1016/j.ijhm.2019.102383

Fosso Wamba, S., Kala Kamdjoug, J. R., Epie Bawack, R., & Keogh, J. G. (2020a). Bitcoin, Blockchain and Fintech: A systematic review and case studies in the supply chain. *Production Planning and Control, 31*(2–3), 115–142. https://doi.org/10.1080/09537287.2019.1631460

Fosso Wamba, S., Queiroz, M. M., & Trinchera, L. (2020b). Dynamics between blockchain adoption determinants and supply chain performance: An empirical investigation. *International Journal of Production Economics, 229*(April), 107791. https://doi.org/10.1016/j.ijpe.2020.107791

Friedman, N., & Ormiston, J. (2022). Blockchain as a sustainability-oriented innovation?: Opportunities for and resistance to Blockchain technology as a driver of sustainability in global food supply chains. *Technological Forecasting and Social Change*. https://doi.org/10.1016/j.techfore.2021.121403

Galati, F. (2022). Blockchain adoption in supply networks: A social capital perspective. *Supply Chain Management, 27*(7), 17–32. https://doi.org/10.1108/SCM-12-2019-0448

Garrard, R., & Fielke, S. (2020). Blockchain for trustworthy provenances: A case study in the Australian aquaculture industry. *Technology in Society, 62*, 101298. https://doi.org/10.1016/j.techsoc.2020.101298

George, R. V., Harsh, H. O., Ray, P., & Babu, A. K. (2019). Food quality traceability prototype for restaurants using blockchain and food quality data index. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2019.118021

Ghode, D., Yadav, V., Jain, R., & Soni, G. (2020). Adoption of blockchain in supply chain: An analysis of influencing factors. *Journal of Enterprise Information Management, 33*(3), 437–456. https://doi.org/10.1108/JEIM-07-2019-0186

Ghode, D. J., Yadav, V., Jain, R., & Soni, G. (2021). Blockchain adoption in the supply chain: An appraisal on challenges. *Journal of Manufacturing Technology Management, 32*(1), 42–62. https://doi.org/10.1108/JMTM-11-2019-0395

Ghode, D. J., Yadav, V., Jain, R., & Soni, G. (2022). Lassoing the bullwhip effect by applying blockchain to supply chains. *Journal of Global Operations and Strategic Sourcing, 15*(1), 96–114. https://doi.org/10.1108/JGOSS-06-2021-0045

Giri, G., & Manohar, H. L. (2021). Factors influencing the acceptance of private and public blockchain-based collaboration among supply chain practitioners: A parallel mediation model. *Supply Chain Management, June*. https://doi.org/10.1108/SCM-02-2021-0057

Gong, Y., Wang, Y., Frei, R., Wang, B., & Zhao, C. (2022a). Blockchain application in circular marine plastic debris management. *Industrial Marketing Management, 102*(November 2021), 164–176. https://doi.org/10.1016/j.indmarman.2022.01.010

Gong, Y., Xie, S., Arunachalam, D., Duan, J., & Luo, J. (2022b). Blockchain-based recycling and its impact on recycling performance: A network theory perspective. *Business Strategy and the Environment, September, 2020*, 1–25. https://doi.org/10.1002/bse.3028

Gopal, P. R. C., Rana, N. P., Krishna, T. V., & Ramkumar, M. (2022). Impact of big data analytics on supply chain performance: An analysis of influencing factors. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04749-6

Gourisetti, S. N. G., Mylrea, M., & Patangia, H. (2020). Evaluation and demonstration of blockchain applicability framework. *IEEE Transactions on Engineering Management, 67*(4), 1142–1156. https://doi.org/10.1109/TEM.2019.2928280

Govindan, K. (2022). Tunneling the barriers of blockchain technology in remanufacturing for achieving sustainable development goals: A circular manufacturing perspective. *Business Strategy and the Environment, December*. https://doi.org/10.1002/bse.3031

Grida, M., & Mostafa, N. A. (2022). Are smart contracts too smart for supply chain 4.0? A blockchain framework to mitigate challenges. *Journal of Manufacturing Technology Management*. https://doi.org/10.1108/JMTM-09-2021-0359

Guggenberger, T., Schweizer, A., & Urbach, N. (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. https://doi.org/10.1109/TEM.2020.2978628

Guo, F., Walton, S., Wheeler, P. R., & Zhang, Y. (2021). Early disruptors: Examining the determinants and consequences of blockchain early adoption. *Journal of Information Systems, 35*(2), 219–242. https://doi.org/10.2308/ISYS-2020-004

Guo, S., Sun, X., & Lam, H. K. S. (2020). Applications of blockchain technology in sustainable fashion supply chains: Operational transparency and environmental efforts. *IEEE Transactions on Engineering Management*. https://doi.org/10.1109/TEM.2020.3034216

Gupta, H., Kumar, S., Kusi-Sarpong, S., Jabbour, C. J. C., & Agyemang, M. (2021). Enablers to supply chain performance on the basis of digitization technologies. *Industrial Management and Data Systems, 121*(9), 1915–1938. https://doi.org/10.1108/IMDS-07-2020-0421

Hald, K. S., & Kinra, A. (2019). How the blockchain enables and constrains supply chain performance. *International Journal of Physical Distribution and Logistics Management, 49*(4), 376–397. https://doi.org/10.1108/IJPDLM-02-2019-0063

Hamdan, I. K. A., Aziguli, W., Zhang, D., Sumarliah, E., & Usmanova, K. (2022). Forecasting blockchain adoption in supply chains based on machine learning: Evidence from Palestinian food SMEs. *British Food Journal*. https://doi.org/10.1108/BFJ-05-2021-0535

Han, X., & Rani, P. (2022). Evaluate the barriers of blockchain technology adoption in sustainable supply chain management in the manufacturing sector using a novel Pythagorean fuzzy-CRITIC-CoCoSo approach. *Operations Management Research*. https://doi.org/10.1007/s12063-021-00245-5

Hartley, J. L., & Sawaya, W. J. (2019). Tortoise, not the hare: Digital transformation of supply chain business processes. *Business Horizons, 62*(6), 707–715. https://doi.org/10.1016/j.bushor.2019.07.006

Hartley, J. L., Sawaya, W., & Dobrzykowski, D. (2022). Exploring blockchain adoption intentions in the supply chain: Perspectives from innovation diffusion and institutional theory. *International Journal of Physical Distribution and Logistics Management, 52*(2), 190–211. https://doi.org/10.1108/IJPDLM-05-2020-0163

Hasan, H., AlHadhrami, E., AlDhaheri, A., Salah, K., & Jayaraman, R. (2019). Smart contract-based approach for efficient shipment management. *Computers and Industrial Engineering, 136*(July), 149–159. https://doi.org/10.1016/j.cie.2019.07.022

Hastig, G. M., & Sodhi, M. M. S. (2020). Blockchain for supply chain traceability: Business requirements and critical success factors. *Production and Operations Management, 29*(4), 935–954. https://doi.org/10.1111/poms.13147

Hayrutdinov, S., Saeed, M. S. R., & Rajapov, A. (2020). Coordination of supply chain under blockchain system-based product lifecycle information sharing effort. *Journal of Advanced Transportation*. https://doi.org/10.1155/2020/5635404

He, Y., Chen, L., & Xu, Q. (2021). Optimal pricing decisions for a global fresh product supply chain in the blockchain technology era. *International Journal of Logistics Research and Applications*. https://doi.org/10.1080/13675567.2021.1981275

Helo, P., & Hao, Y. (2019). Blockchains in operations and supply chains: A model and reference implementation. *Computers and Industrial Engineering, 136*(July), 242–251. https://doi.org/10.1016/j.cie.2019.07.023

