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REVIEW ARTICLE

Blockchain Enabled Supply Chain Management

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Abstract
A distribution network is a mechanism that links a company and its suppliers to create and distribute a product to the end customer. This network is made up of numerous activities including people, entities, knowledge, and assets. The distribution network also represents the steps taken to get a good or service out of its inception to the customer. A supply chain links a company and its suppliers to create and distribute a product to the end customer. This network is made up of numerous actions, persons, entities, knowledge, and resources. The distribution network also represents the steps taken to get a service or product from its inception to the customer. Blockchain allows all parties in a supply chain to access the same data, potentially reducing communications or data transfer issues. Less time to be spent on data confirmation and more time can be spent on providing goods and services quality, cutting prices, or both. Blockchain allows all parties in a supply chain to access the same information, potentially reducing connection or data transfer issues. Less time that could be spent on data confirmation and more time could be spent on delivering products or services quality, cutting prices, or both. This article takes a broad look at how blockchain might assist manage supply chains. Also discussed is how a crypto supply network outperforms a supply chain.

Keywords Supply chain management · SCM · SCRM · Blockchain · Blockchain-enabled

Introduction

The disruption has developed over time, from supply chain disruptions resulting from environmental change and company form changes to cyberattacks enabled by new technologies. The risk of disturbance, whether direct or indirect, jeopardizes society's serviceability while increasing the vulnerability of logistics and distribution networks. For example, the universal implementation of COVID-19 has an impact on the advancement of people and products all over the world. As a result of the delivery chain disturbance, items and objects have experienced delays and blockages. Simultaneously, the need for specialized items employed in illness treatment has expanded significantly, making forecasting market demands a wide variety of patient goods more challenging.

Following the upheaval caused by the need to contain the virus's transmission, the most crucial task for businesses is restoring the supply chain. Cyberattacks have lately been identified as one of the various sorts of hazards linked with delivery chain disruptions.

To put the chain to the test, cyber-attacks were deployed. Businesses are concerned about forgery, theft, deception, fact change, and manipulation. Stuxnet computer harmful software remotely maintained management of Iran's Natanz nuclear enrichment complex in November 2010, resulting in a loss of functionality, connection, or the ability for interdependent networks. It was proposed that it become "Cyber risk is a challenge at the intersection of enterprise, regulation, and era," as per the definition.

The potential consequences of cyber breaches range from large cash losses due to business disruption and regulatory fines to immaterial costs such as customer loss and company reputation [1]. Understanding and acceptance of supply chain management (SCRM) have grown in recent decades.

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As a result of the introduction of digitization and data analytics, businesses have established critical competencies in providing up-to-date solutions using SCRM. Industry Digitization [3] 4.00 With real-time sharing of data and improvement, Revolution enables real-time SCRM and promotes collaboration, interaction, and engagement among supply chain participants. The interplay of procedures and systems, technological advances, on the other hand, introduce new disruptions to production or processes, such as destructive digital activities that risk item security, customer consideration, the firm's brand image, or a lower market position.

In this vein, institutions of higher learning and professionals are currently implementing a plethora of theoretical and practical propositions in the crypto age for conserving data integrity as well as structure, transparency, security, and safety as a conceptual model for mitigating the aforementioned problems.

Blockchain is one of the states of the art technology that can be used to avoid supply chain disruptions and ensure the delivery in an efficient manner. The following Fig. 1 explores the key levers of blockchain in supply chain management. Step 1 clearly explains developing access to the source material, step 2 plans to increase the planning, 3 and 4 deals with managing the source and visibility towards the compliances, 5 deals with delivery and the final step deals with the decentralization of the mercantile.

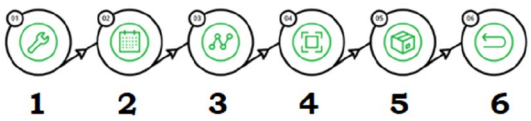

Fig. 1 Driving value in the supply chain through blockchain [1]

Blockchain design is a rapid innovation that has gained popularity in recent years and can aid in the detection and control of supply chain risks. "The blockchain represents a new organizational paradigm for all quasiparticle (discrete units) of anything and everything, and also the potential synchronization of all anthropogenic on a much larger scale than possible in the past". The following Fig. 2 depicts the different application areas where blockchain can be effectively used in supply chain systems.

Dasaklis et al. [4], have done an extensive survey in understanding the implementation of blockchain-enabled supply chains and explored the various features and challenges through research works. The use of blockchains in the production process promises to be an appealing research topic for future studies, especially in the age of cybersecurity. Although some reviews examined current blockchain application forms in the distribution chain, there is ambiguity around whether blockchain as well as promising technology can manage and predict interruptions, leading to higher supply chain agility and reliability, or how these innovations can play a critical role in security and privacy challenges, smart contract execution, counterfeit monitoring, as well as tracking to ensure the food's safety.

