

Blockchain-Based Supply Chain Finance and Its Impact on Supply Chain Performance: A Conceptual Model

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Abstract

Blockchain technology (BCT) is gaining momentum and expanding rapidly across diverse industries. This distributed ledger system is recognized as a promising solution for addressing supply chain challenges, offering information auditability, transparency, and verifiability. Supply chain finance (SCF) is an emerging financing model that effectively optimizes the financial flow with the other supply chain parties. Applying BCT to the realm of SCF improves performance by enhancing the transparency and security of all financial transactions. Although blockchain-based supply chain finance represents an emergent avenue for improving supply chain performance, its long-term efficacy depends on the alignment with trust and information security. A conceptual framework is developed based on the Resource-Based View theory (RBV) to underpin the role of BCT application in the SCF to improve the supply chain performance. In addition, this paper investigates how BCT's trust and information security features can enhance traditional SCF practices and ultimately contribute positively to overall supply chain performance. This study contributes to the body of knowledge by addressing the underexamined nexus in current literature. Extending existing literature, novel determinants are introduced that may influence supply chain performance, offering both theoretical enrichment and practical contributions.

Keywords: Blockchain Technology, Supply Chain Finance, Blockchain-based Supply Chain Finance, Supply Chain Performance, Trust, Information Security

Introduction

In the current business landscape, where competition is structured around entire supply chains rather than individual firms, organizations are increasingly adopting effective and innovative supply chain management practices to sustain their strategic positioning and

competitiveness within the industry (PN, 2021). Supply Chain Finance (SCF) has emerged as a strategic financing tool for delivering innovative solutions to stakeholders within the supply chain (Omran et al., 2017). This strategic financing tool represents a significant avenue for revenue generation and strategic expansion within financial institutions, while simultaneously advancing innovation across supply chain systems (Zhao et al., 2023). However, conventional SCF models often suffer from a lack of visibility in physical supply chain processes, time-consuming and inefficient manual paperwork, regulatory and compliance-related costs, the risk of fraud, and high transaction costs (Ioannou and Demirel, 2022). Blockchain technology (BCT)—characterized by decentralization, immutability, and tractability—contributes to the advancement of SCF solutions through reducing inadequacies and enhancing visibility between different parties (Ioannou and Demirel, 2022). By enabling reliable, traceable, and convenient financial operations, blockchain-based SCF can potentially accelerate the supply chain process and solve the financing dilemma of many industries (Fu et al., 2022; Rijanto, 2021). However, BCT remains at an early stage of adoption, and the existing body of research regarding supply chain management is still limited. Moreover, past studies have failed to pay sufficient attention to the impact of BCT applications on supply chain performance (Wamba et al., 2020). Despite growing scholarly interest, a comprehensive understanding of the application of BCT within the context of SCF remains limited (Wang et al., 2021).

While blockchain-based supply chain finance holds promise for enhancing supply chain performance, its long-term efficacy rests on the alignment with trust and information security. Recent scholarly investigations suggest that BCT offers a robust mechanism for addressing potential issues related to trust and security within supply chain systems (Kucukaltan et al., 2022; Gong et al., 2022; Shu et al., 2024). Numerous researchers have indicated that trust is an influential factor contributing to effective supply chain performance (Dirks and Ferrin, 2001; Vern et al., 2024; Kankam and Dza, 2025). Neglecting to pay attention to the concept of trust hinders implementing BCT in SCF in the new supply chain ecosystems (Rijanto, 2021). Additionally, the results of the prior studies indicated that information security initiatives are positively associated with supply chain robustness and performance (PN, 2021; PN, 2014). Today's global supply chains rely upon the speedy and robust dissemination of information among supply chain partners. Hence, processing of accurate supply chain information is quintessential to ensure the robustness and performance of supply chains (PN, 2021).

