

# **Analysis of Supply Chain Finance Using Blockchain:A Systematic Review of Literature.**

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## **Introduction**

Supply chain financing based on Internet technology is gradually displacing alternative types of financing for small and medium-sized enterprises (SMEs) as a result of the continued full execution of the "Internet Plus" growth plan . Banking, supply chain management, and healthcare are just a few of the sectors that have been severely impacted by the radical, new trends that blockchain pioneered. Blockchain startups initially came to the public's attention two to three years ago. The majority of modern organisations are currently exploring blockchain technology application cases. Blockchain, in its simplest form, is a distributed ledger system that works as a decentralised ledger.

As a result, it was widely believed that blockchain would primarily be used in the financial sector. Strangely, the properties of blockchain suggest that it could have a big impact on the financial sector. It is crucial to take into account blockchain's place in the banking sector in the next few years as blockchain applications proliferate across numerous industries.

## **Benefits of Blockchain for Finance Sector:**

Any new technology is generally challenging at first. It is difficult to discover a technology whose name accurately conveys what it accomplishes, which is the most important problem. The blockchain is a perfect illustration in this situation because it represents precisely whatever the name implies. The blockchain technology permits for the creation and archival of information blocks.

## **Decentralization**

A distributed digital ledger can be created using blockchain technology. As a result, processing and storing transaction data are not needed of a single third party. Because there isn't a single location where transaction data can be kept with a unique security system, the use of blockchain in finance functions can therefore completely eliminate the possibility of transaction data hacking. Furthermore, blockchain technology eliminates the effect of intermediaries on financial transactions. Blockchain applications in banking may be easier to use and more affordable as a result.

## **Security**

Security with blockchain technology stands out among the many benefits that favor its application in banking. Blockchain secures its transaction ledger via encryption. As a result, the data was only accessible to those who had a certain key code. Blockchain transactions also offer great levels of security since they are decentralized and peer-to-peer.

## **Unchangeable**

The most crucial aspect of blockchain that answers the question "Is blockchain the future of finance?" Once the writing of blocks and their addition to blockchain takes place, they cannot be changed. With regular business transactions, immutability gives a plethora of significant benefits. Blockchain ledgers, in essence, can function as reliable information sources.

## **Abstract:**

It is possible to address inefficiencies that now exist in conventional supply chain finance systems by implementing blockchain technology. A thorough literature study is used to illustrate these problems and how blockchain might address them. Complex networks' lack of transparency, poor risk management, information asymmetries, and ineffective operations are the key challenges. These issues can be solved by blockchain-based SCF solutions because of attributes like decentralization, transparency, traceability, and automation possibilities.

"In the current climate, where the Covid-19 outbreak has revealed the weaknesses of the supply chain financing and trading on paper systems, digital transformation promises to minimize friction in international trade. We look at current advances in business applications and provide theoretical stances on the use of blockchain technology in supply chain financing systems. By removing inefficiencies and enhancing visibility among several stakeholders, which have up to now been the key impediments in this area, we contend that blockchain technology promotes innovation in supply chain finance solutions.

## **Systematic Literature Review**

Our major goal was to identify potential use cases for specific supply chain finance (SCF) solutions that may be sparked by the use cases provided by blockchain technology, such as authorised payables (or buyer-led) financing strategies (BCT). After describing all of the various SCF approaches and processes, two questions were asked to determine the existing blockages, bottlenecks, and pain points.

- 1. How can the use of BCT help remove obstacles to SCF solutions?**
- 2. What opportunities might be presented by potential BCT uses in the supply chain operations?**

The study paper's objective is to examine the following two concerns and notions in connection to the use of blockchain technology in the SCF. This research is a survey of multiple studies by various authors.

Dong, L., et al., (2022) analysed that deep-tier suppliers are particularly susceptible to interruptions in many supply chains because of their modest size and lack of access to cash, according to analysis. In order to reduce the risk of a supply interruption in both a conventional system (with limited visibility) and a system using blockchain technology, they looked at the usage of advance payment (AP) as a financing instrument in a multitier supply chain (with perfect visibility). This study's major objective was to shed light on how agents' operational and financial decisions, as well as profit levels in a multitier supply chain, are impacted by the implementation of blockchain technology.