Continuing from the previous discussion, this study adds to knowledge by collecting data through bibliometric searches and applying bibliometric approaches, most importantly sharing between users' analysis and the co-occurrence network of the author's words. These are quantitative approaches to researching literature in several contexts. Supply chains, smart factories, and blockchain. This widespread application proves its utility in describing the subject's developmental trajectory and consensus in a much more objective way than conventional descriptive

Fig. 2 Blockchain in Supply Chain Management [2]

appraisals, as well as showing the route to the most intriguing future research.

Literature Survey

Blockchain technology is implemented to improve supply chain management and enable businesses to grow at large. This section gives a detailed investigation of the usage of blockchain for effective supply chain management.

Jabbar et al. [4] have discussed about the various issues and challenges in implementing blockchain-enabled supply chain using different case studies and concluded that many organizations have taken steps to build a blockchain-enabled platform for efficient business.

The application of Block Chain has been evaluated in different business processes by [5]. The authors have described a shift in the Business process (BP) methods over the Internet of Things (IoT) from persistent to transient, from static to dynamic, and from centralized to decentralized, and new enabling technologies are highly demanded to fulfill some emerging functional requirements (FRs) at the stages of design, configuration, diagnosis, and evaluation of BPs in their lifecycles.

The authors in [6] have conducted an extensive survey using the advanced scientific quantitate method and contributed towards the application of blockchain as a key component of cyber supply chain risk management (CSRM), manage and predict disruption risks that lead to resilience and robustness of the supply chain.

Etemadi et al. [7] identified the barriers affecting the implementation of blockchain as a component of cyber supply chain risk management and the methods to overcome the challenges. Management elements on the outbound and inbound sides will differ, according to SCRM literature. A positive situation when dealing with risk in terms of supplier selection, for example, is to maintain the starting from raw materials; nevertheless, just on the consumer side, the financial environment, including a patient's vulnerability to financial disaster, also may prove to be critical Chang and Chen [8] have conducted an extensive survey on the application of blockchain in supply chain management and provided a blueprint for these applications from the perspective of literature analysis. The research work also focussed on technical adoption/diffusion, block-supply chain integration, and their social impacts.

Technological involvement in supply chain management lies in four areas: extended visibility and traceability, supply chain digitalisation and disintermediation, improved data security and smart contracts [9].

In [10] the author has discussed about a two-stage conceptual supply chain model and experimented the same using blockchain concepts. Furthermore, the work has a scope for the exploration of supply chain phenomena using a blockchain-enabled simulated supply chain, which represents the perfect test environment to explore the real advantages of blockchain technology.

A supply chain is a system of organizations, people, activities, information and resources involved in moving a product or service from supplier to customer [11]. These elements, together with the flows, give a foundation for understanding the device in any supply chain, regardless of its complexity. Risk issues may also be raised merely based on these viewpoints.

Because of the actual movements of goods from suppliers to clients, we characterize the fabric as following the flow. Economic flows include lines of credit, timely pay bills, financial disasters, price strategies, credit terms, and supplier contracts [9].

Information flows with the flow are used to keep all delivery chain factors up to date and, as a result, supply resources for decision-making inside the delivery chain. Order status, order delivery, and stock status are examples of facts linked with the drift [10].

As previously said, supply chain operations are defined as each flow and technique. As with any delivery chain, decision factors such as layout and management regulations are determined mainly and progressed based on reading full performance measures [11].

Fransisco [12] has described an Unified Theory of Acceptance and Use of Technology to expand the explanation of end-user technology acceptance for blockchain traceability applications. The author has proved the theory to be effective for supply chain traceability issues. The effect of the outside risk occurrences in the supply chain operations is discussed.

Blockchain technology helps integrate various SC functions such as recording, tracking, data sharing, and scalability [13]. The involvement of the technology IT firm using a duplicate copy of the transaction, storage and transparency that enables traceability of a product or service is discussed by Francisco and Swanson [14].

Furthermore, the device as a technique model of the resource (supply), make (making), and replenish (call for). This technique is based only on the Supply-Chain Reference (SCOR) edition, which is extensively used between supply chain practitioners and academicians (Supply Chain Council, 2008) [15].

From [1–15] the following observations are made:

- Supply chain management is centred on community fabric flows but has now grown in size and incorporated other streams like finance and indicative.
- The ability to regulate supplier risk is a concern and to overcome it extensive research is required.

