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Supply Chain Management in Agriculture Using Blockchain Technology

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Abstract: *Block chains, now firmly established, are a digital system that combines data management, incentive systems, cryptography, and networking to enable the execution, recording, and verification of transactions between parties. Even while the original goal of block chain technology was to facilitate new forms of digital currency that would enable easier and more secure payment methods, they have enormous promise as a new foundation for all kinds of transactions. Agribusiness stands to gain a lot from this technology by leveraging it as a platform to conduct "smart contracts" for transactions, especially for high-value goods. Before we go any further, it is important to distinguish between distributed ledgers and block chain technologies and private digital currencies. Given the distributed and global character of digital currencies such as Bitcoin, it is improbable that central banks will be able to adequately oversee the underlying protocols. Monetary authorities are primarily concerned with understanding the "on-ramps" and "off-ramps" that comprise the links to the traditional payments system, rather than being able to monitor and manage the money itself. In contrast to the digital currency component of the block chain, the distributed ledger aspect holds great potential for application in trade and agriculture funding, especially in scenarios where multiple partners are involved and a dependable central authority is lacking.*

Keywords: Advanced Encryption Standard, block-chain

I. INTRODUCTION

Given the distributed and global character of digital currencies such as Bitcoin, it is improbable that central banks will be able to adequately oversee the underlying protocols. Monetary authorities are primarily concerned with understanding the "on-ramps" and "off-ramps" that comprise the links to the traditional payments system, rather than being able to monitor and manage the money itself. In contrast to the digital currency component of the block chain, the distributed ledger aspect holds great potential for application in trade and agriculture funding, especially in scenarios where multiple partners are involved and a dependable central authority is lacking. Since they demonstrate that existing strategies for fostering transparency and trust have not been able to address or, in some cases, have made the problems of low transparency and trust in agri-food chains worse, these informational challenges pose a severe threat to food safety, food quality, and sustainability. The integrity of food in particular has become a major issue. In food value chains, food integrity pertains to the authenticity and fairness of food at both the physical and digital layers. It is anticipated that the digital layer would provide dependable and trustworthy information on the provenance and origin of food items at the physical layer. Blockchain technology provides a means of ensuring the durability of documents and could facilitate data sharing amongst many participants in the food value chain. This idea could lead to an exciting paradigm shift that ensures food integrity and fosters transparency and trust in food networks.

II. RELATED WORK

Agriculture Supply Chain Traceability of Soybeans By means of Blockchain, Raja Jayaraman, Nishara Nizamuddin, Khaled Salah, and Mohammed Omar additionally With a high degree of integrity, dependability, and security, the recommended method—which was published in IEEE Access (Volume: 7)—improves efficiency and safety by doing away with the need for intermediaries, centralized authority, and transaction records. The recommended approach

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focuses on using smart contracts to control and oversee all communications and exchanges between all stakeholders involved in the supply chain ecosystem. All transactions are documented and maintained thanks to connections to an immutable blockchain ledger and a decentralized file system (IPFS), providing everyone with access to a high degree of traceability and transparency into the supply chain ecosystem in a secure, dependable, and effective way. Integrating blockchain-driven traceability into the real-world agri-food supply chain Massimo Vecchio, Miguel Pincheira Caro, Raffaele Giaffreda, and Muhammad Salek Ali 2018 IoT Vertical and Topical Summit on Agriculture (IOT Tuscany) printed in In this article, AgriBlockIoT—a fully decentralized blockchain-based traceability system—is presented. It is designed to manage the agri-food supply chain by seamlessly integrating Internet of Things (IoT) devices that generate and use digital data along the entire chain. In order to appropriately assess AgriBlockET, we first created a conventional use-case inside the designated vertical area, specifically "from-farm-to-fork."Then, in order to ensure traceability, we built and implemented a use-case using Ethereum and Hyperledger Sawtooth, two alternative blockchain platforms. In conclusion, we evaluated and contrasted the installations' performance concerning latency, CPU, and network use, highlighting their principal benefits and drawbacks.A Dispersed Platform with Shared and Duplicate Bookkeeping for Agricultural Products Using Blockchain Provenance Mengzhen Wang, Fei-Yue Wang, Xiujuan Wang, Haoyu Wang, and Jing Hua Intelligent Vehicles Symposium (IV) 2018 IEEE In this work, we propose a blockchain-based agricultural provenance system that is characterized by decentralization, cooperative maintenance, consensus trust, and reliable data in order to tackle the trust problem in the supply chain for commodities. The recorded information includes the management actions (fertilization, irrigation, etc.) with a specific data structure. Tracking the provenance of agricultural goods with blockchain technology not only broadens its potential applications but also fosters a reliable network among the many stakeholders in the agriculture sector. A blockchain and RFID-based approach to China's food and agriculture supply chain tracking 16th International Conference on Service Management and Systems FengTian (ICSSSM) First, we look at the current state of development and application of blockchain and RFID (Radio-Frequency IDentification) technologies in this study.Subsequently, we scrutinize the advantages and disadvantages of employing RFID and blockchain technology in the development of the agri-food supply chain traceability system. Lastly, we showcase the process of system creation. Food safety can be efficiently guaranteed by obtaining, transferring, and sharing authentic data about agri-food in the production, processing, warehousing, distribution, and selling linksages. This will enable traceability with trustworthy information along the whole agri-food supply chain. Food supply security with blockchain technology The 2017 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM) featured a release by Bowen Zhang, Daniel Tse, Yuchen Yang, Chenli Cheng, and Haoran Mu. This article introduces blockchain technology, makes the case for its use to information security in the food supply chain, and compares it to the current supply chain architecture.