Hew, J. J., Wong, L. W., Tan, G. W. H., Ooi, K. B., & Lin, B. (2020). The blockchain-based Halal traceability systems: A hype or reality? *Supply Chain Management, 25*(6), 863–879. https://doi.org/10.1108/SCM-01-2020-0044

Hong, L., & Hales, D. N. (2021). Blockchain performance in supply chain management: Application in blockchain integration companies. *Industrial Management and Data Systems, 121*(9), 1969–1996. https://doi.org/10.1108/IMDS-10-2020-0598

Hrouga, M., Sbihi, A., & Chavallard, M. (2022). The potentials of combining blockchain technology and internet of things for digital reverse supply chain: A case study. *Journal of Cleaner Production, 337*(January), 130609. https://doi.org/10.1016/j.jclepro.2022.130609

Hu, S., Huang, S., Huang, J., & Su, J. (2021). Blockchain and edge computing technology enabling organic agricultural supply chain: A framework solution to trust crisis. *Computers and Industrial Engineering, 153*(November 2020), 107079. https://doi.org/10.1016/j.cie.2020.107079

Huang, L., Zhen, L., Wang, J., & Zhang, X. (2022). Blockchain implementation for circular supply chain management: Evaluating critical success factors. *Industrial Marketing Management, 102*(99), 451–464. https://doi.org/10.1016/j.indmarman.2022.02.009

Iftikhar, A., Ali, I., Arslan, A., & Tarba, S. (2022). Digital innovation, data analytics, and supply chain resiliency: A bibliometric-based systematic literature review. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04765-6

Ivanov, D., & Dolgui, A. (2021). A digital supply chain twin for managing the disruption risks and resilience in the era of Industry 4.0. *Production Planning and Control, 32*(9), 775–788. https://doi.org/10.1080/09537287.2020.1768450

Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. *International Journal of Production Research, 57*(3), 829–846. https://doi.org/10.1080/00207543.2018.1488086

Jabbar, A., & Dani, S. (2020). Investigating the link between transaction and computational costs in a blockchain environment. *International Journal of Production Research, 58*(11), 3423–3436. https://doi.org/10.1080/00207543.2020.1754487

Jain, G., Singh, H., Chaturvedi, K. R., & Rakesh, S. (2020). Blockchain in logistics industry: In fizz customer trust or not. *Journal of Enterprise Information Management, 33*(3), 541–558. https://doi.org/10.1108/JEIM-06-2018-0142

Ji, G., Zhou, S., Lai, K. H., Tan, K. H., & Kumar, A. (2022). Timing of blockchain adoption in a supply chain with competing manufacturers. *International Journal of Production Economics, 247*(November 2021), 108430. https://doi.org/10.1016/j.ijpe.2022.108430

Jiang, R., Kang, Y., Liu, Y., Liang, Z., Duan, Y., Sun, Y., & Liu, J. (2022). A trust transitivity model of small and medium-sized manufacturing enterprises under blockchain-based supply chain finance. *International Journal of Production Economics, 247*(March), 108469. https://doi.org/10.1016/j.ijpe.2022.108469

Kamble, S., Gunasekaran, A., & Arha, H. (2019). Understanding the Blockchain technology adoption in supply chains—Indian context. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2018.1518610

Kamble, S. S., Gunasekaran, A., Kumar, V., Belhadi, A., & Foropon, C. (2021). A machine learning based approach for predicting blockchain adoption in supply Chain. *Technological Forecasting and Social Change, 163*(August 2019), 120465. https://doi.org/10.1016/j.techfore.2020.120465

Kamble, S. S., Gunasekaran, A., & Sharma, R. (2020). Modeling the blockchain enabled traceability in agriculture supply chain. *International Journal of Information Management, 52*(April 2019), 101967. https://doi.org/10.1016/j.ijinfomgt.2019.05.023

Kamran, R., Khan, N., & Sundarakani, B. (2021). Blockchain technology development and implementation for global logistics operations: A reference model perspective. *Journal of Global Operations and Strategic Sourcing, 14*(2), 360–382. https://doi.org/10.1108/JGOSS-08-2020-0047

Karakas, S., Acar, A. Z., & Kucukaltan, B. (2021). Blockchain adoption in logistics and supply chain: A literature review and research agenda. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.2012613

Karamchandani, A., Srivastava, S. K., Kumar, S., & Srivastava, A. (2021). Analysing perceived role of blockchain technology in SCM context for the manufacturing industry. *International Journal of Production Research, 59*(11), 3398–3429. https://doi.org/10.1080/00207543.2021.1883761

Karamchandani, A., Srivastava, S. K., & Srivastava, R. K. (2020). Perception-based model for analyzing the impact of enterprise blockchain adoption on SCM in the Indian service industry. *International Journal of Information Management*. https://doi.org/10.1016/j.ijinfomgt.2019.10.004

Karuppiah, K., Sankaranarayanan, B., & Ali, S. M. (2021). A decision-aid model for evaluating challenges to blockchain adoption in supply chains. *International Journal of Logistics Research and Applications*. https://doi.org/10.1080/13675567.2021.1947999

Katsaliaki, K., Galetsi, P., & Kumar, S. (2021). Supply chain disruptions and resilience: A major review and future research agenda. *Annals of Operations Research*. https://doi.org/10.1007/s10479-020-03912-1

Kayikci, Y., Durak Usar, D., & Aylak, B. L. (2021). Using blockchain technology to drive operational excellence in perishable food supply chains during outbreaks. *International Journal of Logistics Management*. https://doi.org/10.1108/IJLM-01-2021-0027

Kayikci, Y., Gozacan-Chase, N., Rejeb, A., & Mathiyazhagan, K. (2022a). Critical success factors for implementing blockchain-based circular supply chain. *Business Strategy and the Environment, April*. https://doi.org/10.1002/bse.3110

Kayikci, Y., Subramanian, N., Dora, M., & Bhatia, M. S. (2022b). 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. https://doi.org/10.1080/09537287.2020.1810757

Kazancoglu, I., Ozbiltekin-Pala, M., Mangla, S. K., Kumar, A., & Kazancoglu, Y. (2022). Using emerging technologies to improve the sustainability and resilience of supply chains in a fuzzy environment in the context of COVID-19. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04775-4

Khan, H. H., Malik, M. N., Konečná, Z., Chofreh, A. G., Goni, F. A., & Klemeš, J. J. (2022a). Blockchain technology for agricultural supply chains during the COVID-19 pandemic: Benefits and cleaner solutions. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2022.131268

Khan, S. A. R., Godil, D. I., Jabbour, C. J. C., Shujaat, S., Razzaq, A., & Yu, Z. (2021). Green data analytics, blockchain technology for sustainable development, and sustainable supply chain practices: Evidence from small and medium enterprises. *Annals of Operations Research, SDG*. https://doi.org/10.1007/s10479-021-04275-x

Khan, S., Kaushik, M. K., Kumar, R., & Khan, W. (2022c). Investigating the barriers of blockchain technology integrated food supply chain: A BWM approach. *Benchmarking: An International Journal.* https://doi.org/10.1108/bij-08-2021-0489

Khan, S. A., Mubarik, M. S., Kusi-Sarpong, S., Gupta, H., Zaman, S. I., & Mubarik, M. (2022b). Blockchain technologies as enablers of supply chain mapping for sustainable supply chains. *Business Strategy and the Environment*. https://doi.org/10.1002/bse.3029

Kim, H. M., & Laskowski, M. (2018). Toward an ontology-driven blockchain design for supply-chain provenance. *Intelligent Systems in Accounting, Finance and Management, 25*(1), 18–27. https://doi.org/10.1002/isaf.1424

Kittipanya-ngam, P., & Tan, K. H. (2020). A framework for food supply chain digitalization: Lessons from Thailand. *Production Planning and Control, 31*(2–3), 158–172. https://doi.org/10.1080/09537287.2019.1631462

