

Exploring the Potential of Blockchain in Supply Chain Management

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Abstract

This paper evaluated the facts and noted that supply chain management might be completely transformed by blockchain technology, that still exist certain obstacles that must be removed before it can be used more extensively. It is probable that more businesses will use blockchain to increase supply chains' effectiveness, transparency, and security as the system develops and matures. Although supply chain management might benefit from the use of blockchain, several obstacles currently stand in the way of its broader acceptance. Since this field is nevertheless in its infancy, many businesses could be reluctant to make an investment in it until it has demonstrated its viability. Furthermore, considering a blockchain infrastructure can only handle a certain amount of interactions, scalability issues also exist. This is the major reasons for which firms are investing in the technology that will help to assure better management of the supply chain.

Keywords: Supply Chain, SCM, Blockchain, Distribution Network, Blockchain Infrastructure, Technology

Introduction

By automating procedures, increasing visibility, facilitating real-time data analysis, boosting communication, and streamlining decision-making, technologies has completely transformed supply chain administration. This operational simplification boosts productivity, lowers expenses, fosters better teamwork, and raises customer happiness. This is accurate since technology has opened up staff members for higher-level jobs that call for strategic planning and creative problem-solving, such as computerised freight audits, robotic storage systems that manage assets, and processing of invoices[1]. Continuous data collection and analysis can help lessen the impact of supply chain disruptions. Automation significantly improves the efficiency of handling supply chains. IT platforms have enabled the automation of hitherto time-consuming procedures like as receiving orders, invoices, and stock restocking.Both companies and consumers may now engage more quickly and easily thanks to the rise in online communication. Clients now have higher standards and demands for honesty, delivery times, as well as reaction times to be a result of technological advancements that improve delivery and accessibility[2]. While an online supply chain employs technologies including AI, Blockchain, and numerous others that streamline procedures, enhance visibility, and deliver immediate knowledge into various supply chain phases, a conventional supply chain depends on manual procedures, documentation, and little insight. Because of this, the purpose of the report is to evaluate and discuss how blockchain affects the administration of supply chains.

The impact of blockchain on the management of supply chain

The most common use scenario for blockchain technology is identifying assets, with 40% of those polled saying that their organisations were using it for safe information sharing and tracking assets management[3].

