

BENCHMARKING ANALYSIS; IMPLEMENTATION OF BLOCKCHAIN SYSTEM IN SUPPLY CHAIN MANAGEMENT OF VEHGRO B.V

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ABSTRACT

When adapted to logistics, technology of blockchain has the potential to significantly increase visibility all the way through global supply chains. As a consequence, it can improve goods tracking and provide data that cannot be altered to build trust among parties. Blockchain also ensures data security and transparency. This would contribute to the increasing demand for traceability in the food sector, as traceability has become a critical aspect in the field of food production as it ensures the quality and safety of the food product. The aims of this research is to analyze blockchain implementation and determine the implication of implementing a blockchain system in supply chain management, as well as to encourage VehGro to utilize blockchain in its supply chain in order to compete with its competition using benchmarking analysis. The study's investigation included both interviews and literature. The findings suggest that VehGro should implement private blockchain since it delivers various benefits to the organization. However, there are a few things that must be considered before implementing it.

Keywords: Blockchain, Supply Chain Management, Agricultural Food, Benchmarking Analysis

BACKGROUND

Blockchain is one of the most significant technological innovations in recent years (Sharma, 2021). Implemented in a wide range of fields, including social and legal industries, finance, smart property, and networks of supply chain. The blockchain concept has appeared as a technology which support the field of virtual money for the first time (Nakamoto, 2008). Bitcoin, which was created by Nakamoto in 2008, was the first blockchain platform. Bitcoin, in particular, is a decentralized ledger that enables users to keep accurate record transactions involving cryptocurrency, also known as virtual currencies (Swan, 2015). The main distinction among blockchain and another type of distributed ledgers is that rather than relying on third parties, new transactions are recorded on the blockchain as a result of network participants accumulating them and inserting them into blocks for validation (Christidis and Devetsikiotis, 2016). There is no need for a third trusted party, this system ensures the immutability and integrity of data. In addition, businesses and industries could benefit from a decentralized and transparent transaction system provided by the blockchain technology.

The supply chain is an interconnected network of entities, tasks, resources, people, and relevant data. A major shift in business management techniques, supply chain management encompasses the entire material, logistics, service, and information flow from suppliers to manufacturers or service providers to the final customer. It is one of the most effective methods for companies to enhance the quality of their performance. Supply chain collaboration and communication are critical components of supply chain success (Zhu et al., 2018).

Supply chain management has become an important competitive advantage, and various technologies, The Internet of Things (IoT), 5G, cloud computing, Edge/Fog computing, and data science, among other technologies, have improved digital capabilities in the supply chain's various organizational layers. This digital initiative is essential in pursuing the integration and standardization of the supply chain system. Furthermore, the focus of supply chain research is

shifting to blockchain systems (SC). By permitting faster and more cost-effective product delivery, enhancing product traceability, improving partner coordination, and making financing more accessible, it is possible that blockchain would have a significant impact on improving the supply chain. Smart contracts can insert transactions into the blockchain ledger, resulting in an order process that is extremely optimized (Hasan et al., 2019; Martinez et al., 2019). It is also important to note that each participant in the blockchain has their own unique digital signature, or identifier. The transaction is then recorded as a token transfer from one participant to the next on the blockchain. It is the primary function of the blockchain in cryptocurrency networks intended to replace fiat currencies, allowing an infinite number of anonymous parties to interact anonymously and securely with each other without the need for a central intermediary. Its goal is to protect the operations of a small number of well-known parties from malicious actors while also improving the efficiency of the supply chain. Additionally, blockchain systems can be used to ship goods across borders without worrying about their origins or provenance being compromised due to certification issues (Choi, 2019; George et al., 2019; Spadoni et al., 2019). Successful supply chain blockchain applications will necessitate the introduction of new permissioned blockchains, new requirements for representing transactions on a block, and new system rules, all of which are currently in the works but will be required for success. Moreover, in this research the writer is tasked by his company coach, Mr. Kees Tesselhof, to assist VehGro B. V, an international wholesaler specializing in the import, export, and distribution of organic food and care products, which is planning to implement a blockchain system for supply chain management.

THEORITICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Blockchain

In its most basic form, blockchain is a new technology which can be described as a difficult-to-change shared list (Rogerson, M., & Parry, G. C., 2020). The blockchain is, at its core, a storage of data and technology access. Consequently, every "block" stores a restricted collection of data and transactions, while the "chain" connects all of the blocks together in a specific order. A computer network serves as the foundation for the chain, which is a distributed electronic ledger or entry list maintained by users or participants. The current dataset is obtained by following the chain from the first to the (current) last block and resolving the transactions in each block. Thereby, not only the current dataset, the blockchain contains also the entire transaction history (Verhoeven, P., Sinn, F., & Herden, T., 2018). In other words, Blockchain is, at its core, a distributed database system that secures transactional data or other information and is governed by a consensus mechanism. (Swan, 2015).

