Uncovering blockchain technology potential to develop Resilient-Sustainable Supply Chains (RSSC) – A Systematic Literature Review

Hameem Bin Hameed*, Alessandro Creazza

School of Industrial Engineering, LIUC – Università Cattaneo, Corso Matteotti 22, 21053 Castellanza (VA), Italy
(email. hbinhameed@liuc.it, acreazza@liuc.it)

Abstract: Resilience and sustainability are becoming increasingly vital in modern society. To facilitate the realization of these concepts, a multitude of Industry 4.0 technologies are available to support decision-makers. This study offers a comprehensive exploration of Blockchain Technology (BCT) and its seamless integration into supply chains. Employing a Systematic Literature Network Analysis (SLNA), which combines bibliometric techniques with a traditional systematic literature review, we gain invaluable insights into the pivotal role of BCT in shaping resilient and sustainability-based supply chains. This research seeks to illuminate the transformative potential of BCT in contributing to a more environmentally conscious and resilient global economy. Our findings provide a thorough understanding of how theory is harnessed to assess and investigate this niche topic, highlighting BCT's potential to address key elements including supply chain design, supplier relationships, technology and information systems, inventory management, contingency and risk planning, triple bottom line considerations, corporate system dynamics, and geopolitical factors. The study summarizes the information proceeding towards a framework that answers how a resilient-sustainable supply chain can be created.

Keywords: Blockchain technology, resilience, sustainable, supply chain development, conceptual framework

1. Introduction

Ecosystems of businesses are evolving and are readily faced with exemplary challenges that test them to their limits. (Liang, Adnan, & Leilei, 2018). Consequently, supply chains associated with these businesses also face unprecedented obstacles. Hence, the sustainability aspect of associated supply chains is a major point of concern, and the present standard working practices are evolving from focusing merely on the economic element to a complete overhaul to deal with the environmental, economic, and societal impacts and more. (Carter & Rogers, 2008).

The recent disruption caused to the global supply chain network by the COVID-19 pandemic brings doubt regarding the resilience of the systems to cope with the fluctuations of demand and supply (Shen & Sun, 2021). Event readiness and its respective response in supply chains is the focus of the development of resilient supply chains (Kopanaki, 2022). One of the key prominent contributors i.e., (Christopher & Peck, 2004) define resilience as the inherent ability of a system to accommodate disturbances and the ability to return to the original state that was present before the disturbance. This led to the development of the relationship conceptual model by (Ponomarov & Holcomb, 2009), where they describe the intricate relationships and associations between the logistics and supply chain capabilities and resilience; they also provide a key factor in their model i.e., learning – signifying that it is a constant ongoing process that leads to the development of better supply chains. Speaking of development, academia alongside industries and government bodies have been pushing for the immediate digitalization of the supply chain. Understanding ground realities, real-time tracking of products, and analysis of the influence of a disturbance remain the key benefits of digitalization efforts (Dmitry Ivanov & Dolgui, 2021). Knowing ground realities can readily contribute to the development of policies surrounding the Sustainable Development Goals (SDGs). The use of digital technologies readily helps to realize the goals set out for SDGs (Akram et al., 2022).

Sustainability and resilience are two concepts that are increasingly becoming a core point of discussion in an academic and an industrial setting. Though previously highlighted as two entirely different elements, the recent developments are shaping the landscape to an alternate view. The present perspective resonates that they are interconnected to one another and have a significant overlap (Zupancic, 2023). Authors such as (Akshay Patidar, Sharma, Agrawal, & Sangwan, 2023; Vergara, Martínez, & Salais-Fierro, 2023) proceed to generate a term i.e., RSSC – Resilient and Sustainable Supply Chain, for better easement and understanding. The combined usage of resilience and sustainability as a subset of one another or synonym depends on the circumstance and contributes to the mitigation of unfavorable conditions (Carissimi, Creazza, & Colicchia, 2023). The 'mutually reinforcing' property is paving the way for scholars to develop performance models and inherently aiding firms to capitalize on both simultaneously (Hervani, Nandi, Helms, & Sarkis, 2022; Marta Negri, Cagno, Colicchia, & Sarkis, 2021). The study by (M. Negri, Cagno, & Colicchia, 2022) provides an account of how firms perceive the two elements and they provide an answer that there is somewhat of a consensus between firms that these are two sides of the same coin. If the perspective is narrowed down to the aspect of circular economy, resilience, and sustainability are simultaneously targeted and leveraged (Bag, Gupta, & Foropon, 2019). (Cherrafi, Chiarini, Belhadi, El Baz, & Chaouni Benabdellah, 2022) highlights various barriers to prevent supply chains from becoming resilient and sustainable such as lack of visibility, demand uncertainty, and globalization. In summary resilience and sustainability are crucial in supply chain management as