Köhler, S., & Pizzol, M. (2020). Technology assessment of blockchain-based technologies in the food supply chain. *Journal of Cleaner Production*. https://doi.org/10.1016/j.jclepro.2020.122193

Kopyto, M., Lechler, S., von der Gracht, H. A., & Hartmann, E. (2020). Potentials of blockchain technology in supply chain management: Long-term judgments of an international expert panel. *Technological Forecasting and Social Change, 161*(July), 120330. https://doi.org/10.1016/j.techfore.2020.120330

Kouhizadeh, M., Saberi, S., & Sarkis, J. (2021). Blockchain technology and the sustainable supply chain: Theoretically exploring adoption barriers. *International Journal of Production Economics, 231*(June 2020), 107831. https://doi.org/10.1016/j.ijpe.2020.107831

Kshetri, N. (2021). Blockchain and sustainable supply chain management in developing countries. *International Journal of Information Management, 60*(May 2019), 102376. https://doi.org/10.1016/j.ijinfomgt.2021.102376

Kshetri, N. (2022). Blockchain systems and ethical sourcing in the mineral and metal industry: A multiple case study. *International Journal of Logistics Management, 33*(1), 1–27. https://doi.org/10.1108/IJLM-02-2021-0108

Kumar, A. (2021a). Improvement of public distribution system efficiency applying blockchain technology during pandemic outbreak (COVID-19). *Journal of Humanitarian Logistics and Supply Chain Management, 11*(1), 1–28. https://doi.org/10.1108/JHLSCM-06-2020-0050

Kumar, A. (2021b). Value and incentives for adoption of Blockchain technology for a single supplier multiple retailer networks. *Journal of High Technology Management Research*, *32*(1), 100407. https://doi.org/10.1016/j.hitech.2021.100407

Kumar, A., Abhishek, K., Rukunuddin Ghalib, M., Nerurkar, P., Bhirud, S., Alnumay, W., Ananda Kumar, S., Chatterjee, P., & Ghosh, U. (2021b). Securing logistics system and supply chain using Blockchain. *Applied Stochastic Models in Business and Industry, 37*(3), 413–428. https://doi.org/10.1002/asmb.2592

Kumar, A., Liu, R., & Shan, Z. (2020). Is blockchain a silver bullet for supply chain management? Technical challenges and research opportunities. *Decision Sciences, 51*(1), 8–37. https://doi.org/10.1111/deci.12396

Kumar, A., Srivastava, S. K., & Singh, S. (2022a). How blockchain technology can be a sustainable infrastructure for the agrifood supply chain in developing countries. *Journal of Global Operations and Strategic Sourcing*. https://doi.org/10.1108/JGOSS-08-2021-0058

Kumar, P., Singh, R. K., & Shahgholian, A. (2022b). Learnings from COVID-19 for managing humanitarian supply chains: Systematic literature review and future research directions. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04753-w

Kusi-Sarpong, S., Mubarik, M. S., Khan, S. A., Brown, S., & Mubarak, M. F. (2022). Intellectual capital, blockchain-driven supply chain and sustainable production: Role of supply chain mapping. *Technological Forecasting and Social Change, 175*(October 2021), 121331. https://doi.org/10.1016/j.techfore.2021.121331

Laeequddin, M., Sardana, G. D., Sahay, B. S., Waheed, K. A., & Sahay, V. (2009). Supply chain partners' trust building processthrough risk evaluation: The perspectives of UAE packaged food industry. *Supply Chain Management, 14*(4), 280–290. https://doi.org/10.1108/13598540910970117

Li, C. Z., Chen, Z., Xue, F., Kong, X. T. R., Xiao, B., Lai, X., & Zhao, Y. (2021a). A blockchain- and IoT-based smart product-service system for the sustainability of prefabricated housing construction. *Journal of Cleaner Production, 286*, 125391. https://doi.org/10.1016/j.jclepro.2020.125391

Li, G., Fan, Z. P., & Wu, X. Y. (2021b). The choice strategy of authentication technology for luxury e-commerce platforms in the blockchain era. *IEEE Transactions on Engineering Management*. https://doi.org/10.1109/TEM.2021.3076606

Li, K., Lee, J. Y., & Gharehgozli, A. (2021c). Blockchain in food supply chains: A literature review and synthesis analysis of platforms, benefits and challenges. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.1970849

Li, Q. X., Ji, H. M., & Huang, Y. M. (2022a). The information leakage strategies of the supply chain under the block chain technology introduction. *Omega (united Kingdom), 110*, 102616. https://doi.org/10.1016/j.omega.2022.102616

Li, X., Lu, W., Xue, F., Wu, L., Zhao, R., Lou, J., & Xu, J. (2022b). Blockchain-enabled IoT-BIM platform for supply chain management in modular construction. *Journal of Construction Engineering and Management, 148*(2), 1–18. https://doi.org/10.1061/(asce)co.1943-7862.0002229

Li, Y., Jiang, S., Shi, J., & Wei, Y. (2021d). Pricing strategies for blockchain payment service under customer heterogeneity. *International Journal of Production Economics, 242*(August), 108282. https://doi.org/10.1016/j.ijpe.2021.108282

Li, Z., Guo, H., Barenji, A. V., Wang, W. M., Guan, Y., & Huang, G. Q. (2020). A sustainable production capability evaluation mechanism based on blockchain, LSTM, analytic hierarchy process for supply chain network. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2020.1740342

Liu, H. (2022). Combating unethical producer behavior: The value of traceability in produce supply chains. *International Journal of Production Economics, 244*(June 2021), 108374. https://doi.org/10.1016/j.ijpe.2021.108374

Liu, J., Zhang, H., & Zhen, L. (2021a). Blockchain technology in maritime supply chains: Applications, architecture and challenges. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.1930239

Liu, Lu., Li, Y., & Jiang, T. (2021c). Optimal strategies for financing a three-level supply chain through blockchain platform finance. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.2001601

Liu, L., Zhang, J. Z., He, W., & Li, W. (2021b). Mitigating information asymmetry in inventory pledge financing through the Internet of things and blockchain. *Journal of Enterprise Information Management, 34*(5), 1429–1451. https://doi.org/10.1108/JEIM-12-2020-0510

Liu, M., Zhang, X., & Wu, H. (2021d). The impact of platform restriction on manufacturer quality transparency in the blockchain era. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.1972180

Liu, P., Long, Y., Song, H. C., & He, Y. D. (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. https://doi.org/10.1016/j.jclepro.2020.123646

Liu, W., Shao, X. F., Wu, C. H., & Qiao, P. (2021e). A systematic literature review on applications of information and communication technologies and blockchain technologies for precision agriculture development. *Journal of Cleaner Production, 298*, 126763. https://doi.org/10.1016/j.jclepro.2021.126763

Liu, X., Barenji, A. V., Li, Z., Montreuil, B., & Huang, G. Q. (2021f). Blockchain-based smart tracking and tracing platform for drug supply chain. *Computers and Industrial Engineering, 161*(July), 107669. https://doi.org/10.1016/j.cie.2021.107669

Liu, Y., Ma, D., Hu, J., & Zhang, Z. (2021g). Sales mode selection of fresh food supply chain based on blockchain technology under different channel competition. *Computers and Industrial Engineering, 162*(August), 107730. https://doi.org/10.1016/j.cie.2021.107730

Liu, Z., & Li, Z. (2020). A blockchain-based framework of cross-border e-commerce supply chain. *International Journal of Information Management, 52*(December 2019), 102059. https://doi.org/10.1016/j.ijinfomgt.2019.102059

Lohmer, J., Bugert, N., & Lasch, R. (2020). Analysis of resilience strategies and ripple effect in blockchain-coordinated supply chains: An agent-based simulation study. *International Journal of Production Economics, 228*(September 2019), 107882. https://doi.org/10.1016/j.ijpe.2020.107882

Longo, F., Nicoletti, L., Padovano, A., d'Atri, G., & Forte, M. (2019). Blockchain-enabled supply chain: An experimental study. *Computers and Industrial Engineering, 136*(July), 57–69. https://doi.org/10.1016/j.cie.2019.07.026

Lumineau, F., Wang, W., & Schilke, O. (2021). *Organization science blockchain governance—A new way of organizing collaborations? Blockchain governance—A new way of organizing collaborations?* September 2022.

