

THE IMPLEMENTATION OF BLOCKCHAIN WITHIN SUPPLY CHAIN TRACEABILITY OF ORGANIC COFFEE BEANS BETWEEN THE FARMERS AND THE COMPANY: A CASE OF VEHGRO B.V

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ABSTRACT

Blockchain is an advanced technology that starts implemented in many factors, such as economy, business, health, etc. In specific, blockchain can also be implemented in the supply chain, which can help the company improve its performance and trust its stakeholders. Furthermore, it will help increase the controlling system for safety and quality of the product, where it becomes customer's attention because numerous food incidents and accidents in recent years have driven an increase in the need for traceability. The blockchain brings the solution to traceability. This research paper aims to convince VehGro to implement blockchain in its traceability system by providing the opportunities and challenges of blockchain. Then, how this system works in supply chain traceability between the farmers to VehGro. The research method will use an interview with some experts in blockchain and supply chain, and also a literature review to complement the research.

Keywords: Blockchain, Supply Chain Traceability, Food Safety, Organic Food

BACKGROUND

A supply chain is a system composed of many enterprises, and based on information flow, it is also responsible for the circulation of products from the manufacturer to the customer (Leng et al., 2018), which includes different activities, people, entities, information, and resources. It represents the steps to get the product or service from its original state to the customer. In addition, the supply chain is a business network with value-added because its information, logistics, and capital flow are involved. Currently, a supply chain has changed from traditional to digitised (Jabbar, S. et al., 2020). Besides, sustainability in supply chain implementation turns into a significant challenge to keep safety and quality along the food supply chain. Because of foodborne illnesses are usually infectious and are also influenced by bacteria, viruses, parasites, or chemical substances entering the body through contaminated food (WHO, 2007).

The increasing of consumers' concern about keeping safety and quality of the food makes some companies try to looking for the best services and accuracy in providing data, which means every product can easily track and trace, which related to the traceability to the production process. In addition, traceability is a tool to improve food safety and quality monitoring to increase consumer trust (Kher et al., 2010). Traceability has been introduced by many different meanings, which can be the history of a product (Regattieri et al., 2007). Furthermore, digital technologies can become a solution because nowadays they have enhanced efficiency and resilience, which can help the company to improve its supply chain performance (Govindan et al., 2018; da Silva et al., 2018; Yu et al., 2018). The companies used digital transformation involve fundamental changes in the business process (Hagberg et al., 2016) and information exchange based on digitality (Berman, 2012; Frank et al., 2019). Using technology also helps in reducing supply chain risks and supply uncertainties (Bag, 2017; Büyüközkan and Göçer, 2018; Khan et al., 2019).

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In recent years, blockchain has become the system primarily used by companies. This system is currently growing rapidly and has many benefits for many users. Blockchain is the distributed networks can improve information traceability by providing information availability and accuracy, also reducing supply chain risks (Wang et al., 2020). It also can be defined as a digital, decentralised, and distributed ledger in which transactions are logged and added in chronological order to create permanent and tamper-proof records (Treiblmaier, 2018). By implementing the Blockchain system-based traceability supply chain recently positively impacted the company. Blockchain systems have become a technology that is widely adopted and preferred (Parker et al., 2016; Constantinides et al., 2018; Choi et al., 2020a).

VehGro will be the central point of this research. VehGro is one of the companies engaged in organic products located in Hengelo, the Netherlands. This company was established in 2012, and its founders are André Vehof and Michael Groothuis. VehGro's business covers importing, exporting, and distributing high-quality natural food. They are also a wholesale centre for organic products such as sweeteners, natural salts, herbs and spices, beans and cereals, teas, etc. Although VehGro already has a good whole supply chain, the writer wants to research how the Blockchain system can implement in their supply chain traceability. It will be focusing only on the organic coffee beans supply chain for the farmer to the company, VehGro.

THEORITICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Blockchain

Blockchain is one of the advanced technologies which have become a trend in business because of its advantages, it uses a shared data infrastructure that updates automatically in real-time (Pilkington, 2016). It does not need a third party to process and settle transactions, it only needs minutes by using computer algorithms. In addition, it provides transactional, distributed ledger functionality which can operate without the need for a centralised, trusted authority (Bhardwaj et al., 2018). Basically, this system allowed everyone to join and one of the key characteristics that make the blockchain system so appealing to the general public is that it is decentralised by nature. It is built on the P2P (Peer to Peer) network concepts. There are no dedicated servers or a single authority; instead, users must agree. The thing that needs to be authorised is that when users join the blockchain, they only need to verify their data (digital identity verification). After users get authorization, they can participate in blockchain activities. Therefore, it can be concluded that a distributed network's blockchain is a complete and permanent history of network operations that is shared among all nodes. Blockchain also can be defined as a public ledger of all completed or digital transactions that may be verified at any moment in the future and shared among participating parties (Schneier et al., 1998).