III. MOTIVATION

The last three years have seen a massive surge in interest in blockchain technology (BCT), with numerous companies and academic institutions focusing on the potential applications of this technology in a range of financial, industrial, and social domains. On the other hand, the technology has also been the subject of a great deal of exaggeration and hyperbole, which has created misconceptions and inflated expectations. Although BCT is still in its early stages of development, its commercial applications seem quite promising. Blockchain innovation is thought to challenge existing players in various industries through its applications, structures, and business concepts. It is often characterized by decentralized, open-source development.

IV. PROBLEM STATEMENT AND OBJECTIVES

The last three years have seen a massive surge in interest in blockchain technology (BCT), with numerous companies and academic institutions focusing on the potential applications of this technology in a range of financial, industrial, and social domains. On the other hand, the technology has also been the subject of a great deal of exaggeration and hyperbole, which has created misconceptions and inflated expectations. Although BCT is still in its early stages of development, its commercial applications seem quite promising. Decentralized, open-source development is often associated with blockchain innovation, which is thought to upend existing players in numerous industries through its applications, business concepts, and structures.

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V. SYSTEM ARCHITECTURE

A comprehensive process framework for the project is provided by a conceptual model called "system architecture". It describes each stage of the project's creation using a flow. Every step is explained in great depth. The system architecture is as follows: A hash value that acts as a record of each transaction that occurs in the system is contained in a block. When every block is connected to every other block, a virtual block chain is created. The hash value of a current block is created using the hash of the previous block and the data from the current block. In this way, the hashes of all subsequent blocks must be changed if one block is tempered. The many copies are stored across multiple servers, ensuring the confidentiality and integrity of the information. Since all transactions are made via an application interface, the management of the agricultural supply chain will continue to be transparent.

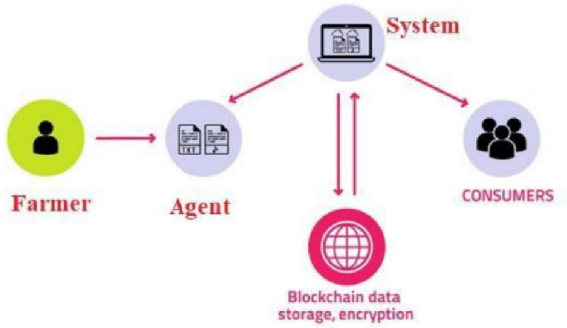

Figure 1: System Architecture

VI. FUTURER WORK

In the future, we'll look into government sponsorship so that we can carry out a large-scale project with some domain and hosting space online.

VII. CONCLUSION

We're planning to develop a Java web application prototype to implement BCT in supply chain management. We will implement blockchain features such as:

1. Disentanglement
2. The Hash Algorithm
3. A safe database.

Consequently, it is possible to monitor the agricultural supply chain and establish a minimum price for agricultural products.

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