Maity, M., Tolooie, A., Sinha, A. K., & Tiwari, M. K. (2021). Stochastic batch dispersion model to optimize traceability and enhance transparency using Blockchain. *Computers and Industrial Engineering, 154*(January), 107134. https://doi.org/10.1016/j.cie.2021.107134

Mangla, S. K., Kazancoglu, Y., Ekinci, E., Liu, M., Özbiltekin, M., & Sezer, M. D. (2021). Using system dynamics to analyze the societal impacts of blockchain technology in milk supply chainsrefer. *Transportation Research Part e: Logistics and Transportation Review*. https://doi.org/10.1016/j.tre.2021.102289

Mangla, S. K., Kazançoğlu, Y., Yıldızbaşı, A., Öztürk, C., & Çalık, A. (2022). A conceptual framework for blockchain-based sustainable supply chain and evaluating implementation barriers: A case of the tea supply chain. *Business Strategy and the Environment, January.* https://doi.org/10.1002/bse.3027

Manupati, V. K., Schoenherr, T., Ramkumar, M., Panigrahi, S., Sharma, Y., & Mishra, P. (2022). Recovery strategies for a disrupted supply chain network: Leveraging blockchain technology in pre- and post-disruption scenarios. *International Journal of Production Economics, 245*(February 2021), 108389. https://doi.org/10.1016/j.ijpe.2021.108389

Manupati, V. K., Schoenherr, T., Ramkumar, M., Wagner, S. M., Pabba, S. K., & Inder Raj Singh, R. (2020). A blockchain-based approach for a multi-echelon sustainable supply chain. *International Journal of Production Research, 58*(7), 2222–2241. https://doi.org/10.1080/00207543.2019.1683248

Martinez, V., Zhao, M., Blujdea, C., Han, X., Neely, A., & Albores, P. (2019). Blockchain-driven customer order management. *International Journal of Operations and Production Management, 39*(6), 993–1022. https://doi.org/10.1108/IJOPM-01-2019-0100

Martins, J., Parente, M., Amorim-Lopes, M., Amaral, L., Figueira, G., Rocha, P., & Amorim, P. (2022). Fostering customer bargaining and e-procurement through a decentralised marketplace on the blockchain. *IEEE Transactions on Engineering Management, 69*(3), 810–824. https://doi.org/10.1109/TEM.2020.3021242

Mathivathanan, D., Mathiyazhagan, K., Rana, N. P., Khorana, S., & Dwivedi, Y. K. (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. https://doi.org/10.1080/00207543.2020.1868597

McGrath, P., McCarthy, L., Marshall, D., & Rehme, J. (2021). Tools and technologies of transparency in sustainable global supply chains. *California Management Review, 64*(1), 67–89. https://doi.org/10.1177/00081256211045993

Menon, S., & Jain, K. (2021). Blockchain technology for transparency in agri-food supply chain: Use cases, limitations, and future directions. *IEEE Transactions on Engineering Management*. https://doi.org/10.1109/TEM.2021.3110903

Min, H. (2019). Blockchain technology for enhancing supply chain resilience. *Business Horizons, 62*(1), 35–45. https://doi.org/10.1016/j.bushor.2018.08.012

Mishra, H., & Maheshwari, P. (2021). Blockchain in Indian Public Distribution System: A conceptual framework to prevent leakage of the supplies and its enablers and disablers. *Journal of Global Operations and Strategic Sourcing, 14*(2), 312–335. https://doi.org/10.1108/JGOSS-07-2020-0044

Montecchi, M., Plangger, K., & Etter, M. (2019). It's real, trust me! Establishing supply chain provenance using blockchain. *Business Horizons, 62*(3), 283–293. https://doi.org/10.1016/j.bushor.2019.01.008

Moretto, A., & Macchion, L. (2022). Drivers, barriers and supply chain variables influencing the adoption of the blockchain to support traceability along fashion supply chains. *Operations Management Research*. https://doi.org/10.1007/s12063-022-00262-y

Mukherjee, A. A., Singh, R. K., Mishra, R., & Bag, S. (2021). Application of blockchain technology for sustainability development in agricultural supply chain: Justification framework. *Operations Management Research*. https://doi.org/10.1007/s12063-021-00180-5

Naef, S., Wagner, S. M., & Saur, C. (2022). Blockchain and network governance: Learning from applications in the supply chain sector. *Production Planning & Control*. https://doi.org/10.1080/09537287.2022.2044072

Nandi, M. L., Nandi, S., Moya, H., & Kaynak, H. (2020). Blockchain technology-enabled supply chain systems and supply chain performance: A resource-based view. *Supply Chain Management, 25*(6), 841–862. https://doi.org/10.1108/SCM-12-2019-0444

Nandi, S., Sarkis, J., Hervani, A., & Helms, M. (2021). Do blockchain and circular economy practices improve post COVID-19 supply chains? A resource-based and resource dependence perspective. *Industrial Management and Data Systems, 121*(2), 333–363. https://doi.org/10.1108/IMDS-09-2020-0560

Narwane, V. S., Raut, R. D., Mangla, S. K., Dora, M., & Narkhede, B. E. (2021). Risks to big data analytics and blockchain technology adoption in supply chains. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04396-3

Nath, S. D., Khayer, A., Majumder, J., & Barua, S. (2022). Factors affecting blockchain adoption in apparel supply chains: Does sustainability-oriented supplier development play a moderating role? *Industrial Management & Data Systems, 122*(5), 1183–1214. https://doi.org/10.1108/imds-07-2021-0466

Nayal, K., Raut, R. D., Narkhede, B. E., Priyadarshinee, P., Panchal, G. B., & Gedam, V. V. (2021). Antecedents for blockchain technology-enabled sustainable agriculture supply chain. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04423-3

Ning, L., & Yuan, Y. (2021). How blockchain impacts the supply chain finance platform business model reconfiguration. *International Journal of Logistics Research and Applications*. https://doi.org/10.1080/13675567.2021.2017419

Niu, B., Dong, J., & Liu, Y. (2021a). Incentive alignment for blockchain adoption in medicine supply chains. *Transportation Research Part E: Logistics and Transportation Review, 152*(February), 102276. https://doi.org/10.1016/j.tre.2021.102276

Niu, B., Shen, Z., & Xie, F. (2021b). The value of blockchain and agricultural supply chain parties' participation confronting random bacteria pollution. *Journal of Cleaner Production, 319*(June), 128579. https://doi.org/10.1016/j.jclepro.2021.128579

O'Leary, D. E. (2017). Configuring blockchain architectures for transaction information in blockchain consortiums: The case of accounting and supply chain systems. *Intelligent Systems in Accounting, Finance and Management, 24*(4), 138–147. https://doi.org/10.1002/isaf.1417

O'Leary, D. E. (2019). Some issues in blockchain for accounting and the supply chain, with an application of distributed databases to virtual organizations. *Intelligent Systems in Accounting, Finance and Management, 26*(3), 137–149. https://doi.org/10.1002/isaf.1457

Oguntegbe, K. F., Di Paola, N., & Vona, R. (2022). Behavioural antecedents to blockchain implementation in agrifood supply chain management: A thematic analysis. *Technology in Society, 68*(February), 101927. https://doi.org/10.1016/j.techsoc.2022.101927