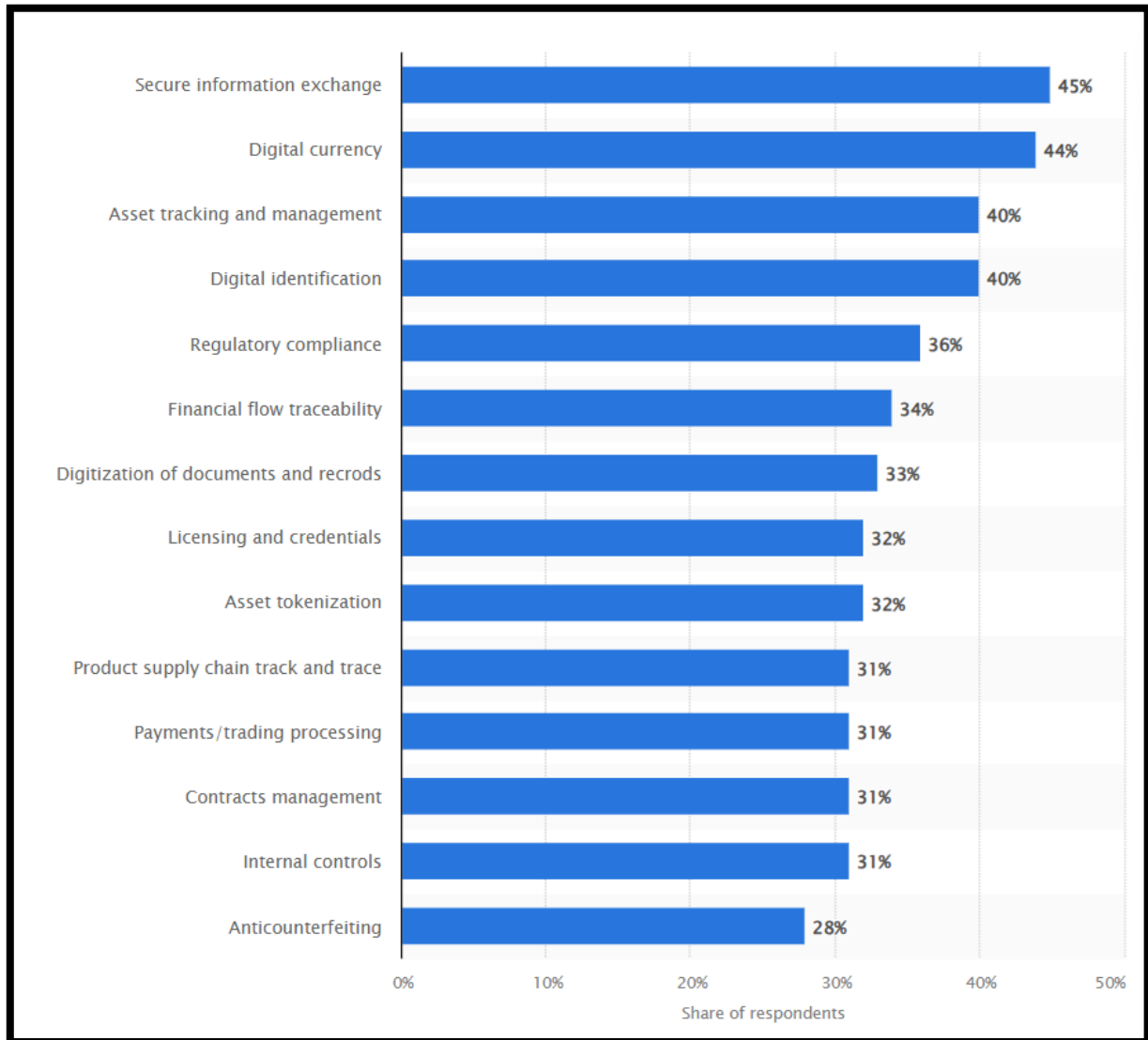


Figure 1: Use of Blockchain for SCM

(Source: [3])

Based on the data, it can be further said that Blockchain technology may support more visible and resilient supply chains through a variety of ways. Initially it provides traceability, that can improve performance in terms of economy. This implies that every participant in the manufacturing chain joins the Blockchain ecosystem. This is accurate in that it is simpler to monitor and confirm the state of commodities throughout their travel through their supply chains thanks to the impermeable and decentralised record of activities made possible by blockchain software[4]. Blockchain technology offers an archive of data that is readable among every participant and has built-in security and accountability.



By offering a decentralised, transparent record that logs transactions and uses artificial intelligence to automate implementation, blockchain technology improves the operation of supply chains by guaranteeing compliance and lowering opportunistic behaviour. Blockchain may save information, display historical asset documents, and monitor the evolution of resources. The Ethereum blockchain's record-keeping procedures are enforced via intelligent agreements. Whether an object is digital or tangible, anybody may see its source and travel in the moment. Supply chain productivity, accountability, and reliability will all be enhanced by using blockchain[5]. Furthermore, blockchain technology has the potential to improve network member teamwork, which might lead to lower costs and more efficiency. The supply chain has become more efficient as a result of improved automation and decreased inefficiencies brought about by blockchain connectivity. The constant monitoring of items and safe data exchange among participants significantly improved transparency by reducing the risks of mistake and fraud. Faster and more effective recalls are made possible by blockchain technology, which makes the chain of supply more accessible and verifiable[6]. This is accurate since handling their supply chains enables businesses to deliver goods faster, guarantee product availability, minimise quality problems, and handle returns with comfort, all of which increase profitability for the company and its clients.