Supply Chain

The supply chain is a key sector for businesses that deal with getting things from one place to another. It is the whole process from primary commodities until the final product, which is ready to sell to the end customer and to recycle the used product. The supply chain is a network of organisation that are involved in the various processes and activities that produce value in the form of products and services provided to the end consumer via upstream and downstream links (Christopher 1992). Supply Chain Management (SCM) encompasses suppliers, manufacturers, distributors, and retailers. Financial and information frameworks are connected to these four elements, requiring constant performance analysis, monitoring, and improvement (Yildiz and Ahi, 2020), where is including the designing and management, coordination, and partnership with the

network, which involves sourcing, purchasing, transformation, and all logistics management activities (Supply Chain Management Professionals' Council, 2009).

Implementation Blockchain on Supply Chain

Blockchain can be implemented in many sectors because its system enables information sharing security, monitoring of product quality and operation, real-time data, transparency and visibility (Azzi, Chamoun, & Sokhn, 2019; Frizzo-Barker et al., 2020). Furthermore, blockchain can be used to track who is doing what (Alam, 2016). In addition, valid and accurate measurement of outcomes and performance of major supply chain management operations is made possible by blockchain. The inputs tracking data are immutable once they are on a blockchain ledger. But, if there are mistakes in the data, the users can change the data by adding new data to revise the previous data, where they can add an explanation if the previous one is false and changed with the new one (Janse, A., 2022). The blockchain produces trust among suppliers. Efficiency can be increased and costs can be reduced by eliminating middlemen auditors. On a near-real-time basis, individual providers can undertake checks and balances (Koetsier, 2017), because shipments, deliveries, and progress may all be tracked by other suppliers in the chain. In addition, the time and location of the actions can be determined (Alam, 2016).

Traceability

Traceability is known as the “one step back one step forward” principle, whereas its ability to recognize the source of food’s ingredients and the origin of food product’s information (International Trade Centre, 2015). Traceability also can be defined as an ability to identify and trace the history, distribution, location, and application of products, parts, and materials, to ensure the reliability of sustainability claims, in the areas of human rights, labour (including health and safety), the environment, and anti-corruption, according to the United Nations Global Compact and Business for Social Responsibility (2014). Moreover, it also an aspect that concerns the company, because it is important for a company to know about the process and a whole chain from raw material to the product is sold. It has become a vital tool in a wide range of fields and sectors. Besides, traceability is also a matter for accounting where there will be differences between theoretical and practical things. Because in a real situation, sometimes there will be some obstacles in its implementation and it will change the report and sometimes it makes a cost.

RESEARCH METHODOLOGY

The researcher needs in-depth responses about how blockchain is being implemented in the supply chain traceability of organic coffee beans, which will assist VehGro in determining the benefits and drawbacks of implementing blockchain in their supply chain. This research will conduct the interview, which involves the perspectives of several experts and the company itself. Furthermore, an exploratory study is the most appropriate for this research. Hence, a combination of interviews and literature will be used in this thesis.

The interview method will be used to acquire primary data in this study. The writer will interview the CEO of VehGro. There will also be interviews with an acquaintance of blockchain experts and supply chain experts.

Secondary data can be gathered by searching the literature for relevant information, data, or knowledge. As literature, the writer consults search engines, articles, journals, theses and dissertations. Then, journals and publications included in this study must have been published between twenty years in order to provide the most accurate and relevant

data, because technology and data are continually evolving and the data should be as current as feasible. Otherwise, it is irrelevant and ineffective.

RESULTS AND DISCUSSION

Policy

In this part, the author will offer a few suggestions and recommendations for addressing the problems, all of which should be compatible with VehGro's preferences. Other companies in the same or different industries that want to use blockchain in the supply chain could benefit from these recommendations. Suggestions are based on current technological breakthroughs and the present state of blockchain adoption when this research has written. The company needs to improve its system to increase its company performance. One of the technologies that can be a solution is blockchain. This technology can apply to companies who want to enlarge their business; even if the company has moved to a digital supply chain, it is more advanced and different than the previous system. So, the company that applies blockchain can go up to one level. For instance, in this case, if the company is currently in the second level after applying the digital supply chain, it will upgrade to the third level after implementing blockchain. So, the stakeholders involved in the chain can be satisfied and increase their trust in each other.

VehGro is a private limited company in The Netherlands as a wholesaler of organic products. It has another depot in Germany, which is necessary to implement blockchain into their supply chain traceability because it will help them trace and track their products. The starting point is that this company should know what kind of blockchain should be implemented. The researcher suggests the company use a private blockchain because it is a private limited company. So, the company does not need to make a public network; instead, the stakeholder is from the farmer to the company, which means only half stakeholders are involved in the network. In addition, VehGro can join the IBM blockchain platform to guide them in implementing the blockchain and how it works in their system. In addition, this platform using Hyperledger Fabric as its framework – like the IBM Blockchain Platform – gives the company the flexibility to choose to keep the data private and which data is shared because IBM develops private and permissioned blockchain. They also provide steps on adopting blockchain even if the company is still hesitant to implement blockchain, and they can arrange an appointment to have a consultation with them. If VehGro is interesting in joining this IBM Blockchain Platform, some options can they choose within this platform:

1. Join an existing network

Joining an existing blockchain network is the quickest way to success, which means joining with the innovators who are transforming industries worldwide and adding value with blockchain. The benefits are that the company can independently build its solutions, co-create with IBM blockchain experts, and find new opportunities.