Considering the arguments and gaps, this study proposes a conceptual framework based on the resource-based view (RBV) to synthesize the existing literature on the role of blockchain-based SCF, trust, and information security in enhancing overall supply chain performance, ultimately helping achieve a sustained competitive advantage. Specifically, the study's primary objective falls into three dimensions: (1) to examine the role of blockchain-based SCF systems in enhancing the overall supply chain performance. (2) to investigate the potential contribution of blockchain-based SCF in creating trust among supply chain members and information security within the supply chain. (3) to examine the effect of trust among supply chain members and information security within the supply chain on enhancing the supply chain performance. This paper presents new insights into how organizations can enhance supply chain performance through the digitalization of traditional SCF systems. It helps professionals, managers, academics, and researchers understand the role of

Blockchain-based SCF systems in addressing key challenges and in fostering sustainable supply chains.

This paper comprises four sections. The first section reviews existing literature on Blockchain-based supply chain finance and supply chain performance. The second section explores the underlying theoretical foundations and develops key propositions, followed by the presentation of the conceptual framework. The third section outlines the research methodology. The fourth section summarizes the conclusions, practical and theoretical implications, and suggests directions for future research.

Literature Review

Blockchain Technology and Supply Chain Management

Blockchain Technology (BCT) was initially conceived by Satoshi Nakamoto in his paper, "Bitcoin: A Peer-to-Peer Electronic Cash System," following the financial crisis of 2008 (Nakamoto, 2008). It is commonly referred to as distributed ledger technology (DLT), which differs from traditional ledger systems because it allows sharing among participants. BCT functions as a shared database or public ledger, enabling the distribution of all records, transactions, and public/private events among involved BCT parties (Crosby et al., 2016). The rise of Bitcoin and cryptocurrency has significantly increased the popularity of BCT. Being a decentralized database where all records are accessible to network members, the recorded data is typically secure, traceable, and maintained within a peer-to-peer network (Kouhizadeh and Sarkis, 2018). Most participants in the database validate each transaction recorded in the public ledger. Information entered into the database is generally permanent and retained (Crosby et al., 2016).

The integration of BCT into supply chains has garnered widespread interest across diverse industries, primarily due to its potential for managing complexity and interconnectivity (Babaei et al. 2025). Increasingly, BCT is recognized as a promising solution for addressing supply chain challenges (Aslam et al., 2021; Vu et al., 2024), offering information auditability, transparency, verifiability, and awareness of the supply chain members' actions (Elhidaoui et al., 2022). The latest academic discourse highlights that supply chains based on BCT systems are highly scalable, intelligent, and connected with a smoother process than conventional supply chain management (Heiskanen, 2017; Rehman et al., 2023). As a key driver of digitalization, BCT enhances efficiency and aligns with the expectations of customers and suppliers in supply chains (Babaei et al., 2025). By leveraging cryptographic protocols and consensus mechanisms, BCT improves supply chain management practices, facilitating the secure and trustworthy exchange of information across supply chain actors, thereby enhancing the timeliness and reliability of communication (Vu et al., 2024). Besides, BCT enhances supply chain sustainability and resilience by enabling traceability, reducing intermediaries through smart contracts, and providing transparent records that improve efficiency and resource use. It also supports carbon tracking, helping firms to lower emissions and participate in climate initiatives (Pandey, Daultani, and Pratap 2023).

BCT adoption has shown a positive and significant effect on supply chain performance (SCP), as evidenced by empirical studies (Wamba et al., 2020). Through secure data-sharing mechanisms and decentralized authentication protocols, BCT allows stakeholders to verify transactions, monitor product flows, and reduce reliance on intermediaries—thereby

improving responsiveness and reliability across the supply chain (Elhidaoui et al., 2022). Moreover, BCT's potential to transform information-sharing practices presents a timely opportunity to address long-standing performance bottlenecks. The technology enables value creation through real-time data validation, which supports better decision-making and resource allocation. Despite its growing relevance, researchers have historically paid limited attention to SCP outcomes resulting from BCT adoption (Rehman et al., 2023; Wamba et al., 2020). This gap underscores the need for conceptual models that explicitly link BCT's secure infrastructure to measurable performance improvements.

Blockchain-Based Supply Chain Finance

SCF has long been referred to as a short-term financial solution offered by an external financial institution. This offer mainly targets suppliers and customers demanding working capital (Xiao et al., 2022). The SCF participants, including supply chain management professionals, distributors, logistics providers, and financial institutions, collaborate to generate value (Rijanto, 2021). SCF is a financial solution in which the buyer can provide the seller/supplier with an immediate settlement through a third party or an intermediary, such as a bank with a specific interest (Alora & Barua, 2019). Offering tools and management practices, SCF optimizes the financial flow with the other supply chain parties efficiently (Caniato et al., 2019). It usually proposes financial solutions for typical supply chain issues, for example, allowing the buyer to delay the payment to the supplier while having the supplier paid faster by a third party, such as a bank, financial institution, or investors (Rijanto, 2021).