Working structure of Block chain

Previous studies have discovered some high-impact applications of blockchain, such as enhancing supply chain efficiency and advancing sustainability. Additionally, digital currencies may be utilised to guarantee that goods fulfil certain quality requirements all the way through the entire supply chain. Businesses may monitor and confirm adherence to certain standards by logging information regarding a distributed ledger at every stage of manufacturing[7]. In this sense, logistics processes were more efficient as a result of improved automation and decreased delays brought about by blockchain incorporation. Real-time monitoring of items and safe data exchange among partners significantly improved transparency by reducing the risks of mistake and fraud. Additionally, blockchain ensures supply chain accountability by facilitating openness and unchangeable paperwork. The digital ledger records any transaction or transport of products, enabling stakeholders to track the location and point of origin. Blockchain adds encryption keys to each information block to produce an encrypted chain that is impenetrable[8]. This technology has the potential to address the difficulties of complex supply networks, where rapidity, responsiveness, and openness are essential. Blockchain provides a wide range of advantages for supply chain administration, from enhanced sustainability including continuous interaction to quicker payments, reduced expenses, and increased confidence.

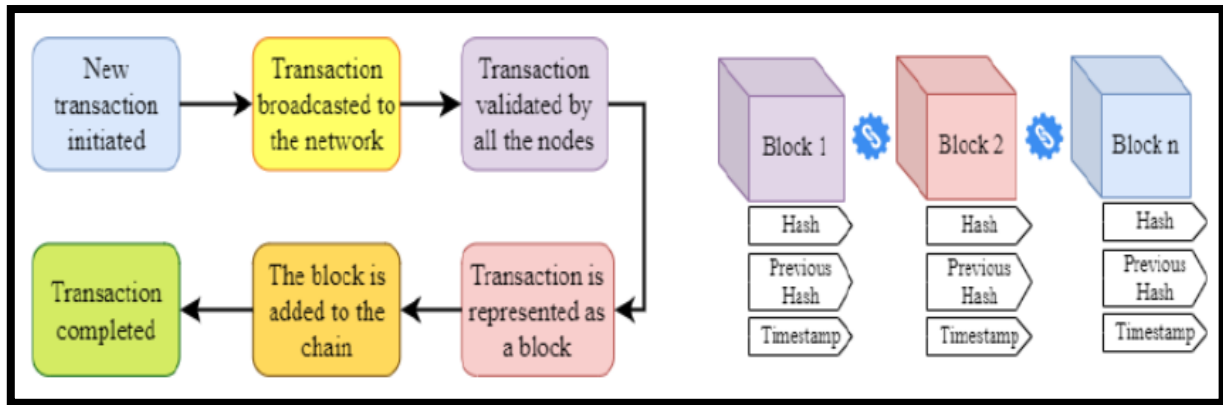


Figure 2: Working Structure of a blockchain

(Source: [8])

Blockchain technology has several applications and implementations throughout a range of businesses and industries, particularly but not restricted to the financial services, supply chains, logistics, development, infrastructure, and agricultural sectors. Throughout the past decade, it emerged as many important technical advancements. It operates like a distributed, autonomous database of details of transactions that is verified by an international network.

Supply chain transparency continues to be a significant barrier for companies in spite of fierce competition. Organisations fight for competency and cost reducing, but blind spots among middle and third-tier providers put up obstacles. Consumers, particularly in the food and leisure industries and markets are prepared to stump up for disclosure and require it[9]. In order to answer the crucial issue concerning how blockchain systems might change the trust component of supply confinement certain issues are also noted. This involves the lack of clear implementation structures, the failure to adequately take sustainability into account while adopting blockchain, the lack of empirical support for theoretical advantages. Regarding the drawbacks, it should be mentioned that Blockchain systems execute transactions more slowly than standard databases[10]. Supply chain processes may be delayed as a result of the reduced processing rate caused by validating transactions across several PCs or locations. This is accurate given the highlighted obstacles to the use of blockchain into supply chain administration. The connections between supply chain administration obstacles are shown. Risks associated with economic and financial matters remain the most significant obstacles. The two factors with the highest importance are inadequate comprehension and contractual hazard. This is noteworthy because several blockchains have communication issues, which restricts the scope of programs, and changing and ambiguous rules present difficulties for SCM firms.

Regardless of these characteristics, the blockchain provides an unchangeable ledger that enables a decentralised, trustless system that is independent of outside parties. The blockchain records all transactions or transfer of items, giving stakeholders real-time access to information on the origin, setting, and situation of things. 40% of those in supply chains said they plan to make investment in blockchain technology since 2022. According to 35% of those participating throughout the same poll, they intend to purchase sensors[11].

