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Needs

Currently, the increasing importance is given to food safety and integrity that ensure handling, preparing and storing food in ways that prevent **foodborne** illnesses, as well as the fairness and authenticity of food in the value chains both materially and digitally.

Due to the globalization, agriculture management is becoming more complex, the **documentation**, along with copies for all other involved parties, increases the transaction processes that makes it challenging to understand the origin of products [5]. Furthermore, the increased number of intermediaries and human labor rises the risk of fraud or mistakes.

Moreover, **counterfeiting** activities and fake products are growing in open market [6]. A numerous transparency and efficiency issues in agricultural supply chains ultimately put farmers and consumers at a disadvantage.

Additionally, consumers demand desired products in a **shorter notice**.

Last but not least, there is increased problem of **information asymmetry and miscommunication** among stakeholders caused by longer supply chains [7]. Therefore, it is crucial to note that, the informational transparency of these processes is required in order to ensure trustworthiness of the products, as well as the effectiveness of all the elements that play part in the process [8].

Benefits

BCT increases the notion of trust and improves the efficiency of agricultural development [9].

Through decentralization, trustworthiness and collective maintenance it ensures a reliable, entirely transparent and secure register of well-systemized data for productive analysis on a **real time** basis with no need of intermediaries and central authorities [10;11].

BCT is recognized as a significant tool to solve the problems related to faulty, **fraud** and adulteration [12]. Interested parties can track and trace all the relevant information regarding the product. That makes easier for manufacturers to identify the weak points or causality of faulty; and for regulators to verify if the product meets the standards.

Moreover, it earns customer confidence and facilitates making **informed** purchasing decision, thus, reduces risk of **foodborne** diseases.

In the Blockchain system, all the data is stored in unique shared database, so there is no more problem of **information asymmetry and miscommunication** among stakeholders. Thanks to this digital database, a recall progress in BCT helps to define if along supply chain, there is passed and used the correct information. It simplifies to trace contaminated products to their source **quickly**, allowing faulty items to be removed from stores to minimize both **illness** and financial losses.

Introduction

BCT originally designed for crypto-currency has found great response in many other areas. The aim of the paper is summarizing the needs of BCT adoption in the supply chain; the benefits that it can bring to the agricultural sector; the difficulties and future prospective associated with BCT deployment.

Methodology

To achieve the research purpose, the article methodology goes through the SLR. The literature analysis distributes the key concepts and advances in the research on related topics and generates new knowledge [1;2;3]. Properly used empirical analysis holds a potential to design the research in a way to address important issues and provide transparent and reproducible answers [4].

Limitations

Lack of privacy – that is lead by transparency.

The security model - once the private key is lost or seized by robbery, there is no way of recovery.

Limited scalability – using the hush function results in low processing speed and therefore limited scalability.

High costs - Computing the hush is expensive in terms of electricity and money.

Hidden centrality - there is a huge disparity in terms of hardware capability that results in speed of hash calculation. In such cases, the remaining group may act with conspiracy and the hidden centrality may take place.

Lack of flexibility - BCT consists of a number of pre-defined rules.

Attacks (Double-spend attack, 51% attack, Race attack, Finney attack, Block Withholding Attack, Eclipse attack, Denial of Service (DoS) attack, Sybil attack, Routing attack, Vector76 attack, Brute-Force attack, Bribery attack, Tampering, Botnets etc.)

Technological barriers - adopting BCT requires more experts in the field and fundamental changes in the system

Interoperability - for reaching its maximum benefits, BCT needs the whole industry, banking system, government to use this technology. Moreover, may occur the problem of interoperability between different BCTs. Additionally, the **legal aspects** should be discussed. [13;14;15]

Future prospective

Despite the **attacks** described above, the concept of BCT is strongly associated with safety and security. BCT is resilient enough towards attacks to continue operating normally [16].

In order to combat with **privacy** issue, so called off-chain solution can be used.

The establishment of unique Blockchain standards can be helpful for the problem of **interoperability**.

As for the issue of the **technological barriers** and **legal aspects**, these are the essential components of all stages of development. Consequently, the better study of this technology, refinement of its certain functions and simultaneously consideration of its capabilities in the regulations may be a way to overcome described limitations.

Thus, with the time and working on it all above-mentioned limitations can be conquered – changing the structure and algorithm of BCT, giving more education to users, writing down new/adapted regulations, establishing the unique standard, etc.

Results and Conclusion

The results showed that current agri-food supply chains deal with number of inefficiencies. There is a problem of "paper documents", as well as tracking the product that on the one hand increases the risk of counterfeiting and on the other hand makes difficult to call back falsified or harmful product from market in time. In many cases this causes people to get sick. In addition, there are often problems with reliability or even access to information.

The paper demonstrated the capabilities of BCT to eliminate these problems and to modernize the agri-food supply chain. It provides a transparent system that collects, stores and transmits data in a secure way and that is maximally protected from any kind of fraud. At the same time, it accumulates the necessary information and delivers it to the interested party in a short notice. Consequently, it reduces the costs associated with identifying falsified or harmful products and removing them from sale.

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Figure 1. Tracing Wine with Blockchain Technology