Kao, Y. C., et al., (2022) observed that to manage SCF, which involves several partners and intricate financial transactions, many institutions are ready to adopt technological solutions. There hasn't been any sound guidance on how banks may construct a full model to evaluate their Fintech strategy for supply chain finance; previous research has either concentrated on the technology component or the optimization of a supply chain. In this study, a hybrid decision model for banks was developed using the DEMATEL "decision-making trial and evaluation laboratory" and other analytical techniques. They underlined the benefits of the blockchain-based strategy and offered four sensible Fintech options based on prior research.

Zhang, T., et al., (2021) did an examination of supply chain finances. By incorporating the characteristics and components of the block chain in various application links of supply chain finance, it is possible to successfully address the issue of SME financing in supply chain finance. This is based on the block chain with the ongoing, in-depth application of the "Internet +" development strategy.

Wang, L., et al., (2021) investigated A blockchain-based platform that provides SCF solutions to supply chain partners was the subject of an exploratory case study, and the results were analysed using a number of qualitative methods. This study sought to understand the value creation in service-dominant logic and social exchange theory-based supply chains. The outcomes show that the blockchain-based SCF provides services to customers by putting in place essential resources and abiding by best practises.

Dong, C., et al., (2021) discovered that the core company shouldn't create its own originated channel when selling high-cost products is its primary business or employing a game-theoretic method to research the operations strategy for SCF with ABS or asset-backed securitization (ABS), where the marginal cost of blockchain implementation is sufficiently high. However, as the market gains

credibility following the adoption of blockchain technology, the service rate and the rate of interest continue to fall. Additionally, as long as the marginal cost of blockchain technology is kept low enough, all supply chain actors profit more in both controlled and decentralized systems.

Xing, G., et al., (2021) have investigated the process of creation of value and sharing of interest between businesses and innovators in blockchain-enabled innovation chains, concentrating on the ratio of effort to income during the process of technical advancement (BCEIC). The research shows that in an environment where blockchain technology is used,

(1) being an innovator early in the innovation chain is advantageous, (2) the innovators are focusing on innovation activities, and (3) all innovators are completely motivated. The last opportunity is to completely include blockchain technology into the innovation chain, which will definitely result in even greater outcomes.

Yang, L., et al., (2021) analyzed for food supply chain with a single platform having a single supplier, a game-theoretic model was built to examine operational decisions and blockchain adoption strategies. It was argued that not necessarily all the commonly used supply chain contracts can achieve perfect coordination within the supply chain in the presence of blockchain. They investigated the factors that led supply chain participants to adopt blockchain in their study, taking into account adoption's fixed costs, product contamination, and altered data.

Centobelli, P., et al., (2021) presented the circular blockchain networks development integrated Triple Retry framework. A supply chain consisting of a manufacturer, a reverse logistics service provider, a selection centre, a recycling centre, and a landfill was developed using a circular blockchain platform. The outcomes illustrate the potential for blockchain technology to enhance trash management and product return management.

Powell, W., et al., (2021) put forth two methods to improve data trust and integrity in the Blockchain and IoT-enabled food supply chain. It comments on the findings and lessons learned from a current supply chain of the beef industry that integrates Blockchain and IoT to track supply chain events and guarantee cattle provenance. Rather than only gathering lag indicators of past states, the results enable IoT and Blockchain to be used as lead indicators of desired future states. They also help to promote supply chain behaviors that increase the likelihood of achieving the desired future states through mechanism design and to lessen the possibility of unreasonable claims being made about the performance of IoT data.

G. K., Sharma, et al., (2021) reported that a number of challenges plague the pharmaceutical industry, with operational issues and fake drugs being the most prevalent. Recent advancements in blockchain technologies may be able to address these challenges, such as the need to monitor product authenticity from the point of manufacturing to the point of consumption in order to stop further monetary losses. Blockchain should be examined and tested for usage in the pharmaceutical supply

chain model, according to this study, in order to securely keep track of the transactions between parties and to boost trust and transparency. They researched the acceptance and use of blockchain to address supply chain concerns.

Lo, S. K., et al., (2021) found that multi-party networks, which are essential for company operations but may be challenging to maintain, have more confidence thanks to the blockchain. The first of the two modeling approaches proposed in this paper demonstrated how blockchain-based systems could be specifically and formally described as security protocols. Second, to evaluate a design mitigation for blockchain-specific problems like consensus-based "forking" (also known as "orphan blocks" or "uncle blocks") by enabling transaction reordering behavior to arise in the model.