they promote risk mitigation, operational continuity, financial stability, competitive advantage, regulatory compliance, resource efficiency, long-term viability, and innovation (Aming'a, Marwanga, & Annan, 2024; Carissimi et al., 2023; Su, Wu, & Tan, 2023; Villar, Paladini, & Buckley, 2023). The recent interest in the topic provides evidence that RSSC needs to be studied in a wider context.

Given the digitalization of supply chains has long been in effect, the COVID-19 pandemic helped to stress the need for increased use; assessing the short and long-term effects requires a significant amount of data that can only be obtained by active monitoring using technology. One of the key technologies that is linked to the supply chain is Blockchain Technology (BCT). The technology was introduced by (Nakamoto, 2009), and it was originally presented to tackle peer-to-peer transactions. However, the same concept has been applied and different other methods of its use have been invented. BCT works as a decentralized way to conduct business (Abou Jaoude & George Saade, 2019). This allows the system to run independently of a managing authority hence creating self-authorizing entities that validate the data given their presented data and last known transaction.

The study seeks to provide contextualization of how digital technology such as blockchain could aid in developing a Resilient-Sustainable Supply Chain (RSSC) using a systematic literature review approach that has been further refined by using bibliometric networks and content analysis i.e., a Systematic Literature Network Analysis (SLNA) (Colicchia & Strozzi, 2012). The importance of the study lies in the present recap covering a niche's use of a given technology and its influence in multiple associated areas throughout a supply chain, it seeks to progress the study is resilience and sustainability as a whole and not two separate entities.

This article is structured as follows. Section 2 provides insights regarding the methods used, and following that, section 3 contains respective results, in section 4 discussion is presented, and the last section provides the conclusion and future possible avenues of research.

2. Methodology

To carry out this research the authors chose to take account of the existing literature that exists for the blockchain and supply chain regarding the circular economy and resilience. The adopted methodology has multiple phases that cast a wide net to gather and capture all relevant literature. The first stage or the initial stage in section 2.1 systematically reviews the literature according to the guidelines and research flow developed by (Denyer & Tranfield, 2009). It follows the Context (C), Intervention (I), Mechanisms (M), Outcomes (O); CIMO logic to build an arsenal of articles that seek to provide a result that holds value and is replicable (Denyer & Tranfield, 2009). The SLR process relies on establishing questions that are necessary to dictate the motivation behind the research, subsequently, studies are sourced from various online academic databases and finally building upon the procured data (research articles, publications) the process of selection takes place (Carissimi et al., 2023). The data was sourced from Scopus and Web of Science. Primarily searches were made in Scopus and later similar made in Web of Science and Google Scholar, no contrasting difference was observed with the data retrieved from the other two sources.

Following the initial stage is the secondary stage, which uses a combination of various bibliographic methods to create and provide highlights regarding the movement of the conversation; in this study regarding the use of blockchain to leverage resilience in circular supply chains. The process provides critical links regarding contribution to academic literature. The CNA is divided into three sub-phases that essentially provide a citation network, citation scoring (influence), and notable keywords that are being used in this association. Various software has been used to aid develop, analyzing, and graphing this knowledge, in this study VOSViewer, and Pajek were extensively used.

2.1. Initial stage – Literature Review (SLR)

Context is a key element of research and allows to researcher to seek out the truth, this may be done by placing strategic questions that provide an overview regarding the value being communicated by the research work (Denyer & Tranfield, 2009). Building upon the guidelines, this study has two overarching research questions, that tackle the focus of the study from various perspectives.