Supply Chain Management

A supply chain is a network of partners work together to produce raw materials (upstream) into finished goods that are valued by customers (downstream) while managing returns at each level (Harrison, A., & van, H. R. I., 2011). In another sense, the term "supply chain" refers to a network of businesses that are involved in a variety of processes and activities that generate value and deliver it to the end user via upstream and downstream links in the form of goods and services (Christopher 1992). When it comes to supply chain management (SCM), everything from raw material production to customer purchases to can recycling is included (Harrison, A., & van, H. R. I., 2011). According to the literature, supply chain development will be the future foundation of competition in many industries. Supply chain analysis advocates for the elimination of non-core processes (waste) as well as the streamlining of the supplier and logistics networks (Das and Narasimhan, 2000). A company's ability to compete on price can be improved by making changes to the supply chain. When trying to make price-sensitive functional goods, this is especially important (Fisher, 1997). To reduce uncertainty in demand and lead times, supply chain systems can be streamlined. Customer service can be improved, enhancing the company's competitiveness. Supply chain competition has evolved from direct competition between companies to supply chain competition (Vickery et al., 1999; Monczka and Morgan, 1996).

Blockchain System in Supply Chain Management

To allow faster supply chain transactions and reduce administrative and order delivery times, the use of the blockchain system should be adopted (Kshetri, 2018). In managing the supply chain, there are P- and D-time. P- and D-time have an impact on one another. If P- time exceeds D-time, delivery may be delayed. One application of the BC system is to shorten the time it takes to deliver orders. Delivery delays are frequently caused by slow manual administrative processes; in this case, tracking and correcting a problem in a timely manner is made possible by the BC system and is dependent on reliable data access. They also allow for the secure digitalization of these documents, which speeds up the shipping approval processes and may result in faster delivery times. Moreover, the BC system reduces the delivery time by managing the P-time as well. For P-time, the BC system tracks the supply from the supplier, allowing the company to know the details of the supply's arrival so that they are already prepared to produce when the supply arrives, allowing them to estimate whether they will be able to complete the order in time for D-time. Having shared a distributed ledger with other network actors makes it possible to track the progress of several orders at the same time (Chang et al., 2020), increasing trust among partners. Furthermore, because each network participant can conduct its own checks and orders are governed by smart contracts, eliminating intermediaries allows for cost savings. (Hasan et al., 2019).

Blockchain solutions provide network participants with visibility and transparency; hence, even if the entities do not trust one another, the technology controls the guarantee of safety and reliability, enhancing customer satisfaction with the final product (Schmidt and Wagner, 2019). Blockchain system acts as an anti-counterfeiting tool by authenticating and certifying products, thereby protecting the product's origin and provenance (Bai and Sarkis, 2020). Furthermore, the usage of the blockchain system is intimately tied to the SC's long-term improvement: a permanent and distributed ledger would allow for better control of the global food supply by knowing the quantity required by the market.

Benchmarking Analysis

Comparing a company's business processes and metrics to industry bests and best practices is known as benchmarking. The most commonly used measurements are those of quality, timeliness, and price. While benchmarking can have many different definitions depending on the context, compare among quantitative and qualitative elements, and the scope, a closer examination disclose that the essence is consistent. Benchmarking, according to the definitions above, entails identifying opportunities for advancement and searching for best practices (both within and outside the industry), and then adapting and standardizing these best practices to address the organization's processes and priorities in a systematic, organized, and standardized manner (Panwar, A., Nepal, B., Jain, R., & Prakash Yadav, O., 2013). When we're competing, we have to compare ourselves to our rivals. With no market data, we'd have no idea if we're better at any given task than our competition (Jurevicius, O., 2021).

RESEARCH METHODOLOGY

The purpose of this research is to analyze the implementation of blockchain system and encourage VeGro to implement blockchain system in its supply chain management by compare it to its competitor using benchmarking analysis. Therefore, this research will use qualitative approach that collect primary data and secondary data to answer the research question and to deepen researcher's understanding about the topic. This research is being conduct by the researcher in order to make implementation plan for VehGro in order to compete with the competitor.

