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Value Creation through Blockchain Technology in Supply Chain Management

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Background and Abstract

In the last several years, digitization in supply chain management (SCM) has been primarily focused. The digital transformation has brought tremendous value to the supply chain organizations. As published in the article "How to Achieve Six-Figure Benefits from Digitizing Paper-Based Supply Chain Operations, 2018", it has been proven that digital transformation has improved efficiencies and productivity in the supply chain operations by leaps and bounds. With the foundation of the Digital transformation now the current era of fast communication needs to use the blockchain technology in SCM. The primary objective of this paper is to focus on what values Blockchain in SCM can add for the customer and the business community. Using blockchain in SCM provides an incredible advantage of securing /retaining the origin of multiple entities (data), help detecting fraud, improve inventory management, detect the issues earlier in the SCM cycle, help in fast-tracking of goods (Logistics), and build the customer trust. As an example blockchain in the food industry will help to track every step in the supply chain cycle and improve the visibility of goods, can help to improve the efficiency and have less wastage/loss because of the shelf-life and inconsistencies in the SCM and provide real value-added information to the consumer. For example, by reading a simple QR code with a smartphone, data such as an animal's date of birth, use of antibiotics, vaccinations, and location where the livestock was harvested can easily be conveyed to the consumer. In food, for example, a retailer would know with whom his supplier has had dealings. Additionally, since transactions are not stored in any single location, it is almost impossible to hack the information.

Keywords: Blockchain technology; Chain Management; Digital technology

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Blockchain in SCM: A cultural change

The evolution of supply chain management shows that companies in the SCM sector are reluctant for the creation of the value chain, or I would say somewhat not fully ready for the blockchain. It is not only the technology that they have to use, but they also need to be ready for a transparent platform, and I will call it a cultural change in the SCM. While on one hand companies have to start thinking of changing the way they track the logistics cycles, on the other hand, we need to innovate and enhance the Blockchain technology that can turn the SCM industry into a much transparent and productive form. The current supply chain, which is also known as a linear economy model is meeting directly or indirectly the needs of customers. However, it has several limitations about products' information for customers and transparency to the customers. In today's world customers do not ask that question like where this product is coming from, who is the actual supplier, who is the actual manufacturer, what are the conditions under which this product is made, what are the ingredients for my product? These questions are genuine, and any customer has the right to ask and know it. The answer to these questions is the Blockchain. The introduction of Blockchain technology in healthcare and finance sectors has received growing interest. This is because the blockchain technology uses a trusted intermediary. Now the operations in these sectors have been performed in a decentralized manner which was not possible before the introduction of blockchain technology. Every segment of the process got frozen and recorded with no changes or alterations. Blockchain uses the method of encryption for securing the originality of each transaction at all the stages. The increasing interest of companies in a supply chain to transport products between various parties still faces the problem of delay in delivery of products, and other similar issues. Digitization has helped to get rid of the paper, but security remains a big concern.

What is the real value here for the customer and the industry?

Data security and efficient availability of information in the supply chain need a broad technology-based solution and provide an incredible benefit as a customer and company. The blockchain is what is addressing that. Let's think about this. By using Blockchain, Walmart can provide all the information the consumer wants in 2.2 seconds. During an outbreak of disease or contamination, six days is an eternity. A company can save lives by using blockchain technologies. Isn't that amazing? Blockchain also allows specific products to be traced at any given time, which would help to reduce food waste. For instance, contaminated products can be traced easily and quickly, while safe foods would remain on the shelves and not be sent to landfills.

SCM has been suffering from a long time to provide the missing links to the customer and for maintaining its historical sourcing information. This is being addressed by the inclusion of blockchain

technology in the SCM. In a recently published work, Casado-Vara proposed the use of blockchain in the agriculture supply chain industry [1]. Along with the proposal of the blockchain, the researchers also focused on a multi-agent system to solve the real-time problems in the supply chain sector. The primary objective of the proposed approach was to secure the information shared between different people for transactions conducted in supply chains. In the same proposed approach, an agent system protects the information shared between various partners in a supply chain system. Besides, blockchain technology is now widely applied to develop the ranking and award system for those who are more active and proficient in their duties.