RQ1. What are the contributions of BCT in developing a resilient-sustainable SC?
RQ2. What are the factors of blockchain that influence the resilience and sustainability element in a SC?

This presented work focuses on the use of blockchain and associated technologies in the supply chain to produce resilience and sustainability. It is only appropriate to have a set of well-defined keywords. For this study 4 sets of keywords are convened they are mentioned as follows.

- "Blockchain", "Smart contracts", "Distributed Ledger Technology", "digital ledger", "cryptographic ledger", "public transaction ledger".
- "Supply chain", "logistics", "SCM", "supply network", "logistic network", "business logistics management".
- "Resilience", "Resilient", "Flexible", "durable"
- "Sustainable", "Circular", "closed loop"

These keywords were used as search terms primarily in Scopus and later Web of Science. For this study the raw unfiltered search yielded approximately 474 documents after applying the language filter 465 documents remained and following that, after the search was refined to peer-reviewed journals 288 scientific papers remained, lastly after applying the subject filter the final number of documents that this article dealt with is 267.

2.2. Secondary stage - Systematic Literature Network Analysis (SLNA): Analysis of network

This stage of the study caters to the bibliographic nature of the topic at hand and is sorted in and carried out in two distinct manners that compromise two wide methods which have sub-divided processes. The first is a Citation Network Analysis, the second is a Citation Score Analysis and the last is the analysis of the keywords.

The Citation Network Analysis (CNA) works on the premise that authors in a field of study tend to keep their

work saturated with other authors working in the same general category (Colicchia & Strozzi, 2012). Multiple software is employed to understand this evolution; software such as Pajek, VOSViewer, and Microsoft Excel are key in the development of specific networks.

The Citation Score Analysis (CSA) provides a view into how articles have been performed and provides a quantified view of their impact. Impactful works of literature have a healthy growth in the number of citations that they receive (Strozzi, 2017). This perspective allows us to understand that the context and content provided by a specific academic work are not limited to a specific time frame but also can lead to being a role model for future works.

Keywords are an optimal way to classify where a scientific work belongs and allow readers to search and understand if the article presents value to their work. The keywords are grouped in this phase and assessed as a whole, keywords that are used together more frequently are classified into the same section (Colicchia & Strozzi, 2012).

Theories are used by authors to provide a contextualization and analysis of the information available (Kembro, Selviaridis, & Näslund, 2014). They are vital for a discipline i.e., a line of research to mature and advance (Clifford Defee, Williams, Randall, & Thomas, 2010). The utilization of theory provides a foundation and helps in classification by answering 'what', and 'why' questions, so that other researchers could benefit; it is not limited to the research aspect as it helps to dissect the real conditions and scenarios (Silva, Fritz, & El-Garaihy, 2022).

3. Results

3.1. Citation Network Analysis (CNA)

To narrow down literature to understand the evolutionary nature of the topic at hand it is required that only the connected elements be considered. These connected elements/documents are those that build upon existing knowledge and lead the reader to formulate a comprehension of the timeline of the topic development. In this study from the total sample size of 267, 223 items were a part of the connected group while the remaining 44 documents were not.

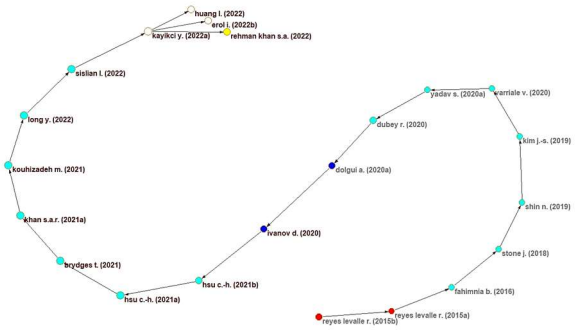

Figure 1 Mainpath

For the first two articles on the main path, their work points towards two main concerns that a greater number of stakeholders must be taken into consideration and that the complexity of the supply chain should always be accounted for when dealing with resilience and sustainability. Following these, a paper that provides an outlook of how supply chain sustainability and resilience complement one another. This provides us with a core point that resilience and sustainability have a symbiotic relationship. The fourth article on the main path takes a systematic review of the literature regarding resilience in the large-supply chain and yields a framework that identifies that tackling multiple unrelated events of disruption must not be the sole goal. Similarly, the 5th document, takes into perspective, what are the critical factors that readily affect the resilience and sustainability of a supply chain These documents provide a key insight into the inner workings of dealing with sustainability and resilience.