Oh, J., Choi, Y., & In, J. (2022). A conceptual framework for designing blockchain technology enabled supply chains. *International Journal of Logistics Research and Applications*. https://doi.org/10.1080/13675567.2022.2052824

Omar, I. A., Debe, M., Jayaraman, R., Salah, K., Omar, M., & Arshad, J. (2022). Blockchain-based supply chain traceability for COVID-19 personal protective equipment. *Computers and Industrial Engineering, 167*(April 2021), 107995. https://doi.org/10.1016/j.cie.2022.107995

Oropallo, E., Secundo, G., Vecchio, P. D., Centobelli, P., & Cerchione, R. (2021). Blockchain technology for bridging trust, traceability and transparency in circular supply chain. *Information and Management, June*. https://doi.org/10.1016/j.im.2021.103508

Ozdemir, A. I., Erol, I., Ar, I. M., Peker, I., Asgary, A., Medeni, T. D., & Medeni, I. T. (2020). The role of blockchain in reducing the impact of barriers to humanitarian supply chain management. *International Journal of Logistics Management, 32*(2), 454–478. https://doi.org/10.1108/IJLM-01-2020-0058

Pan, X., Pan, X., Song, M., Ai, B., & Ming, Y. (2020). Blockchain technology and enterprise operational capabilities: An empirical test. *International Journal of Information Management, 52*(May 2019), 101946. https://doi.org/10.1016/j.ijinfomgt.2019.05.002

Pandey, V., Pant, M., & Snasel, V. (2022). Blockchain technology in food supply chains: Review and bibliometric analysis. *Technology in Society, 69*(August 2021), 101954. https://doi.org/10.1016/j.techsoc.2022.101954

Papathanasiou, A., Cole, R., & Murray, P. (2020). The (non-)application of blockchain technology in the Greek shipping industry. *European Management Journal, 38*(6), 927–938. https://doi.org/10.1016/j.emj.2020.04.007

Patil, A., Shardeo, V., Dwivedi, A., & Madaan, J. (2021). An integrated approach to model the blockchain implementation barriers in humanitarian supply chain. *Journal of Global Operations and Strategic Sourcing, 14*(1), 81–103. https://doi.org/10.1108/JGOSS-07-2020-0042

Paul, S., Adhikari, A., & Bose, I. (2022a). White knight in dark days? Supply chain finance firms, blockchain, and the COVID-19 pandemic. *Information and Management, 59*(6), 103661. https://doi.org/10.1016/j.im.2022.103661

Paul, T., Islam, N., Mondal, S., & Rakshit, S. (2022b). RFID-integrated blockchain-driven circular supply chain management: A system architecture for B2B tea industry. *Industrial Marketing Management, 101*(December 2021), 238–257. https://doi.org/10.1016/j.indmarman.2021.12.003

Paul, T., Mondal, S., Islam, N., & Rakshit, S. (2021). The impact of blockchain technology on the tea supply chain and its sustainable performance. *Technological Forecasting and Social Change, 173*(August), 121163. https://doi.org/10.1016/j.techfore.2021.121163

Philsoophian, M., Akhavan, P., & Namvar, M. (2022). The mediating role of blockchain technology in improvement of knowledge sharing for supply chain management. *Management Decision, 60*(3), 784–805. https://doi.org/10.1108/MD-08-2020-1122

Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management, 20*(1), 124–143. https://doi.org/10.1108/09574090910954873

Pournader, M., Shi, Y., Seuring, S., & Koh, S. C. L. (2020). Blockchain applications in supply chains, transport and logistics: A systematic review of the literature. *International Journal of Production Research, 58*(7), 2063–2081. https://doi.org/10.1080/00207543.2019.1650976

Pun, H., Swaminathan, J. M., & Hou, P. (2021). Blockchain adoption for combating deceptive counterfeits. *Production and Operations Management, 30*(4), 864–882. https://doi.org/10.1111/poms.13348

Qian, X., & Papadonikolaki, E. (2021). Shifting trust in construction supply chains through blockchain technology. *Engineering, Construction and Architectural Management, 28*(2), 584–602. https://doi.org/10.1108/ECAM-12-2019-0676

Quayson, M., Bai, C., & Sarkis, J. (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. https://doi.org/10.1109/TEM.2020.2996003

Queiroz, M. M., & Fosso Wamba, S. (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*(December 2018), 70–82. https://doi.org/10.1016/j.ijinfomgt.2018.11.021

Queiroz, M. M., Fosso Wamba, S., De Bourmont, M., & Telles, R. (2021). Blockchain adoption in operations and supply chain management: Empirical evidence from an emerging economy. *International Journal of Production Research, 59*(20), 6087–6103. https://doi.org/10.1080/00207543.2020.1803511

Queiroz, M. M., Telles, R., & Bonilla, S. H. (2020). Blockchain and supply chain management integration: A systematic review of the literature. *Supply Chain Management, 25*(2), 241–254. https://doi.org/10.1108/SCM-03-2018-0143

Rainero, C., & Modarelli, G. (2021). Food tracking and blockchain-induced knowledge: A corporate social responsibility tool for sustainable decision-making. *British Food Journal, 123*(12), 4284–4308. https://doi.org/10.1108/BFJ-10-2020-0921

Raj Kumar Reddy, K., Gunasekaran, A., Kalpana, P., Raja Sreedharan, V., & Arvind Kumar, S. (2021). Developing a blockchain framework for the automotive supply chain: A systematic review. *Computers and Industrial Engineering, 157*, 107334. https://doi.org/10.1016/j.cie.2021.107334

Raj, P. V. R. P., Jauhar, S. K., Ramkumar, M., & Pratap, S. (2022). Procurement, traceability and advance cash credit payment transactions in supply chain using blockchain smart contracts. *Computers and Industrial Engineering, 167*(February), 108038. https://doi.org/10.1016/j.cie.2022.108038

Rashideh, W. (2020). Blockchain technology framework: Current and future perspectives for the tourism industry. *Tourism Management, 80*(November 2019), 104125. https://doi.org/10.1016/j.tourman.2020.104125

Rauniyar, K., Wu, X., Gupta, S., Modgil, S., de Sousa, L., & Jabbour, A. B. (2022). Risk management of supply chains in the digital transformation era: Contribution and challenges of blockchain technology. *Industrial Management and Data Systems*. https://doi.org/10.1108/IMDS-04-2021-0235

Razak, G. M., Hendry, L. C., & Stevenson, M. (2021). Supply chain traceability: A review of the benefits and its relationship with supply chain resilience. *Production Planning and Control*. https://doi.org/10.1080/09537287.2021.1983661

Rejeb, A., Keogh, J. G., Simske, S. J., Stafford, T., & Treiblmaier, H. (2021). Potentials of blockchain technologies for supply chain collaboration: A conceptual framework. *International Journal of Logistics Management, 32*(3), 973–994. https://doi.org/10.1108/IJLM-02-2020-0098

Reyes, P. M., Li, S., & Visich, J. K. (2016). Determinants of RFID adoption stage and perceived benefits. *European Journal of Operational Research, 254*(3), 801–812. https://doi.org/10.1016/J.EJOR.2016.03.051

Rodríguez-Espíndola, O., Chowdhury, S., Beltagui, A., & Albores, P. (2020). The potential of emergent disruptive technologies for humanitarian supply chains: The integration of blockchain, artificial intelligence and 3D printing. *International Journal of Production Research, 58*(15), 4610–4630. https://doi.org/10.1080/00207543.2020.1761565

Roeck, D., Sternberg, H., & Hofmann, E. (2020). Distributed ledger technology in supply chains: A transaction cost perspective. *International Journal of Production Research, 58*(7), 2124–2141. https://doi.org/10.1080/00207543.2019.1657247