BCT is considered a promising information technology to assist SCF operations in becoming intelligent and convenient (Luo, 2024). BCT algorithms have the capability to ensure a high level of privacy and protection of organizational information, owing to their special digital features that control the flow of information throughout the BCT nodes (Fu et al., 2022). With its transparency characteristics, BCT can solve the issue of information asymmetry in the supply chain, including warehousing data, logistics data, and financial transactions (Du et al., 2020). BCT records all financial invoices in a distributed ledger and makes it available for parties sharing the database; It can reduce the risk of double financing fraud, thus increasing the security (Bai et al., 2022). Usually, SCF participants screen sensitive business information of their corporations. SCF won't be able to ensure the comprehensiveness of business information without the full exchange of financial information (Du et al., 2020).

Different research articles highlighted the support of BCT characteristics in overcoming SCF barriers. Tsai (2022) developed a blockchain-driven SCF model that can address the SCF issues of trust, transparency, and security. Furthermore, Nozari and Ghahremani-Nahr (2022) stated that the BCT is a computer-based programming feature that enables data to be recorded digitally using cryptographic algorithms, which can better address the issue of SCF security. This can be achieved through BCT's ability to record all supply chain data, ensuring the traceability of physical, information, and financial flows within the supply chain. Throughout the blockchain-driven SCF model, supplier financing is more transparent and immutable; hence, it helps deal with the barriers to SCF (Tsai, 2022). Researchers are optimistic about its future contributions to the success of SCF and noted that this topic should be further examined (Du et al., 2020; Fu et al., 2022; Yang et al., 2022; Luo,

2024). However, the field is still relatively nascent and undervalued (Ioannou and Demirel, 2022; Bai et al., 2022) despite demonstrating promise across various supply chain domains to solve problems related to trust, transparency, and data validation (Rijanto, 2021).

Underpinning Theories and Hypotheses Development

The resource-based view (RBV) philosophy holds that a firm's resources play a significant role in determining the capabilities that yield the intended performance. Organizations can acquire and maintain a competitive edge by strategically allocating important resources (Wernerfelt, 1984; Olavarrieta and Ellinger, 1997). Businesses may deal with difficult conditions by maximizing their resources and competencies (Peteraf and Barney, 2003). Additionally, a firm's RBV demonstrates how turning its distinct resources into capabilities can give it a competitive edge. Businesses can obtain a competitive advantage by incorporating and rearranging resources in their operations and procedures (Fawcett et al., 2011; Madhani, 2021).

The RBV provides a strong framework for linking internal resources to capabilities, allowing organizations to harness BCT effectively, recognized as a key resource within the RBV paradigm (Shahzad et al., 2023). Implementing BCT across the supply chain significantly improves various capabilities, enhancing overall supply chain performance (Madhani, 2021). Additionally, from the RBV viewpoint, BCT functions as an intangible innovative technology that can evolve into a strategic resource for companies, facilitating the attainment and preservation of competitive advantages (Kant, 2021). In this regard, Barney (1991) claimed that intangible resources are typically easier to duplicate and are more strategically significant than tangible ones. Thus, BCT is recognized as an intangible technological asset (Kant, 2021).

Numerous research studies have explored the topics of BCT and SCF implementations and their relation to enhancing supply chain performance from the RBV perspective. For instance, Latan et al. (2023) discovered that adopting BCT improves supply chain performance based on the RBV. Agrawal et al. (2024) reviewed the role of SCF and the value chain based on RBV to optimize the business and financial performance of the supply chain. Furthermore, other studies have attempted to link BCT and SCF to examine their role in blockchain-based supply chain finance, aiming to enhance supply chain performance. In this regard, Kaur et al. (2022) analyzed the barriers that hinder the adoption of BCT in SCF to support the supply chains of SMEs. Boakye et al. (2022) highlighted that a Blockchain-based supply chain finance system based on the RBV perspective can be considered as a resource to enhance the flow of cash, information, and goods within the supply chain. Moreover, implementing sustainable supply chain management practices allows organizations to gain a competitive edge by utilizing effective methods for assessing asset efficiency (El-Garaihy et al., 2022).