The sixth article starts with the introduction of BCT while the seventh highlights the effect of a blockchain on the profits and the reputation of companies, it also helps in production efficiency and thus leads to incremental gains. The 8th study is the critical factors associated the BCT and sustainable supply chains. The 9th and 10th provide the utility of technology. This sector essentially focuses on the common good of the actors involved and how blockchain could potentially aid in increasing the efficiency and productivity of supply chains in the context of resilience and sustainability.

From 11th to 15th, the works focus on the suitability of the blockchain and, they further dissect the sustainability section into a circular economy perspective. As with utility, adoption, and application, there are a few barriers to consider and hence the next set of documents seeks to study the barriers and how key factors that provide a boost in the implementation of the BCT aid in developing supply chains from perspectives of resilience, sustainability, and circular economy.

It is evident from the present progression of the narrative that has shifted from a theoretical perspective to one that is more practical. The evolutionary nature of the main path can be simplified as to how authors have studied the blockchain and supply chain in general. The initial perspectives started off the discussion by showing how blockchain can aid in understanding the complexity and uncertainty of the supply chain, later, the nature of the relationship between sustainability and resilience, following how digitalization (BCT) can aid in achieving better efficiency and reduce disruption (essentially focusing on the performance and benefits), moving towards the motivations behind the lack of adoption and then proceeding multiple directions.

3.2. Analysis of keywords

This analysis has been realized by using a minimum threshold of keywords equal to 5; this means that the overlap that exists between the documents must be of 5 keywords. This yielded a connected sample size of 71 divided into 5 clusters, shown in Figure 2.

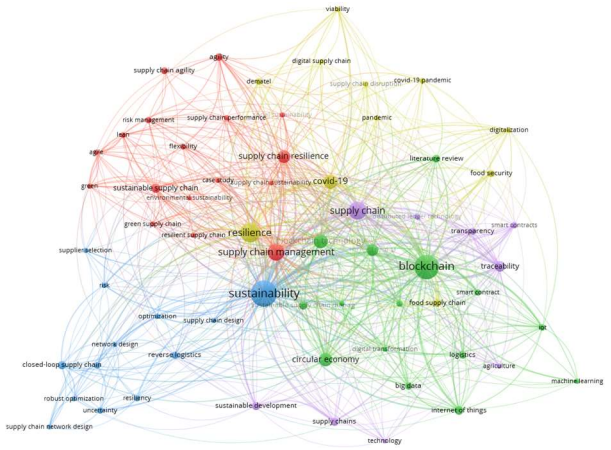

Figure 2 The cluster of author's keywords using VOSViewer.

Cluster 1 shown in the red shade is composed of items that are dedicated to the performance and characteristics of a supply chain. It points to the study of risk and the nature of a supply chain. This cluster contains elements regarding the adoption of BCT to improve green supply chain management and how organizational culture plays a mediating part (Long, Feng, Fan, & Liu, 2022). Though not limited to it also addresses the element of resilience such as the study by (A. Patidar, Sharma, Agrawal, & Sangwan, 2022), which addresses the issue of resilience and how technology more so industry 4.0 plays a part in achieving it.

Cluster 2 is composed of technology shown in green. The cluster contains elements such as blockchain, big data, artificial intelligence, and smart contracts. This cluster mainly focuses on the use of technology as an aid to day-to-day operations.

Cluster 3 shown in blue is composed of circular economy, optimization, resilience, robust optimization, and uncertainty. It provides the basis for how supply chains can be configured. It also points to the use of technology to mitigate risk and deal with uncertainty. A study by (Song et al., 2021) is a prime example where the authors provide an intricate account of how interactions between the participants of an agricultural supply chain can be better with noise and data reduction through means of technologies such as blockchain. Another notable example is the study by (Goli, 2023), which provides the "blockchain-enabled closed-loop supply chain" that addresses the robustness of a portfolio and financial consequences.