Marriage between value creation and financial aspect of SCM through Blockchain

In the last many years, researchers have developed useful insights into strategic and operational aspects of managing the supply chain. The ample body of knowledge provides information on the supply chain, but limited literature on value creation and its appropriation seeks the attention of industrial and academic researchers. On the other hand, the strategic aspect of SCM is focused on the efficient supply chain. The value creation is more specific to value addition in financial terms. Both, the operational and strategic aspects are contrasting to each other, but these are the essential components of supply chain management systems [2]. To bridge the gap between value addition and supply chain, available literature gives the idea of new designs of the architecture in supply chain networks. Recent research work extends the restricted supply beyond the various suppliers' tiers to cover the value chain. One of the designed architecture adds the value at all steps from the creation of raw material to delivery of a product through the concept of Blockchain.

Digital technology alone cannot meet the needs of the parties involved in the supply chain sector. To increase the vital importance of digital technology in the SCM, new trends have been thought and introduced. In the supply chain sector, sometimes business to business (B2B) integration is required that requires the secure exchange of information between two parties over the internet. To establish an end to end secure communication, third parties' services may be reduced by using the blockchain technology. Korpela et al. have focused on the integration of digital technology with the supply chain to enhance the security of transactions that occur between two parties [3]. Generally, blockchain technology is used to give cost-effective and secure transactions on the internet over clouds. This is aimed at fast transactions with the low-cost [4].

Blockchain deployment in other than finance sectors has widely experimented with different names. The supply chain is one of these sectors, which requires further attention to the comprehensive implementation of blockchain technology. The internet of things (IoT) applications are widely used and ultimately affect the supply chain. Some of the IoT applications include the barcodes, sensors, radio-frequency identification, GPS tags, and chips for tracking the products at each step in the supply chain. In line with the findings of a primary study by Casado-Vara, each role in the supply chain contributes to performing their responsibilities [1]. The prime need in SCM sector is to assign the appropriate role to each actor, and then monitor them to increase the efficiency and product. The value proposition is increased in SCM as product quality, and the appropriate location is measured through the blockchain technology. Now stakeholders can check whether the position of the product where it is placed in suitable or wrong. This checking of products is of great importance for refrigerated products. Keeping the refrigerated products away from a warm environment adds the value of a product in the perspective of its price and health risks.

In general, blockchain technology is focused on transactional ledgers for transferring the assets. An immutable and consensus-based ledger provide tracking of the products' transformation that undergoes in the supply chain. However, the most modern solution using blockchain technology executes the smart contract — for example, software stubs which are usually used to process an agreement automatically. In this regard, very complex systems that support the general purpose are executed. Ruta et al. used a basic blockchain to revise smart contracts for distributed execution and validation through consensus [5,6]. The same proposed approach worked well for the small and medium-sized supply chain. However, it showed limitations towards the large size supply chain. Overall, the proposed approach worked well and needed to ascertain experiments on the large size supply chain.

Conclusions

This paper presented an overview of the literature on SCM and blockchain technology. It is imperative that SCM would need blockchain to be more effective and transparent. The literature focused on this paper is discussed about value creation and addition through the blockchain technology. Before the introduction of blockchain technology in SCM, digitization of SCM brought revolution in SCM. This revolution in SCM could not provide full-scale security of information used in SCM. This paper covered that blockchain in this complex world is securing the information and then using the secured information for fast delivery of products. Secondly, blockchain technology covers the audit of all transactions made within the SCM sector. Besides, the safety of products within the supply chain is monitored by the applications of blockchain technology. Introduction of agents to create a collaborative framework for value addition is the emerging research area for future works.

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