This study is grounded in RBV theory, which explains possible ways for resources to generate, maintain, and sustain competitive advantage. The RBV perspective outlines how a firm can maintain its competitive edge by implementing a value-creation strategy that competitors cannot easily imitate (Barney, 1991). This perspective is relevant to the current study because organizations can improve their supply chains through BCT adoption, which can streamline financial transactions. Based on this framework, the analysis examines the

relationships between Blockchain-based SCF and supply chain performance, offering a conceptual lens to examine how the Blockchain-based SCF system fosters trust and enhances information security within organizations, enabling them to achieve a significant competitive advantage by improving supply chain performance. Accordingly, Blockchain-based supply chain finance, trust, and information security are considered strategic resources that contribute to performance when effectively managed. This theoretical lens allows us to explore how these intangible assets mutually influence organizational outcomes. Figure 1 illustrates the development of the research framework derived from RBV theory. The hypotheses are presented accordingly.

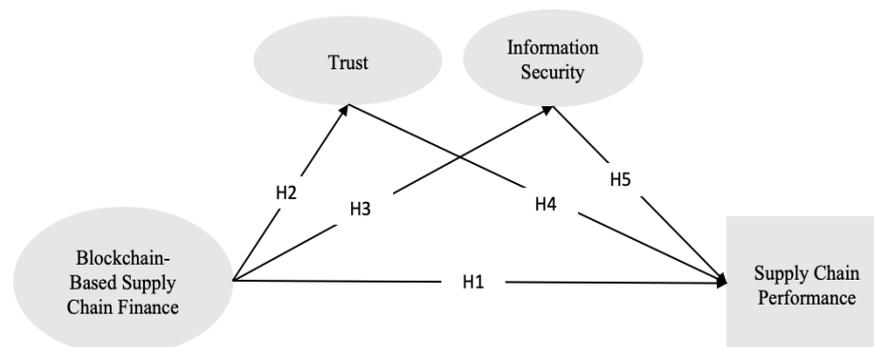


Figure 1 Conceptual Framework based on the RBV Theory

Blockchain-Based Supply Chain Finance and Supply Chain Performance

BCT is one of the most recent technologies used to optimize the performance of SCF (Pawlicka and Bal, 2021) with its unique characteristics of tractability, decentralization, and immutability (Yadav et al., 2023). The role of SCF in improving supply chain performance has received increased attention from researchers (Jia et al., 2020). Companies realize that optimization of financial flows and the allocation of working capital in the supply chain have led to improvements in the overall supply chain performance and to a reduction of financial risk. Addressing these challenges, SCF has emerged and evolved to provide innovative financial services for partners in the supply chain (Omran et al., 2017). SCF can assist suppliers experiencing financial difficulties and liquidity issues by reducing the time it takes for them to collect their payments (Medina et al., 2023). With its unique characteristics, recent studies suggest that BCT can better address the SCF's information authentication issue and other potential SCF issues, such as financing fraud, as well as concerns related to potential operational risks in the supply chain (Zhao et al., 2023).

Empirical studies have begun to validate the contribution of the Blockchain-based supply chain finance to supply chain performance. For instance, Nozari and Ghahremani-Nahr (2022) stated that Blockchain-based supply chain finance ensures reliable, traceable, and convenient operations that deliver fewer human errors. Likewise, Bhatia et al. (2023) found that a Blockchain-based supply chain finance system can reduce various operational costs within the supply chain, such as negotiation, contracting, and accessing finance costs. Despite these promising developments, scholarly attention to BCT's role in supply chain performance remains limited (Wamba et al., 2020). Wang et al., (2021) highlights the need to understand how BCT functions within the domain of supply chain finance. Consequently, the present study proposes the following hypothesis on the relationship between Blockchain-based supply chain finance and supply chain performance:

H1: Blockchain-based supply chain finance significantly influences supply chain performance.