Cluster 4, which is shown in yellow is composed of keywords that are related to disruptive events such as e.g., COVID-19 and holds keywords related to food security and logistics. It points to keywords that describe research done in times of crisis. A prime representative for this cluster is the study by (Sharma, Joshi, Luthra, & Kumar, 2022), where the authors take a quantitative approach using an integrated approach of multi-criteria decision-making methods from an Indian food supply chain perspective. They provide a study that is at the intersection of risk, resilience, and BCT.

Cluster 5, which is shown in purple, is composed of keywords about the benefits that can be achieved using BCT. It groups the key outperforming characteristics of a BCT. This cluster also deals with barriers/drivers of the adoption of BCT technology; as seen by the study of (Friedman & Ormiston, 2022) where the authors seek to explore the advantages of the BCT in the food supply chain for higher sustainability levels.

3.3. Citation Score Analysis (CSA)

Citation Score Analysis (CSA) allows discovery of scientific works that have performed exceptionally well over the years (Ji, Huang, & Xu, 2022). In this study, 11 papers were taken into consideration due to the sheer volume of the citations they received. Out of these 11 papers, only three were identified in the main path analysis previously, however, the other 8 have received such a high number of citations in recent years that they cannot be overlooked. (D. Ivanov, Dolgui, & Sokolov, 2019) lead the number of citations and has the sharpest incline in terms of citations over the years and presently has 824 citations while only being published in 2019. They provide a key insight into how the ripple effect in an SC can be mitigated using digitalization; it essentially lays the foundation for studying resilience and digitalization in a combined fashion for aiding future research. , the third-ranked paper by (Min, 2019) is an important article to be considered as it provides use cases for BCT. The key takeaway from this paper is that these technologies are heavily reliant on the success of cryptocurrency and any risk to the crypto-market itself is cause for concern and thus an Achilles' heel (Min, 2019). (Esmaeilian, Sarkis, Lewis, & Behdad, 2020) can be considered a major milestone as the articles seek to unravel the strings of BCT, sustainability, and SC. Following this is the work by (Dolgui et al., 2020) that provides a practical view into the workings of a BCT-enabled system in the supply chain. The authors expand on the cyber-physical supply chain development and dive into detail about the workflows by using smart contracts.

One of the most important papers throughout the data set is by (Nandi, Sarkis, Hervani, & Helms, 2021a). The article considers the recent COVID-19 pandemic and seeks to link SC characteristics such as Localization, agility, and digitization to blockchain and circular economy. They provide a viable study that builds the base on improving supply chain resilience using blockchain. These 11 documents all point towards the inherent characteristic of blockchain to contribute to the positive development of supply chains, they provide a reasoning towards how the technology can act as a resource and a strategic advantage when dealing with issues about resilience and sustainability. These highly cited documents though not always study resilience and sustainability together, the reasoning they provide for the use of blockchain is the same in both cases. It points towards the reasoning that resilience and sustainability could both be leveraged together. This however needs to be studied deeper as many different perspectives exist and for one the performance measurement models for resilience and sustainability are quite different. One key output of this exercise is that they agree on the utility of the smart contracts, and this can be a

lever as it makes the stakeholders involved and knowledge flow more smoothly.

3.4. Theory utilization

This study aims to explore prevalent theories utilized by authors to frame and direct their investigations. It examines the theories employed to elucidate how BCT can foster resilience and sustainability. A summary can be found in Table 1 located in Appendix A..