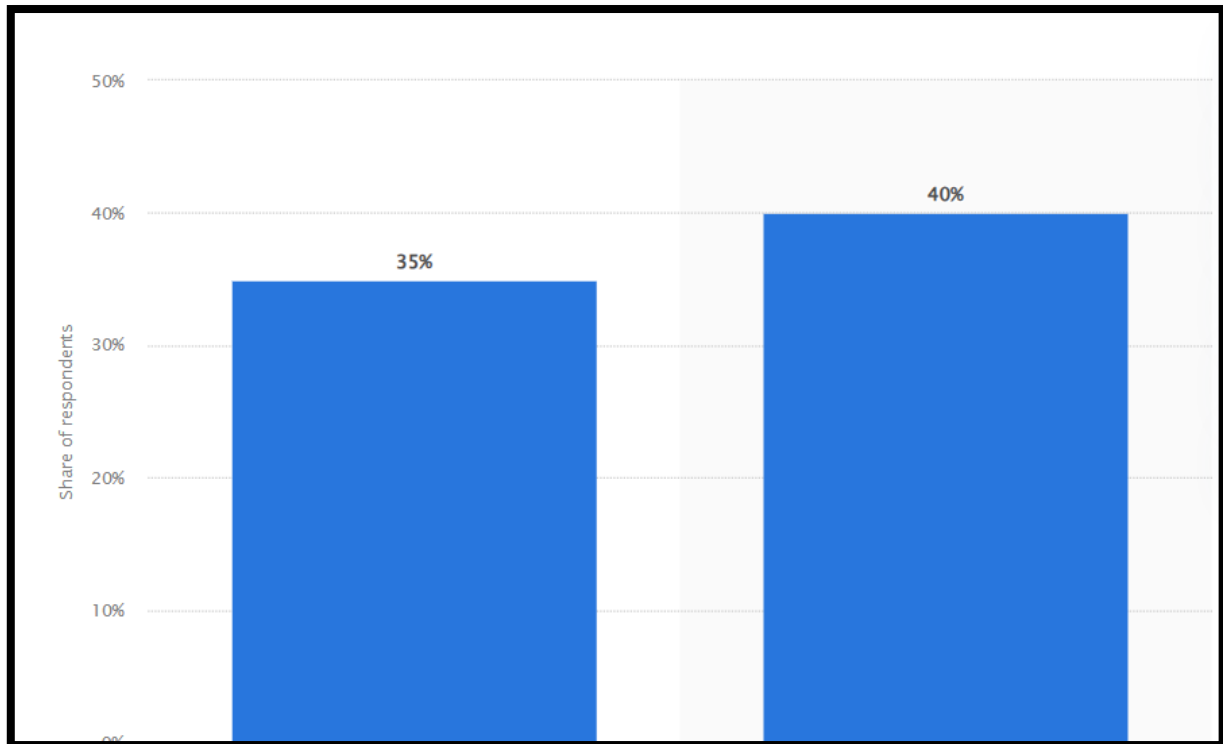


Figure 3: Inclination to increase investment in Blockchain for SCM

(Source: [11])

This is going to be done since Blockchain can help to enhance network exposure, offer new features, boost performance, and fortify a supply chain's streams. Blockchain technology may be applied within supply supply chain oversight to provide an accessible, unchangeable record of information and transactions pertaining to the transportation of commodities and products.

Conclusion

It can be concluded that a digital medium called blockchain makes it possible to create a decentralised, safe, and accessible digital record. This technology eliminates the demand for an authoritative source by allowing information to be recorded and shared throughout a collection of devices. Blockchain technology may be applied to supply chain oversight in order to provide a shared, unchangeable ledger of information and activities pertaining to the transportation of commodities and goods. This may contribute to increased supply chain effectiveness, tracking, and openness. Blockchain, for instance, may be used by a business to monitor the flow of inventory from the supplier to the production, warehouse, as well as retailer. This might assist in guaranteeing the long-lasting and ethical sourcing of the resources. By employing smart contracts, businesses may use blockchain technology to streamline the running of specific supply-chain tasks depending on the satisfaction of predetermined criteria.

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