Rogerson, M., & Parry, G. C. (2020). Blockchain: Case studies in food supply chain visibility. *Supply Chain Management, 25*(5), 601–614. https://doi.org/10.1108/SCM-08-2019-0300

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research, 57*(7), 2117–2135. https://doi.org/10.1080/00207543.2018.1533261

Sahebi, I. G., Masoomi, B., & Ghorbani, S. (2020). Expert oriented approach for analyzing the blockchain adoption barriers in humanitarian supply chain. *Technology in Society, 63*(May), 101427. https://doi.org/10.1016/j.techsoc.2020.101427

Sahebi, I. G., Mosayebi, A., Masoomi, B., & Marandi, F. (2022). Modeling the enablers for blockchain technology adoption in renewable energy supply chain. *Technology in Society, 68*(December 2021), 101871. https://doi.org/10.1016/j.techsoc.2022.101871

Samad, T. A., Sharma, R., Ganguly, K. K., Wamba, S. F., & Jain, G. (2022). Enablers to the adoption of blockchain technology in logistics supply chains: Evidence from an emerging economy. *Annals of Operations Research, 2022*, 1–41. https://doi.org/10.1007/S10479-022-04546-1

Sander, F., Semeijn, J., & Mahr, D. (2018). The acceptance of blockchain technology in meat traceability and transparency. *British Food Journal, 120*(9), 2066–2079. https://doi.org/10.1108/BFJ-07-2017-0365

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). Chapter 4: Understanding research philosophy and approaches to theory development. In *Research methods for business students* (pp. 128–171). January.

Saurabh, S., & Dey, K. (2021). Blockchain technology adoption, architecture, and sustainable agri-food supply chains. *Journal of Cleaner Production, 284*, 124731. https://doi.org/10.1016/j.jclepro.2020.124731

Schmidt, C. G., & Wagner, S. M. (2019). Blockchain and supply chain relations: A transaction cost theory perspective. *Journal of Purchasing and Supply Management, 25*(4), 100552. https://doi.org/10.1016/j.pursup.2019.100552

Schuetz, S., & Venkatesh, V. (2020). Blockchain, adoption, and financial inclusion in India: Research opportunities. *International Journal of Information Management, 52*(May 2019), 101936. https://doi.org/10.1016/j.ijinfomgt.2019.04.009

Sengupta, T., Narayanamurthy, G., Moser, R., Pereira, V., & Bhattacharjee, D. (2021). Disruptive technologies for achieving supply chain resilience in COVID-19 era: An implementation case study of satellite imagery and blockchain technologies in fish supply chain. *Information Systems Frontiers*. https://doi.org/10.1007/s10796-021-10228-3

Sharma, M., Joshi, S., Luthra, S., & Kumar, A. (2021a). Managing disruptions and risks amidst COVID-19 outbreaks: Role of blockchain technology in developing resilient food supply chains. *Operations Management Research, Xu*. https://doi.org/10.1007/s12063-021-00198-9

Sharma, N., Sahay, B. S., Shankar, R., & Sarma, P. R. S. (2017). Supply chain agility: Review, classification and synthesis. *International Journal of Logistics Research and Applications, 20*(6), 532–559. https://doi.org/10.1080/13675567.2017.1335296

Sharma, R., Samad, T. A., Chiappetta Jabbour, C. J., & de Queiroz, M. J. (2021b). Leveraging blockchain technology for circularity in agricultural supply chains: Evidence from a fast-growing economy. *Journal of Enterprise Information Management*. https://doi.org/10.1108/JEIM-02-2021-0094

Shashi, Centobelli, P., Cerchione, R., & Ertz, M. (2020). Managing supply chain resilience to pursue business and environmental strategies. *Business Strategy and the Environment, 29*(3), 1215–1246. https://doi.org/10.1002/bse.2428

Shayganmehr, M., Gupta, S., Laguir, I., Stekelorum, R., & Kumar, A. (2021). Assessing the role of industry 4.0 for enhancing swift trust and coordination in humanitarian supply chain. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04430-4

Sheel, A., & Nath, V. (2019). Effect of blockchain technology adoption on supply chain adaptability, agility, alignment and performance. *Management Research Review, 42*(12), 1353–1374. https://doi.org/10.1108/MRR-12-2018-0490

Shen, B., Cheng, M., Dong, C., & Xiao, Y. (2021). Battling counterfeit masks during the COVID-19 outbreak: Quality inspection vs. blockchain adoption. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.1961038

Shen, B., Dong, C., & Minner, S. (2022). Combating copycats in the supply chain with permissioned blockchain technology. *Production and Operations Management, 31*(1), 138–154. https://doi.org/10.1111/poms.13456

Shen, B., Xu, X., & Yuan, Q. (2020). Selling secondhand products through an online platform with blockchain. *Transportation Research Part E: Logistics and Transportation Review, 142*(September), 102066. https://doi.org/10.1016/j.tre.2020.102066

Shoaib, M., Lim, M. K., & Wang, C. (2020). An integrated framework to prioritize blockchain-based supply chain success factors. *Industrial Management and Data Systems, 120*(11), 2103–2131. https://doi.org/10.1108/IMDS-04-2020-0194

Sislian, L., & Jaegler, A. (2022). Linkage of blockchain to enterprise resource planning systems for improving sustainable performance. *Business Strategy and the Environment, 31*(3), 737–750. https://doi.org/10.1002/bse.2914

Sivula, A., Shamsuzzoha, A., & Helo, P. (2021). Requirements for blockchain technology in supply chain management: An exploratory case study. *Operations and Supply Chain Management, 14*(1), 39–50. https://doi.org/10.31387/oscm0440284

Sodhi, M. M. S., Seyedghorban, Z., Tahernejad, H., & Samson, D. (2022). Why emerging supply chain technologies initially disappoint: Blockchain, IoT, and AI. *Production and Operations Management, February*. https://doi.org/10.1111/poms.13694

Song, Y., Liu, J., Zhang, W., & Li, J. (2022). Blockchain's role in e-commerce sellers' decision-making on information disclosure under competition. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04276-w

Sumarliah, E., Li, T., Wang, B., Fauziyah, F., & Indriya, I. (2022). Blockchain-empowered halal fashion traceability system in Indonesia. *International Journal of Information Systems and Supply Chain Management*. https://doi.org/10.4018/IJISSCM.287628

Sundarakani, B., Ajaykumar, A., & Gunasekaran, A. (2021). Big data driven supply chain design and applications for blockchain: An action research using case study approach. *Omega (united Kingdom)*. https://doi.org/10.1016/j.omega.2021.102452

Sunny, J., Pillai, V. M., Nath, H. V., Shah, K., Ghoradkar, P. P., Philip, M. J., & Shirswar, M. (2022). Blockchain-enabled beer game: A software tool for familiarizing the application of blockchain in supply chain management. *Industrial Management & Data Systems, 122*(4), 1025–1055. https://doi.org/10.1108/imds-10-2021-0609

Sunny, J., Undralla, N., & Madhusudanan Pillai, V. (2020). Supply chain transparency through blockchain-based traceability: An overview with demonstration. *Computers and Industrial Engineering, 150*(October), 106895. https://doi.org/10.1016/j.cie.2020.106895

Suwanposri, C., Bhatiasevi, V., & Thanakijsombat, T. (2021). Drivers of blockchain adoption in financial and supply chain enterprises. *Global Business Review*. https://doi.org/10.1177/09721509211046170

Tan, A., Gligor, D., & Ngah, A. (2022a). Applying blockchain for halal food traceability. *International Journal of Logistics Research and Applications, 25*(6), 947–964. https://doi.org/10.1080/13675567.2020.1825653

Tan, A. W. K., Zhao, Y. F., & Halliday, T. (2018). A blockchain model for less container load operations in China. *International Journal of Information Systems and Supply Chain Management, 11*(2), 39–53. https://doi.org/10.4018/IJISSCM.2018040103