P. Treleaven, et al., (2021) studied that blockchain has been associated with a high level of participation transparency, honesty, trust, and confidence. Although blockchain technology is still in its baby stage, it is a promising technology that could have a big impact on many different sectors in the future. The aim of this thesis is to analyse blockchain security vulnerabilities utilising literature that has already been published between 2010 and 2021. In order to provide scholarly insight that offers an overall view of current security concerns and their influence on the blockchain system, this thesis undertakes a survey of 20 articles. The operation of the blockchain system is first described in this thesis, and then a brief examination of blockchain information security follows. . An extensive collection of security attacks from the literature was compiled using the concept-centered matrix approach. As a result of this process, security attacks were categorised using four tiers of the blockchain system architecture.

Dutta, et al., (2020) analyzed all applicable research done in areas such as distribution, manufacturing, automotive, aviation, banking, innovation, energy, medical services, agriculture and food, internet business, and education can all be updated with blockchain- based innovations through improved visibility and integrated business operations in relation to SC activities.

Dwivedi, S. K., et al., (2020) discovered that there were many serious problems with traditional supply chain management systems, including product tampering, delays, and fraud, as well as efficient authentication, data management, and data integrity. They proposed a system that incorporates transaction and block validation techniques along with the smart contract technology to provide a secure means of distributing the necessary cryptographic keys to all the participants. The security study verifies our protocol's robustness, reasonable computation and communication overhead performance, and ability to address the aforementioned problems. These characteristics include immutability, anonymity, transparency, and a trustless environment.

Di Vaio, A., & Varriale, L. (2020) focused on the key effects of blockchain on operations management (OM), including a high-level review of the most significant ones, are concentrated on the supply chain management (SCM) decision-making process from a sustainable performance

perspective. Using a step-by-step research investigation, we shall confirm it. The contribution to the literature concentrates on SCM's blockchain technology and OM, as well as sustainability issues in the airport environment of Italian airports, and is one of the most important BCT applications within the airport industry, i.e. Airport Collaborative Decision Making (A-CDM) platform for addressing fragmentation, inefficiency reduction, and uncoordinated operations.

Chen, Y., & Bellavitis, C. (2020) explored decentralization of finance and Blockchain technology holds the promise of reducing transaction costs, establishing distributed trust, and empowering decentralized platforms, thereby setting the framework for fresh decentralized business models. This essay looks at the benefits of decentralized finance as well as current business models, challenges, and restrictions. Decentralized finance, a new field in financial technology, has the potential to revolutionize present financial practises and offer a fresh setting for innovation and entrepreneurship while showcasing the advantages and disadvantages of decentralized business models.

Zhang, L., et al., (2020) studied a Blockchain, a cutting-edge technology, could be utilized to analyze and then process that data by successfully integrating financial resources, according to research. In order to enhance the financial system and improve the effectiveness and caliber of financial operations and services, new financial formats or service models are created at three levels (data, regulations, and application). By smoothly merging financial resources, cutting-edge technology called blockchain can be efficiently used to analyze and process data.

Chod, J., et al., (2020) developed a theory demonstrating that expressing to lenders a firm's core qualities, such as its operational capabilities, through inventory transactions is more effective than expressing it through loan requests since it leads to less expensive operational distortions. We describe how the operational parameters of the firm, such as operating expenses, market size, and other variables, affect the efficiency gains. To demonstrate this, we developed the open-source blockchain protocol *b verify*, which makes use of Bitcoin to provide supply chain transparency on a massive and affordable scale. The ability to acquire favourable financing conditions at lower signalling costs by opening a window of transparency into a company's supply chain is one of the main advantages of blockchain deployment, according to the paper. The preferred signalling mode study also reveals the sectors or supply chains that stand to gain the most from this.

After analysis of the above papers, it is understood that blockchain as a system is helpful in managing transactions in the financial supply chain.

## **How can block-chain contribute to enhance the financial supply chain?**

The intersection of supply chain finance and blockchain technology has remarkable benefits for the relevant stakeholders. Some of these include:

### **It increases authenticity in the chain of supply**

The supply chain financing industry is a vast network with many different stakeholders. There are numerous interested parties, from buyers to suppliers to intermediaries, and the information exchange is not always transparent. Each stakeholder may put their interests ahead of those of other stakeholders, resulting in delays in the supply chain. This issue can be resolved using blockchain. The stakeholders who have access to the same data are given copies of the same digital ledger, which maintains the records in the network. Blockchain's immutability prevents misunderstandings and guarantees the network's validity and transparency. It can improve supply chain management and make the chain of supply run more smoothly.