Discussion

Supply chains are complex ecosystems that are unique and distinct from the many available products (Stevens, 1989). These ecosystems are increasingly becoming more interconnected and interdependent through ever-expanding global trade and growing value chains (M. Meier & Pinto, 2020). With growing businesses and the number of actors/players, it is imperative that the system maintains itself and continues to work even during unfavorable events. Unfavorable events or shock events such as the COVID-19 pandemic become a concern for all actors belonging to different tiers of a supply chain (Dmitry Ivanov, 2022). This study seeks to understand the improvement of supply chains by introducing technology i.e., BCT. Its capabilities are highly documented throughout extant literature and have been presented in this study. These capabilities such as traceability, data retention, data security, and data authenticity are highly attractive for a business. The technology allows businesses to operate with a higher efficiency make decisions based on data that is highly reliable and position themselves tactfully against their competitors to gain a competitive advantage (Sheel & Nath, 2019).

The main path that was found in the development of this study provides a view that resembles a perspective that can be better explained as a funnel. The research gaps that are left behind are slowly filled by the next element. One of the biggest selling points for BCT is its ability to allow transactions to be carried out directly and at a lower cost as opposed to the present system of financial transactions. Similarly, collaboration among the participants or actors of a supply chain is key to enabling resilience and allowing better sustainability performance. Moving toward the second question that guided this study. Factors that govern and influence can be sorted into 1) SC design and strategy 2) stakeholder involvement/engagement 3) technology and information system 4) inventory management 5) contingency and risk planning 6) triple bottom line considerations 6) corporate system dynamics and lastly 7) geopolitical factors.

The resilience of supply chains is significantly influenced by their design and the strategies employed by participants, with diversification being a key approach to mitigate risks. BCT, particularly smart contracts, enhances supply chain resilience by providing redundancy, optimizing supplier diversity, and enabling real-time data availability for better decision-making. Firms utilize blockchain-integrated Material Requirements Planning (MRP) and Enterprise Resource Planning (ERP) systems to identify optimal partners and manage inventory efficiently. Blockchain's provenance tracking is crucial in sensitive industries like pharmaceuticals and food, ensuring rapid response to contamination. Additionally, blockchain facilitates sustainable practices by enabling firms to monitor and report on energy use, resource consumption, and carbon footprint, contributing to the global trend towards transparency and environmental accountability.

4. Framework development

Based on elements adopted from theories identified that are core to this research. We present the following conceptual model that provides a means of direction to build an RSSC. The use of blockchain and its adoption is evident in literature and studies have focused on the motivation behind using this technology. It has been explored by various theoretical variations of the Technology Acceptance Model (TAM). TAM presents itself as a gateway means of using technology for gaining an advantage, it also addresses concerns that are internal and external to a firm/entity. The SLNA process has helped in identifying the core actors that are key in developing an RSSC. It builds upon the work of authors who agree that resilience and sustainability have synonyms in nature. The conceptual framework is shown in the Figure 3, provides an overview and contextualization of what is key in developing an RSSC.

The framework seeks to capitalize on the knowledge obtained from the literature review and it builds upon the inherent nature of the work focused on the TAM. It caters to the onboarding of the technology and how it can aid in achieving resilience and sustainability goals along with involving various stakeholders in a VUCA environment.

Knowledge sharing is key and allows all stakeholders to move together for a common goal (Balci & Surucu-Balci, 2021). This is the essence and the premise of the use of BCT as, the plethora of literature that is reviewed above frequents and boasts about the information/knowledge sharing capabilities of the technology. (Raj Kumar Reddy, Gunasekaran, Kalpana, Raja Sreedharan, & Arvind Kumar, 2021) classified VUCA as a core issue when dealing with blockchain and any sort of supply chain development. This also comes as a summation of the works of (Gao, Feng, & Zhang, 2021), who links volatility and contract management, uncertainty and knowledge sharing, Complexity to risk management, and finally Ambiguity to the true unknown disruption, though they can be mitigated with the processes of sharing resources. Similarly, interventions are an important consideration and are vital for the identification of Strengths, Weaknesses, Opportunities, and Threats (SWOT) for an operation to succeed; the phased approach allows for the identification of disruptions, generation of value or solutions, and aligning oneself with the solutions and finally developing strategic gameplans (O. Meier, Gruchmann, & Ivanov, 2023). The theoretical output aided in identifying stakeholder engagement as instrumental; BCT can help manage the stakeholder not only inter-organizations but also intra-organizations (Kramer, Bitsch, & Hanf, 2021). Based on the many interconnected elements, we identify the following propositions.