Blockchain-Based Supply Chain Finance and Trust

BCT's transparency and decentralization features improve trust among stakeholders and intermediaries by addressing double financing fraud in SCF (Bai et al., 2022). Both characteristics of transparency and decentralization enable BCT database participants to share and monitor supply chain-related invoices, payments, and auctions in a very transparent manner (Gong et al., 2022). Invoicing based on BCT is vital in fraud prevention, as it removes the risk of double-spending and manipulation of paper records (Patil and Sangeetha, 2021). Additionally, BCT lowers transaction costs, streamlines cash flow, and enhances coordination through real-time, peer-to-peer information sharing among supply chain participants (Negi, 2024).

Ensuring trust between members of the SCF is a must to increase its efficiency. BCT can ensure the reliability of financial transactions by ensuring that the data entered is immutable and can't be falsified, modified, or deleted (Shu et al., 2024). Therefore, with its complete transparency, the BCT platform is suggested as a solution to deal with the issue of trust within the SCF (Bai et al., 2022).

According to Liu et al. (2021), the maturity and low cost of the blockchain-based supply chain finance can facilitate trust, which can encourage its adoption. Jiang et al. (2022) stated that the application of BCT in SCF can assist in creating a financial platform that integrates suppliers, financial institutions, and other parties, thus facilitating better information sharing and visibility to overcome the lack of trust. Wang et al. (2021) indicated that blockchain-based supply chain finance can build a trust-free system that emphasizes transparency of transactions recorded in the ledger by different members, who may not know or trust each other. Shu et al. (2024) proposed a Blockchain-based supply chain finance trust transitive model to overcome the obstacles of trust transfer and ensure data integrity between the supply chain members.

These evidences signal the BCT's potential to reshape SCF by addressing trust-related barriers. Targeting transparent, decentralized transaction records and promoting integrated financial platforms, BCT enables secure information exchange among various stakeholders. Accordingly, this study developed the following hypothesis on the relationship between Blockchain-based supply chain finance and trust:

H2: Blockchain-based supply chain finance significantly influences trust.

Blockchain-Based Supply Chain Finance and Information Security

Different research articles highlighted the support of BCT characteristics in overcoming SCF barriers. Tsai (2022) developed a blockchain-driven SCF model that can address the SCF issues of trust, transparency, and security. The author identified that blockchain features of transparency and trust can reduce SCF issues. Throughout the blockchain-driven SCF model, supplier financing is more transparent and immutable, thus helping to deal with the SCF barriers. Furthermore, the BCT digital features can better assist in the issue of SCF security by eliminating paper-based documents, including invoices and warehouse-related documents. Thus, it increases data security and eliminates fraud (Gong et

al., 2022). Usually, SCF participants screen sensitive business information of their corporations. SCF won't be able to ensure the comprehensiveness of business information without the full exchange of financial information (Du et al., 2020). Therefore, a blockchain-based supply chain finance platform with full transparency is recommended to address the security issues associated with financial transactions (Tsai, 2022). Thus, the following hypothesis is developed:

H3: Blockchain-based supply chain finance significantly influences information security.

Trust and Supply Chain Performance

Trust is a crucial factor that affects supply chain operations in multiple ways. Supply chains rely on trust among the members of the supply chain network. Consequently, the lack of trust within the supply chain can cause major supply chain challenges (Khan et al., 2018). The trust is integral to ensuring a trustworthy body of communication between supply chain partners, which is essential to enhancing supply chain operations (Owot et al., 2023). Trust can impact the overall supply chain costs, including production, inventory, and waste management costs, thus ensuring a sustainable supply chain performance (Baah et al., 2021).

Over the past decades, trust has been increasingly recognized as an important factor in work organizations, and empirical evidence has generally supported this perspective. In most cases, scholars have assumed that trust has a direct, positive effect on outcomes of interest (Dirks and Ferrin, 2001). Particularly, the findings of the past studies acknowledge that trust functions as a pivotal contributor to supply chain performance (Owot et al., 2023; Vern et al., 2024; Kankam and Dza, 2025). Empirical evidence presented by Jang and Lee (2022) indicated that the performance of companies adopting Korea's supply chain management increased when trust and relationship commitment were strengthened with partner companies. Higher trust and relationship commitment with partner companies in supply chain management contributed to a direct influence on financial and non-financial performance. Drawing on previous literature, the following hypothesis is formulated to assess the impact of trust on the overall supply chain performance:

H4: Trust significantly influences supply chain performance.