### **Brings inclusivity to the ecosystem**

There are flaws in the current supply chain finance environment, particularly in terms of financial inclusion. The top 10 to 50 suppliers of buyers are typically the ones who receive funding from supply chain financiers, cutting out many small and medium-sized businesses. Smaller suppliers can gain more from early payments through buyer-led supply chain finance than their larger counterparts, therefore this is unfair. This problem might be solved by blockchain technology, which would also open up supply chain finance to all parties. Due to the characteristics of the blockchain network, supply chain finance providers may be able to finance invoices issued by all suppliers. Finance providers have no justification for restricting financing to only the most successful suppliers because every transaction and information exchange is recorded in the ledger.

### **Redefines financiers in the supply chain**

In buyer-led supply chain financing, financial firms are typically the financiers. They are in charge of paying the vendors' invoices. Buyers reimburse them via a repayment schedule that includes the borrowed amount plus a little fee and interest. While financial institutions will always be important in buyer-led supply chain finance, blockchain may make the system more accessible to ecosystem participants. Individual investors and corporate foundations alike could benefit financially from supply chain finance. Blockchain is already being used by platforms like YubiFlow to enable various financiers to use supply chain finance to generate returns.

### **Enhances the functioning of the supply chain**

Information exchange is always an issue when there are many parties involved. Supply chain finance has suffered from the same ailment. Information inaccuracy is, in fact, one of the significant reasons why supply chain finance has struggled to solve the age-old issues in the supply chain. However, using technology in blockchain supply chain finance might be the answer. The digital, immutable ledger can keep track of information exchange, asset transfer, product quality, and timelines to smoothen the supply chain. It can reduce lags in the system, saving money and time for all the stakeholders.

Harwick, C., & Caton, J. (2020) studied that despite the growing use of blockchain technology to multiple uses over the past decade, researched Except for the most basic and heavily collateralized forms, financial intermediation is still difficult to achieve. The idea of the technical frontier has reportedly been put up to define the kinds of interactions that can be arranged algorithmically among pseudonymous agents, such as on a blockchain. Also the lending and financial intermediation are not included in it, even in their most basic forms, unlike monetary trade. Real-world identification data integration is a must for true blockchain-native financial apps in the future to prevent defection. They took a look at a few different strategies and come to the conclusion that such integration is possible without jeopardising pseudonymity, provided real-world identification is made available in the breach.

Saberi, S., et al., (2019) studied that blockchain technology is showing promise for tackling a number of issues with international supply chain management as it is a “distributed digital ledger platform” that offers transparency, traceability, and security. This essay provides a critical analysis of the application of blockchain technology and smart contracts to supply chain management. This critical examination examines how blockchains, a new, possibly ground-breaking technology, can overcome a number of challenges. We give suggestions for further research that may offer direction on how to get rid of hurdles to the application of blockchain methodology for management of supply and demand.

Varma, J. R. (2019) studied that up until a decade ago, it was commonly believed that the economic strength and excellent management of those crucial centres would ensure that they would collapse incredibly rarely. More significantly, it was believed that they were too big to fail (TBTF), which allowed for the possibility of government intervention and bailouts in the event that they did falter. The Eurozone Crisis of 2010–2012 fueled fears that even wealthy United States of America sovereigns would likely default on their debts. Another problem that has to be taken into consideration is the repeated hacking of the computer systems of large businesses. An increasing number of people are beginning to doubt the importance of decentralized structures within the financial industry.

Omran, Y., et al., (2017) studied to construct a theoretical foundation for financing supply chain solutions based on blockchain. The structure of reference aims to improve buyer- supplier interaction by removing inability in application of SCF tool like “reverse factoring and dynamic discounting”. In order to create special traits for the application of blockchain technology (BCT) in the field of SCF, we also present value drivers for BCT. Despite being one of the FinTech's (financial technology) most revolutionary enablers, BCT has grabbed a little attention in the quickly growing field of SCF. The results will therefore assist in the development of workable SCF-solutions in the future that take advantage of the most recent technology developments.

Gelsomino, L. M., et al., (2016) investigated ways to make supply chains' cash flows more efficient.