- The supply chain has three main flows. they're Credit lines, the flow of information, and the product flow.
- Credit lines, timely payment of bills, financial calamities, pricing tactics, credit conditions, and supplier contracts are all examples of economic flows.
- The flow of information is employed to keep all delivery network factors up to date and, as a result, to offer resources for decision-making within the delivery chain.
- The flow of goods from the provider to a client is referred to as product flow. This supplier development process also takes into account customer returns and demand for services.
- Facts associated with the drift include order status, delivery service, and stock status.
- Management components on the inbound and outbound sides will be different catering to their tasks.
- Blockchain will offer a transparent workflow that will be more efficient than the traditional supply chain.
- The device as a method model of a supply (supply), manufacture (manufacturing), and stockpile (call for). This method is solely based on the Supply Chain Operations Reference (SCOR) version.
- Like any delivery chain, layout and administration regulations are mostly determined and developed based on reading entire performance metrics.
- Risk Management in terms of provider selection, for example, a favorable situation is to sustain the flow of raw material; but, on the demand side, economic risk, including a customer's risk of financial disaster, may also prove to be crucial.

Proposed Methodology

While blockchain technology is still in its infancy, they are gaining some traction across distribution networks, with trust serving as the major motivator for its adoption. The utility of this technology for the supply chain can be categorized into four areas: better data security, smart contracts, increased visibility and traceability, and improved visibility and traceability. This study reveals several issues, knowledge gaps, and future research opportunities. How well a crypto supply chain should be organized has been investigated from a design approach.

A blockchain is a form of distributed database that securely preserves records of digital information or 'exchanges.' When a transaction occurs on the network, it is broadcast to a peer-to-peer range of interconnected machines called nodes. Each of them solves equations to check and validate the transactions for network consistency. When a transaction is accepted, it is merged with the other events to generate a data block again for the ledger.

Blockchain technology can be used by businesses to trace any transaction, allowing them to share papers, personal information, and cryptocurrencies. It is extremely difficult to manipulate the ledger because it is widely dispersed over the network. To make a change in the ledger, you'd have to log the modification on every node in the network at the same time. If this is not done, the network detects that one record differs from the others and marks the transaction as corrupt.

Consider the technology to be like a Google document, where multiple individuals can see and modify the same document at the same time, as opposed to a Word document that is locked and owned by a single person. With 'Track Changes' enabled, every device on the network can view and modify the system at the same time.

Blockchain technology enables organizations to track all types of transactions more securely and transparently. The potential impact on supplier relationships is massive. Companies can utilize the blockchain to track the history of a product from its inception to its current location. Every time an item is transferred, the transaction is securely recorded, having a lasting record from production to sale. Parties working on a single platform may be able to significantly reduce the delay time, added expenses, or human error which are typically associated with transactions using this advanced technology. The absence of middlemen in the distribution chain reduces the possibility of fraud. Finally, when fraud occurs, detailed records enable businesses to identify the offender.

A shared blockchain ledger offers a secure and tamper-proof audit trail of data, equipment, and financial flow within a supply chain. Companies can use a common blockchain to synchronize logistical data, track information, and manage payments. Furthermore, companies can do so while exchanging only the most important data without significantly affecting their old systems.

Inferences

Despite the tremendous benefits of blockchain generation for establishing trustworthy traceability systems, several challenges persist. This phase classifies the most critical constraints and outstanding concerns linked to blockchain construction and its importance in SC accountability solutions.

Current pilot evaluations are as follows: Several businesses are doing real-world global pilot studies on the application of blockchain in SC accountability. These pilot projects show the potential of blockchain tracing solutions. They are insufficient, however, to illustrate blockchain's ability to bring huge financial benefits. Despite the significant costs of blockchain creation, nothing is known about its enormous utility. The majority of blockchain offerings are

limited sales and are managed on a limited scale, usually within enterprise borders.

When it comes to solutions invention and technique adoption, there is also a considerable obstacle to actual existence. As a result of a lack of information and comprehension of the generation, favorable SC members may be prevented from picking blockchain-primarily based SC traceability options. As device length and complexity increase, larger allocated structures may be increasingly difficult to construct.

Conclusion

By allowing firms to conduct transactions without the intervention of third parties, blockchain improves supply chains. It also enables closer integration of finances and logistical services, as well as increased data sharing among stakeholders.

Integrated payment solutions reduce the time it takes to process trading and settlement transactions, ensuring timely and appropriate product flow. Additionally, blockchain and architecture enable firms to increase compliance, save legal costs and penalties for late income taxes, and prevent counterfeiting and fraud.

Because blockchain data cannot be deleted, they create a visible supply chain. Furthermore, every step of the distribution chain is safely recorded, enabling logistics problems to be traced back to their source. The same is true for obtaining traceable parts or raw materials, increasing accountability, and reducing illegal activity.

Data availability No Dataset involved in this article.

Declarations

Conflict of interest There is no code of conflict between two authors.

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