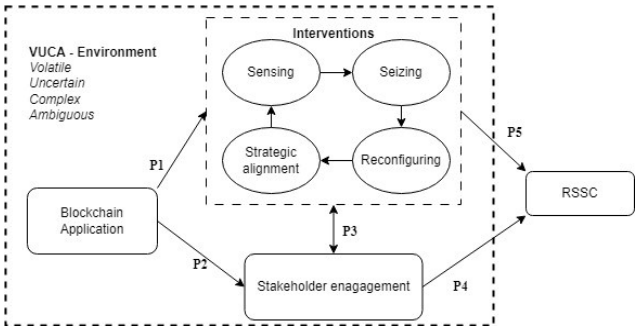

Figure 3 Conceptual framework (author's own construction)

P1. Blockchain applications facilitate interventions both in terms of quality and quantity.

Blockchain does indeed require some resources but after the application, it can act as a resource and aid in actively managing the sustainability and resilience issues that organizations might face, they issues can be mitigated (Hervani et al., 2022). This is brought on by the characteristics of blockchain itself such as identified by the literature, real-time data availability, transparency, and decentralization. This allows the formulation of solutions without reliance on mediators, links the actors directly to one another and improves connection and communication. For instance, this effect can be visualized using sensing capability directly adding to the seizing capabilities that in turn allow necessary reconfiguration of employees, resources, finances, etc., which all align and come together with the strategy a group of firms might adopt.

P2. Blockchain applications have a positive effect on stakeholder engagement.

The diverse set of actors involved in a supply chain is one of the many reasons why it is hard to build a resilient and sustainable supply chain. The peer-to-peer networking effect along with secure transformation allows stakeholders to communicate with one another and make decisions for the betterment of the group (Kramer et al., 2021). This also allows for the building up of collaborative spaces and as with the decentralized nature allows all actors to have an equal say and develop consensus, thus mitigating any unilateral decisions.

P3. Stakeholder engagement and interventions have a mutually beneficial relationship.

This symbiotic relationship is derived from the extensive accessibility of data to all involved parties. Engaged stakeholders contribute critical insights and feedback, which significantly impact the formulation of interventions, thereby enhancing decision-making processes and improving the effectiveness of risk mitigation. This as a whole also allows empowering of managers with information reducing information asymmetry additionally allows onboarding of new stakeholders to grow and provide access to better reconfiguration (Del Mar Alonso-Almeida, Buil-Fabregà, Bagur-Femenías, & Aznar-Alarcón, 2017). Furthermore, enhanced engagement is likely to yield benefits as it facilitates the development of tailored strategies to address market volatility, fluctuating demand, and geopolitical instability.

P4. Stakeholder engagement has a positive effect on developing an RSSC.

Engaging stakeholders and onboarding more actors allows for a broad range of risks to the environment, economics, and society to be dealt with. This essentially also promotes industrial symbiosis and allows actors to deliver their products to new interested parties. Similarly, regular interaction between the parties allows for the generation of a certain level of compliance and standardization just fostering elements such as adapting new requirements more swiftly (Qazi, Appolloni, & Shaikh, 2022; Siems, Seuring, & Schilling, 2023).

P5. Interventions have a positive effect on developing an RSSC.

The role of interventions cannot be neglected as they help the supply chain to not only quickly adapt but also to focus on long-term operational goals that are embedded under the categories of environmental, societal, and economic issues. The core benefit of using blockchain as a resource strengthens the resolve of the interventions as seen in the advantages highlighted in the previous sections, blockchain's ability is centered towards having better quality data that is available. Interventions play a key role in process optimization and lead the way toward less resource-intensive processes and innovation. Moreover, interventions allow for the formulation of contingencies in the event of disruptions, increase the trust between all parties involved, and increase appeal to investors by sustainability declaration (Hervani et al., 2022; Lee & Rha, 2016)

5. Future research

Future research could investigate and test the framework presented in this study. While our study offers a broad perspective, it does not place any constraints on geographical locations or varying levels of economic development. Future research could explore how the proposed framework performs in different regions and economic contexts, assessing its adaptability and effectiveness across diverse settings. Additionally, a longitudinal approach can be taken to track over time to have a more dynamic perspective.