Commodity and information flow difficulties are thoroughly explained in the literature on “logistics and supply chain management”. Just some articles, however, examine the financial movements that take place in supply chains. This article discusses the state of search on financial move in supply networks at the moment. As a result, it becomes evident that there hasn't been a systematic evaluation and optimization of the cost of funds up to now. "Supply Chain Finance" is offered as a theoretical framework and mathematical model to close this gap.

Here are some ways in which supply chain financing is bridging the financial gap for MSMEs in India:

### **Timely access to capital**

MSMEs can benefit from supply chain financing's early payment options, which can quickly meet their need for operating cash. The fund requirement is satisfied within a few hours after the SCF line is set up thanks to emerging technologies and ERP integration. MSMEs can use this money to grow their operations, buy additional raw materials, or keep existing inventory levels at current levels. For MSMEs to run their businesses without interruption, they need access to inexpensive financing options available on demand.

### **Recurrent source of liquidity**

The Indian government has introduced numerous MSME lending programmes, however they only provide one-time access to money. However, MSMEs must keep a steady flow of working cash in order to cover daily costs. Based on monthly invoices, supply chain finance gives MSMEs the chance to regularly have access to enough cash to cover their companies' ongoing demands for working capital.

### **No burden of repayment**

The terms of loan repayment under credit guarantee programmes and supply chain finance varies significantly. The interest rate is lower under credit plans. However, borrowers must pay back the balance owed within the allotted time limit. It differs under supply chain financing, though. Because it is an advance on bills owed to MSME sellers, MSMEs are not responsible for repayment. On the due date, lenders collect money directly from the buyer to satisfy the debt.

### **Cost-effective source of funds**

SCF is a desirable choice for MSME sellers since it has access to affordable financing. The creditworthiness of the customer, the connection to the supply chain, and the vintage tie between the buyer and supplier are taken into account when lending institutions extend loans. Compared to more conventional sources of financing, it is a competitive source of funding that encourages better cooperation between the buyer and the seller. Better terms from the seller can be negotiated by buyers with a respectable credit rating. In exchange, it quickens MSMEs' cash flows and fortifies

sellers so they can help the buyer's company grow more effectively.

### **SCF brings about financial inclusion**

Although SCF has been around for a while, access to real-time data such as bank statements, GST, and e-invoices has expedited the entire process thanks to digital integration and developments in technology. The cost of supply chain financing has decreased and the overall process efficiency has increased thanks to digitization. MSMEs can easily get financing at a lesser cost using supply chain financing, reducing their reliance on shady financial sources. Borrowers can obtain money from reputable financial organizations on more favourable conditions thanks to a simple procedure that requires little documentation. One effective financing option for MSMEs' working capital needs is supply chain financing. It expedites MSMEs' growth and development by providing simple access to loans.

### **Conclusion:**

With its explanation of the justification for blockchain adoption, this review adds to the body of literature on SCF. By presenting many theoretical studies and industry blockchain implementations, it has enhanced this developing topic. One of the first papers to compile the most recent blockchain applications for funding trade and supply chains. Clarifying the current perspectives in academic and practise has identified the areas where blockchain may help commerce and SCF. This evaluation looks at the responses to two study questions in order to investigate how blockchain technology might change SCF.

The absence of knowledge about supply chain travels, ineffective manual processes, documentation, the load of following rules, and the threat of cheating are the single most important obstacles in the present SCF methods, according to our review of the literature. With the help of our research, we were able to better understand a number of cutting-edge blockchain implementation hurdles in SCF, including both technical and regulatory problems as well as business and administrative ones.

One of the few studies that has considered the application difficulties for the acceptance of blockchain in SCF is this one. It offers insightful information on SCF and blockchain, laying the groundwork for more interdisciplinary research on these cutting-edge financial technologies. Additionally, it will encourage managers to create plans and implement the necessary adjustments for blockchain-driven SCF to flourish while assisting practitioners in better understanding how and where blockchain could transform SCF operations. The development of blockchain-based SCF solutions can be encouraged and shaped by the authorities through rules and regulations that encourage innovation, or they can be constrained by severe overregulation because the technology is still in its infancy.

In order to effectively govern blockchain related projects, it is therefore necessary to analyse their innovative use cases. In addition to a cutting-edge analysis of the theoretical solutions, our review offers an investigation of blockchain based business and finance in supply chain solutions. This improves the regulators' capacity to recognise potential new legal issues and create policies and procedures that will encourage innovation.

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