Tan, C. L., Tei, Z., Yeo, S. F., Lai, K. H., Kumar, A., & Chung, L. (2022b). Nexus among blockchain visibility, supply chain integration and supply chain performance in the digital transformation era. *Industrial Management and Data Systems*. https://doi.org/10.1108/IMDS-12-2021-0784

Tan, W. K. A., & Sundarakani, B. (2021). Assessing blockchain technology application for freight booking business: A case study from technology acceptance model perspective. *Journal of Global Operations and Strategic Sourcing, 14*(1), 202–223. https://doi.org/10.1108/JGOSS-04-2020-0018

Tandon, A., Kaur, P., Mäntymäki, M., & Dhir, A. (2021). Blockchain applications in management: A bibliometric analysis and literature review. *Technological Forecasting and Social Change*. https://doi.org/10.1016/j.techfore.2021.120649

Tao, F., Wang, Y. Y., & Zhu, S. H. (2022). Impact of blockchain technology on the optimal pricing and quality decisions of platform supply chains. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2022.2050828

Tezel, A., Febrero, P., Papadonikolaki, E., & Yitmen, I. (2021). Insights into blockchain implementation in construction: Models for supply chain management. *Journal of Management in Engineering, 37*(4), 1–19. https://doi.org/10.1061/(asce)me.1943-5479.0000939

Tian, X., Zhu, J., Zhao, X., & Wu, J. (2022). Improving operational efficiency through blockchain: Evidence from a field experiment in cross-border trade. *Production Planning and Control*. https://doi.org/10.1080/09537287.2022.2058412

Tönnissen, S., & Teuteberg, F. (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*(May 2019), 101953. https://doi.org/10.1016/j.ijinfomgt.2019.05.009

Tozanlı, Ö., Kongar, E., & Gupta, S. M. (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. https://doi.org/10.1080/00207543.2020.1712489

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management, 14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375

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. https://doi.org/10.1108/SCM-01-2018-0029

Treiblmaier, H., & Garaus, M. (2022). Using blockchain to signal quality in the food supply chain: The impact on consumer purchase intentions and the moderating effect of brand familiarity. *International Journal of Information Management*. https://doi.org/10.1016/j.ijinfomgt.2022.102514

Treiblmaier, H., & Sillaber, C. (2021). The impact of blockchain on e-commerce: A framework for salient research topics. *Electronic Commerce Research and Applications, 48*(April 2020), 101054. https://doi.org/10.1016/j.elerap.2021.101054

Tsolakis, N., Niedenzu, D., Simonetto, M., Dora, M., & Kumar, M. (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*(August 2020), 495–519. https://doi.org/10.1016/j.jbusres.2020.08.003

Tsolakis, N., Schumacher, R., Dora, M., & Kumar, M. (2022). Artificial intelligence and blockchain implementation in supply chains: A pathway to sustainability and data monetisation? *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04785-2

Tukamuhabwa, B. R., Stevenson, M., Busby, J., & Zorzini, M. (2015). Supply chain resilience: Definition, review and theoretical foundations for further study. *International Journal of Production Research, 53*(18), 5592–5623. https://doi.org/10.1080/00207543.2015.1037934

Vafadarnikjoo, A., Badri Ahmadi, H., Liou, J. J. H., Botelho, T., & Chalvatzis, K. (2021). Analyzing blockchain adoption barriers in manufacturing supply chains by the neutrosophic analytic hierarchy process. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04048-6

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. https://doi.org/10.1108/IJOPM-01-2019-0022

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. https://doi.org/10.1108/SCM-05-2019-0206

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. https://doi.org/10.1108/SCM-11-2018-0383

Varriale, V., Cammarano, A., Michelino, F., & Caputo, M. (2021). New organizational changes with blockchain: A focus on the supply chain. *Journal of Organizational Change Management, 34*(2), 420–438. https://doi.org/10.1108/JOCM-08-2020-0249

Vivaldini, M. (2021a). Blockchain in operations for food service distribution: Steps before implementation. *International Journal of Logistics Management, 32*(3), 995–1029. https://doi.org/10.1108/IJLM-07-2020-0299

Vivaldini, M. (2021b). Blockchain platforms in supply chains. *Journal of Enterprise Information Management, 34*(6), 1769–1797. https://doi.org/10.1108/JEIM-12-2019-0416

Vivaldini, M., & de Sousa, P. R. (2021). Blockchain connectivity inhibitors: Weaknesses affecting supply chain interaction and resilience. *Benchmarking*. https://doi.org/10.1108/BIJ-10-2020-0510

Vu, N., Ghadge, A., & Bourlakis, M. (2021). Blockchain adoption in food supply chains: A review and implementation framework. *Production Planning and Control*. https://doi.org/10.1080/09537287.2021.1939902

Wamba, S. F., & Queiroz, M. M. (2022). Industry 4.0 and the supply chain digitalisation: A blockchain diffusion perspective. *Production Planning and Control, 33*(2–3), 193–210. https://doi.org/10.1080/09537287.2020.1810756

Wang, B., Lin, Z., Wang, M., Wang, F., Xiangli, P., & Li, Z. (2022). Applying blockchain technology to ensure compliance with sustainability standards in the PPE multi-tier supply chain. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2022.2025944

Wang, H., Zhang, M., Ying, H., & Zhao, X. (2021a). The impact of blockchain technology on consumer behavior: A multimethod study. *Journal of Management Analytics, 8*(3), 371–390. https://doi.org/10.1080/23270012.2021.1958264

Wang, L., Luo, X. R., Lee, F., & Benitez, J. (2021b). Value creation in blockchain-driven supply chain finance. *Information and Management, July*. https://doi.org/10.1016/j.im.2021.103510

Wang, M., Wu, Y., Chen, B., & Evans, M. (2021c). Blockchain and supply chain management: A new paradigm for supply chain integration and collaboration. *Operations and Supply Chain Management, 14*(1), 111–122. https://doi.org/10.31387/oscm0440290

Wang, Y., Chen, C. H., & Zghari-Sales, A. (2021d). Designing a blockchain enabled supply chain. *International Journal of Production Research, 59*(5), 1450–1475. https://doi.org/10.1080/00207543.2020.1824086

Wang, Y., Han, J. H., & Beynon-Davies, P. (2019a). Understanding blockchain technology for future supply chains: A systematic literature review and research agenda. *Supply Chain Management, 24*(1), 62–84. https://doi.org/10.1108/SCM-03-2018-0148

Wang, Y., Singgih, M., Wang, J., & Rit, M. (2019b). Making sense of blockchain technology: How will it transform supply chains? *International Journal of Production Economics, 211*(November 2018), 221–236. https://doi.org/10.1016/j.ijpe.2019.02.002

Wang, Z., Zheng, Z., Jiang, W., & Tang, S. (2021e). Blockchain-enabled data sharing in supply chains: Model, operationalization, and tutorial. *Production and Operations Management, 30*(7), 1965–1985. https://doi.org/10.1111/poms.13356

Westerlund, M., Nene, S., Leminen, S., & Rajahonka, M. (2021). An exploration of blockchain-based traceability in food supply chains: On the benefits of distributed digital records from farm to fork. *Technology Innovation Management Review, 11*(6), 6–19. https://doi.org/10.22215/timreview/1446

Whetten, D. A. (1989). What constitutes a theoretical contribution? *Academy of Management Review, 14*(4), 490–495. https://doi.org/10.5465/amr.1989.4308371

Wong, L. W., Leong, L. Y., Hew, J. J., Tan, G. W. H., & Ooi, K. B. (2020a). Time to seize the digital evolution: Adoption of blockchain in operations and supply chain management among Malaysian SMEs. *International Journal of Information Management, 52*(June 2019), 101997. https://doi.org/10.1016/j.ijinfomgt.2019.08.005