Conclusions

This study provides an account of literature by scouring well-established sources. It seeks to detail the present situations and developments that are surrounding this unique integration. A significant progression and evolution have been seen. The research about this topic is highly fragmented and divided; the main technology that is being considered in this study is BCT; though significant papers tend to study it with a broad view i.e., studying it alongside artificial intelligence, big data analytics, and cloud computing. This work takes a narrow perspective starting with a broad question and then a narrow one leading towards the development of the framework. The main premise of that is to push the literature towards enabling and studying the aspect of resilience and sustainability together and not as two separate entities.

As with all research works, this study also carries its fair share of limitations that are mostly related to methodology, the works that were analyzed were the ones that were only published in the English language. Furthermore, in the

sample of studies taken a decent majority belonged to the developed nations. Lastly, the search was limited to Scopus and Web of Science, thus articles that may have appeared in other databases and not in these would have naturally not been addressed. Additionally in this study, the authors used Pajek to develop the main path and the parameters for the development of the Mainpath can vary concerning the choices that the authors make. In this study, the main path was developed using the "global – standard" operation. Regardless of these limitations, the authors seek to provide researchers with a stepping stone for future research.

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Note: Complete list of references can be provided on request. This is done to save space.

Appendix A.

Table 1 Theoretical lens employed previously.

Theory	Remarks	Source
Resource Based View	BCT can enable resource sharing and knowledgeability and improve communication	(Li, Xue, Li, & Ivanov, 2022; Nagariya, Mukherjee, Baral, & Chittipaka, 2023; Nandi, Sarkis, Hervani, & Helms, 2021b)

Dynamic Capabilities View	Allowing the users to monitor the developments during uncertain periods and capitalize on new business opportunities or readjust present practices	(Li et al., 2022; Mohamed, Haddad, Barakat, & Rosi, 2023; Pattanayak, Arputham, Goswami, & Rana, 2023; Quayson, Bai, Sun, & Sarkis, 2023)
Game Theory	Providing transparency enabling protection against information asymmetry as well as mitigating conflicts due to the record being immutable	(Liu, Zhao, Lyu, & Yue, 2022; Shi, Chen, & Lai, 2023; Wang, Shi, Zhao, Venkatesh, & Chen, 2022)
Organizational Information Processing Theory (OIPT)	BCT can help in times of uncertainty by allowing a greater volume of information to be received	(Alabaddi, Obidat, & Alziyadat, 2023; Dubey, Gunasekaran, Bryde, Dwivedi, & Papadopoulos, 2020)
Resource Dependence Theory	BCT can enable better cross-function operations among different departments in a firm.	(Long et al., 2022; Nandi et al., 2021b)
Knowledge-Based Theory	Knowledge sharing and transfer within and external to the company fosters better relationships and allows faster response to shock. Organization of large quantities of data becomes quite streamlined; allowing the firm to allocate the human resource to more menial tasks.	(Chen, 2022; Mohamed et al., 2023) (Hu, Zhou, Zhang, & Behl, 2023)
Technology Acceptance Model	BCT in a VUCA environment provides benefits such as eliminating intermediaries and streamlining processes	(Cai, Hao, Wang, & Dong, 2023; Chowdhury, Rodriguez-Espindola, Dey, & Budhwar, 2022)
Dynamic Control Theory	BCT allows decision makers access to real-time authentic information thus allowing optimal and quick strategy formulation	(Dolgui et al., 2020)
Innovation Theory	The early adopters of BCT can enhance their value offering to the customers and thus can foster better relations	(Akbari et al., 2023)
Network Theory	Transparency and traceability can be readily established allowing the possibility of verifying that products are of a circular/recycled nature	(Gong, Xie, Arunachalam, Duan, & Luo, 2022)
Transaction Cost Economics	BCT allows parties to have flexible contracts and lower transaction costs as intermediaries are not required and by ensuring the data integrity, fraudulent activities can be mitigated.	(Bechtsis, Tsolakis, Iakovou, & Vlachos, 2021)