Primary data will be collected through firsthand sources such as interviews. The author will conduct an interview with blockchain expert for gain knowledge about blockchain system in supply chain management in general. The interview questions will be presented as a half-structured question in order to gain in-depth knowledge about the research topic. The author will also create a transcript of the interview and analyze it in order to get a decent understanding on the subject matter of the company's current supply chain system and their perspectives on blockchain

technology. Secondary data will be compiled from secondary sources such as company website, company report, public literature studies, articles, journals, books, and websites, as well as previous studies or research on blockchain in the agricultural food supply chain. Blockchain, supply chain, food supply chain, agri-food sector, organic beans, IoT, RFID, and benchmarking analysis are some key words that have been used in various combinations to retrieve relevant articles in various search engines. The titles, abstracts, and conclusions of the articles used in this study were chosen based on their relevance to the topic of this study.

RESULTS AND DISCUSSION

Policy

In this section, the author will make a few suggestions and recommendations to remedy the problem, which should be in line with VehGro's preferences. These recommendations could be used by other companies in the same or a different industry that desire to use blockchain in supply chain management. Suggestions are based on current technological advances and the present state of blockchain adoption at the time the author wrote this research.

The first suggestion would be, VehGro is recommended to implement private blockchain in its supply chain management because VehGro itself is a private company and using private blockchain gives VehGro easier to store and maintain the data. However, before implementing the blockchain system, the organization must first prepare the necessary items. Determine why the organization wants to adopt blockchain because the system itself is complex and expensive. As a result, it may save time and money. Gathering as much blockchain knowledge as possible is also important since it will assist the organization in determining which type of blockchain is ideal for the firm. Then, it is recommended that VehGro cooperate with a group of students from an IT related study or with an actual developer who can design the blockchain for the execution of this private blockchain. However, if VehGro is still unsure about the budget and the uncertainty that implementing this would bring in its supply chain, VehGro's blockchain system should be ordered through IBM rather than directly from the company. IBM (International Business Machines) discovers, designs, and develops breakthrough information technology, which it then converts into value for its clients through consulting services.

Limitation

The author acknowledges that there are limitations to this research. Due to the conditions, the author can only provide theoretical aspects of implementing blockchain and how blockchain could improve supply chain management rather than conducting interviews with VehGro and Unilever. If an interview was possible, the author would learn more about the practical element. Furthermore, the author lacks experience with IT systems, raising doubts on the author's implementation plan's success rate for VehGro. Lastly, there is a time constraint in conducting this research. More in-depth research on the use of blockchain in the food supply chain is possible if there is more time to write this research.

CONCLUSION

VehGro is an import, export, and distribution corporation specializing in organic food and natural care goods. The objective of the company is to treat customers and employees fairly and with respect, and to distribute items that are as organic, clean, natural, sustainable, fairly traded, and of high quality as possible. As a result, traceability has been identified as a critical factor for their organization and any other companies participating in the food supply chain. Mr. Michel Groothuis, CEO of VehGro B.V., said that there is an increased demand from their consumers to know more about the products they are purchasing. Furthermore, the lack of inventory information enhances to VehGro's urgency in resolving this tracking issue. Various people believed blockchain technology could be the solution to this problem, and the technology has been investigated by many researchers to offer promise benefits to the food supply chain, notably in enhancing traceability.

Given its structure and method of operation, blockchain provides a number of advantages that a traditional database cannot easily or at all replicate. The primary distinction between blockchain and traditional databases is that the former is based on the idea of decentralization, from which the majority of its benefits come. As a result of its decentralized nature, the technology dramatically improves transparency, collaboration, and trust among the various parties participating in the supply chain. Not only that, blockchain also provides security. Since the quality and authenticity of a product are dependent on precise product information, blockchain can be useful in protecting records and data while eliminating the risk of hacking and data theft. It also safeguards data's originality and validity by allowing authorized individuals the same ability to post and review data. This prevents any related stakeholders, in the instance of VehGro, from trying to rewrite history and avoiding responsibility. Blockchain helps the company to know the information of the supply's arrival as well as track the goods that they have already sent. As a result, the inventory will be automatically updated. Despite of the advantages of blockchain, this system still has its flaws. The significant disadvantage of Blockchain is its high energy consumption. Even though blockchain reduces administration costs by using less paper, power is consumed each time a new node is established and communicates with each and every other node in order to maintain a real-time ledger. Challenges also faced while implementing blockchain. One of the most common challenges that first-time blockchain implementers face is a lack of initial capital. Capital has always been the most difficult barrier for any company looking to begin implementing blockchain. In the other hand, with the growing popularity of blockchain, there will be a large number of people willing to invest. Besides that, each type of blockchain has its own set of challenges due to inherent flaws. Nonetheless, the blockchain system has immense potential to solve the VehGro problem as mentioned on paragraph above. The author believes that incorporating the blockchain system in the VehGro supply chain will help the company grow and compete with competitors that already utilize the blockchain system.

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