Information Security and Supply Chain Performance

In today's digital era, information security has emerged as a critical organizational priority, increasingly recognized as the foremost concern confronting institutions across sectors (Kwak and Gavirneni, 2014). Security efforts concentrate on reducing risks tied to fraud, system misuse, and privilege abuse (Kolluru and Meredith 2001). Implementing supply chain security initiatives can significantly reduce disruptions and improve planning within the supply chain (Asamoah et al, 2021). Organizations must prioritize information security to safeguard their supply chains against numerous security challenges and risks, as supply chains consist of a network of interconnected technology systems (PN, 2014). Security practices can enhance customer loyalty and satisfaction while lowering costs and aligning them with supply chain objectives (Sarathy, 2006). Furthermore, securing the supply chain is argued to enhance its resilience, improve process efficiency, and decrease vulnerability (Gould et al., 2010).

Academic discourse has illuminated the role of information security in improving supply chain performance. Findings of a study by PN (2014) stated that information security can have a positive effect on supply chain performance. Likewise, Kwak and Gavirneni (2014)

confirmed that effective implementation of internal and external information security initiatives has a positive impact on supply chain operations. Building on the findings of the past studies and considering that modern supply chains depend on fast and reliable information sharing among partners (PN, 2021), this study suggests that information security is significantly linked with supply chain performance.

H5: Information security significantly influences supply chain performance.

Methodology

This conceptual paper employs a theory-driven approach to synthesize and extend existing literature for developing a conceptual framework. Grounded in a conceptual approach, this study applies a library search and an evaluation of previous literature on the subject of supply chain performance in the realm of BCT. The selected documents consist of online databases such as Web of Science, Scopus, Science Direct, and Google Scholar. The paper integrates insights from blockchain-based supply chain finance, trust, information security, and supply chain performance to develop a conceptual framework and propositions.

Conclusion

The current paper discusses and highlights the potential role of a Blockchain-based supply chain finance system in enhancing overall supply chain performance based on the RBV theory. The BCT's ability to record all supply chain data ensures the traceability of physical, informational, and financial flows within the supply chain, enabling BCT database participants to share and monitor supply chain-related invoices, payments, and auctions in a highly transparent manner. The BCT can automate traditional SCF practices to improve control over financial flows and address significant challenges related to fraud and corruption. This indicates that the Blockchain-based supply chain finance system can provide a fully decentralized and shared database for all supply chain members. The transparency and decentralization features of Blockchain-based supply chain finance enhance the trust and security of information shared among stakeholders and intermediaries. Consequently, supply chain operations remain visible, traceable, and decentralized, leading to efficient and timely operations that create value and reduce overall operational costs. The value creation in supply chain processes can contribute to the organization gaining and sustaining a competitive advantage based on the RBV theory.

This study contributes to the existing BCT, finance, and supply chain literature by proposing a conceptual framework to examine the potential contribution of Blockchain-based supply chain finance to supply chain systems' performance. The supply chain plays a crucial role in attaining competitive advantage, owing to its operational nature of producing and delivering products and services to the market. Therefore, the present paper developed a framework that studies the impact of how a digital, decentralized, and immutable financial system can optimize supply chain performance, enhancing overall organizational performance. In addition, the framework fosters a deep comprehension of the potential role of BCT in digitalizing the supply chain financial transactions to overcome fraud, corruption, integrity, and duplication of information shared issues, while offering a theoretical base for future research in the context of supply chain and finance. The literature highlighted the potential of the BCT in redesigning traditional operational processes while streamlining the digital ledger to eliminate the need for third parties throughout the decentralized system. Further, it presents practical implications by providing organizational managers,

professionals, and decision-makers valuable insights on how BCT can secure daily and long-term financial transactions, reduce the possibility of fraud, boost transparency, and integrate information throughout the supply chain. Finally, the framework developed in this study illuminates how organizations can optimize their supply chain performance while assisting practitioners in mitigating data breach risks, fostering better collaboration among stakeholders, and enhancing organizational trust and compliance.

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