Wong, L. W., Tan, G. W. H., Lee, V. H., Ooi, K. B., & Sohal, A. (2020b). Unearthing the determinants of blockchain adoption in supply chain management. *International Journal of Production Research, 58*(7), 2100–2123. https://doi.org/10.1080/00207543.2020.1730463

Wong, W. P., Tan, K. H., Govindan, K., Li, D., & Kumar, A. (2021). A conceptual framework for information-leakage-resilience. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04219-5

Wu, J., & Yu, J. (2022). Blockchain's impact on platform supply chains: Transaction cost and information transparency perspectives. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2022.2027037

Wu, X. Y., Fan, Z. P., & Cao, B. B. (2021). An analysis of strategies for adopting blockchain technology in the fresh product supply chain. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.1894497

Wu, X. Y., Fan, Z. P., & Li, G. (2022). Strategic analysis for adopting blockchain technology under supply chain competition. *International Journal of Logistics Research and Applications*. https://doi.org/10.1080/13675567.2022.2058473

Xia, Y., Zeng, W., Xing, X., Zhan, Y., Tan, K. H., & Kumar, A. (2021). Joint optimisation of drone routing and battery wear for sustainable supply chain development: A mixed-integer programming model based on blockchain-enabled fleet sharing. *Annals of Operations Research*. https://doi.org/10.1007/s10479-021-04459-5

Xing, G., Duan, Z., Yan, W., & Baykal-Gürsoy, M. (2021). Evaluation of "innovation chain + supply chain" fusion driven by blockchain technology under typical scenario. *International Journal of Production Economics, 242*(December 2020), 108284. https://doi.org/10.1016/j.ijpe.2021.108284

Xiong, Y., Lam, H. K. S., Kumar, A., Ngai, E. W. T., Xiu, C., & Wang, X. (2021). The mitigating role of blockchain-enabled supply chains during the COVID-19 pandemic. *International Journal of Operations and Production Management, 41*(9), 1495–1521. https://doi.org/10.1108/IJOPM-12-2020-0901

Xu, J., & Duan, Y. (2022). Pricing and greenness investment for green products with government subsidies: When to apply blockchain technology? *Electronic Commerce Research and Applications, 51*(November 2021), 101108. https://doi.org/10.1016/j.elerap.2021.101108

Xu, P., Lee, J., Barth, J. R., & Richey, R. G. (2021a). Blockchain as supply chain technology: Considering transparency and security. *International Journal of Physical Distribution and Logistics Management, 51*(3), 305–324. https://doi.org/10.1108/IJPDLM-08-2019-0234

Xu, X., & Choi, T. M. (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*(October), 102491. https://doi.org/10.1016/j.tre.2021.102491

Xu, X., & He, Y. (2022). Blockchain application in modern logistics information sharing: A review and case study analysis. *Production Planning and Control*. https://doi.org/10.1080/09537287.2022.2058997

Xu, X., Tatge, L., Xu, X., & Liu, Y. (2022). Blockchain applications in the supply chain management in German automotive industry. *Production Planning and Control*. https://doi.org/10.1080/09537287.2022.2044073

Xu, X., Zhang, M., Dou, G., & Yu, Y. (2021b). Coordination of a supply chain with an online platform considering green technology in the blockchain era. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2021.1894367

Xue, X., Dou, J., & Shang, Y. (2021). Blockchain-driven supply chain decentralized operations—Information sharing perspective. *Business Process Management Journal, 27*(1), 184–203. https://doi.org/10.1108/BPMJ-12-2019-0518

Yadav, S., & Singh, S. P. (2020). An integrated fuzzy-ANP and fuzzy-ISM approach using blockchain for sustainable supply chain. *Journal of Enterprise Information Management, 34*(1), 54–78. https://doi.org/10.1108/JEIM-09-2019-0301

Yadav, V. S., Singh, A. R., Raut, R. D., & Cheikhrouhou, N. (2021). Blockchain drivers to achieve sustainable food security in the Indian context. *Annals of Operations Research*. https://doi.org/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*(October), 108–117. https://doi.org/10.1016/j.tre.2019.09.020

Yang, L., Ni, Y., & Ng, C. T. (2022). Blockchain-enabled traceability and producer's incentive to outsource delivery. *International Journal of Production Research, May.* https://doi.org/10.1080/00207543.2022.2072785

Yang, Lu., Zhang, J., & Shi, X. (2021). Can blockchain help food supply chains with platform operations during the COVID-19 outbreak? *Electronic Commerce Research and Applications, 49*(February), 101093. https://doi.org/10.1016/j.elerap.2021.101093

Yavaprabhas, K., Pournader, M., & Seuring, S. (2022). Blockchain as the "trust-building machine" for supply chain management. *Annals of Operations Research, 2022*, 1–40. https://doi.org/10.1007/S10479-022-04868-0

Yi, Y., Bremer, P., Mather, D., & Mirosa, M. (2022). Factors affecting the diffusion of traceability practices in an imported fresh produce supply chain in China. *British Food Journal, 124*(4), 1350–1364. https://doi.org/10.1108/BFJ-03-2021-0227

Yong, B., Shen, J., Liu, X., Li, F., Chen, H., & Zhou, Q. (2020). An intelligent blockchain-based system for safe vaccine supply and supervision. *International Journal of Information Management, 52*(November 2019), 102024. https://doi.org/10.1016/j.ijinfomgt.2019.10.009

Yousefi, S., & Mohamadpour Tosarkani, B. (2022). An analytical approach for evaluating the impact of blockchain technology on sustainable supply chain performance. *International Journal of Production Economics, 246*, 108429. https://doi.org/10.1016/j.ijpe.2022.108429

Yu, Y., Huang, G., & Guo, X. (2021). Financing strategy analysis for a multi-sided platform with blockchain technology. *International Journal of Production Research, 59*(15), 4513–4532. https://doi.org/10.1080/00207543.2020.1766718

Yu, Y., Luo, Y., & Shi, Y. (2022). Adoption of blockchain technology in a two-stage supply chain: Spillover effect on workforce. *Transportation Research Part e: Logistics and Transportation Review, 161*(September 2021), 102685. https://doi.org/10.1016/j.tre.2022.102685

Zelbst, P. J., Green, K. W., Sower, V. E., & Bond, P. L. (2020). The impact of RFID, IIoT, and blockchain technologies on supply chain transparency. *Journal of Manufacturing Technology Management, 31*(3), 441–457. https://doi.org/10.1108/JMTM-03-2019-0118

Zeng, M., Sadeghzadeh, K., & Xiong, T. (2022). A three-echelon based sustainable supply chain scheduling decision-making framework under the blockchain environment. *International Journal of Production Research*. https://doi.org/10.1080/00207543.2022.2059719

Zhang, G., Yang, Y., & Yang, G. (2022). Smart supply chain management in Industry 4.0: The review, research agenda and strategies in North America. *Annals of Operations Research*. https://doi.org/10.1007/s10479-022-04689-1

Zhang, M., & Huo, B. (2013). The impact of dependence and trust on supply chain integration. *International Journal of Physical Distribution and Logistics Management, 43*(7), 544–563. https://doi.org/10.1108/IJPDLM-10-2011-0171

Zhou, Z., Liu, X., Zhong, F., & Shi, J. (2022). Improving the reliability of the information disclosure in supply chain based on blockchain technology. *Electronic Commerce Research and Applications, 52*(March 2021), 101121. https://doi.org/10.1016/j.elerap.2022.101121

Zhu, Q., Kouhizadeh, M., & Sarkis, J. (2022). Formalising product deletion across the supply chain: Blockchain technology as a relational governance mechanism. *International Journal of Production Research, 60*(1), 92–110. https://doi.org/10.1080/00207543.2021.1987552