2. Build their own solution

A company that wants to enlarge its business and modernize its system can now build, operate, and grow on the IBM Blockchain Platform. This platform allows the company to develop entirely new, higher-value business models. In addition, this gives the dependability, easy to add other organisations in with different on-premises IT infrastructures, and the power to fulfil blockchain's promise.

3. Co-create company solution with IBM

IBM blockchain consulting services help the company creates a scalable, firm distributed system for the company's needs, based on a guaranteed network design

framework that increases operational agility while also generating new revenue streams. One of the benefits is that improving brand trust and sales with product authenticity can increase the product's legalisation.

4. Partner with others for new opportunities

The first joiner in the IBM blockchain platform usually needs others to help others release the true value. They can promote and enhance the existing members of the IBM Blockchain ecosystem. The benefit can access new audiences as an IBM Business Partner.

Based on these options provided by the IBM Blockchain Platform, the researcher suggests VehGro choose to build the company's solution or partner with others for new opportunities. Because by looking at the current condition of VehGro, where there are two stakeholders in the supply chain between farmers and VehGro, it is easier for VehGro to build its software by involving other stakeholders. For the second choice, VehGro can look for their stakeholder involved in the IBM Blockchain Platform. However, suppose there is no one of their stakeholders that joined this platform. In that case, VehGro can have a new partner with others to get a new chance to expand their business and introduce the products to the existing members in the IBM Blockchain Platform.

Despite this, there are some disadvantages to using the blockchain system. One of them is human resources, because of their capability, sometimes it is too hard to adapt with the new system. Therefore, they must quickly adapt and learn this system if the company is to implement blockchain. However, it can be prevented if the company gives training in advance before blockchain enters the system. In addition, integrity is important. Sometimes, people can still lie when inputting the data. So, it needs other people who double-check or have proof before the data is input into the system. Because blockchain has characteristic immutable data, the data that will be input should be correct, and even the user can still revise the mistakes by inputting the new one. Additionally, there are no specific laws and regulations about blockchain itself, but it will adjust according to the existing law. It is also one of the reasons why the company is hesitant to adopt blockchain in the system.

Nevertheless, as long as the country allows anyone to use blockchain, the company can decide to use the blockchain system. It is also important to realise that blockchain implementation will take time and much effort. Moreover, the company will struggle to upgrade the new IT system and convince the people, including the employee and the other stakeholder. However, it will be worth it when the company can succeed by adopting blockchain into its supply chain traceability system. It will help the company increase the controlling system in tracing and tracking the products, organic coffee beans. In addition, VehGro also monitors the quality of the organic coffee beans and how well the quality of the product is shipped to the company. It can also reduce the trust issue between stakeholders because, with the transparency network, all members involved in the system can access the data anytime and anywhere. They can track the input and also the output of the product. Nonetheless, the parties involved in the system should understand how the blockchain works.

Limitation

The researcher acknowledges limitations while conducting this research; the first limitation is any technical issues. The author can only provide the primary data, which is about VehGro, through the previous report made by fellow students in 2019. So, the researcher cannot get accurate data compared to directly interviewing the CEO of VehGro. Hence, some questions are answered using the assumption of the researcher. Second,

because the author lacks the knowledge to propose a new supply chain system and how it will work, the author can only provide the theoretical aspects of integrating blockchain and how the technology might improve supply chain traceability. Third, blockchain technology is relatively new. Although some companies have already implemented the blockchain into their system, there is no strong evidence to convince the other companies who are not using the blockchain yet. Lastly, there is a time limit in conducting this research. If there is more time to write this research, the researcher can do more in-depth research on the application of blockchain in the organic coffee beans supply chain traceability.

CONCLUSION

VehGro B.V. is an organic ingredient importer and supplier of natural ingredients and semi-finished products. Additionally, this company upholds sustainability and transparency. Every company wants to bring their business to enter the global, which means the company will enter the global supply chain and it will become the biggest challenges for this industry to ensure safety, lower fraud, and keep low operating costs. VehGro has entered a global supply chain, which is they get the beans from the importer, where they will get many beans from various farmers in many countries. Therefore, they should improve their system, which simplifies their work and recording of the transaction or their database systems. Blockchain can help them to increase their system because blockchain reduces the complexity of ordinary transactions, because, with single, shared – once recorded, transactions cannot be changed and reduces paperwork will speeding up the transaction times and efficiencies.

The research is about which measurements that can help VehGro improve product quality and traceability of product, organic coffee beans. Since the researcher did not get the information from the company and did not know what is happenings in the company, what kind of problem that faced by the company regarding the organic coffee beans supply chain traceability between the farmers and VehGro. The researcher will use zero-measurement because there is none available on which level that it must be improved, so the researcher will make a starting point of the improvement in organic coffee beans supply chain traceability. It can be measured by seeing how the organic coffee beans can be tracked and traced easily from the farmer to the VehGro.

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