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# Blockchain Deployment for Supply Chain Management in Agriculture

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**Abstract:** *As a digital system that integrates cryptography, data management, networking, and incentive mechanisms to allow the verification, execution, and recording of transactions between parties, block chains are now firmly established. Block chain technologies have significant potential as a new basis for all types of transactions, even though its initial purpose was to support new kinds of digital currency enabling simpler and more secure payments. By using this technology as a platform to carry out "smart contracts" for transactions, particularly for high-value products, agribusiness stands to become a primary benefactor. Prior to further discussion, it is crucial to make a distinction between private digital currencies and the underlying distributed ledger and block chain technology. Since digital currencies like Bitcoin are dispersed and international in nature, central banks are unlikely to be able to effectively regulate their underlying protocols. Instead than being able to monitor and control the money itself, monetary authorities are more concerned with comprehending the "on-ramps" and "off-ramps" that make up the linkages to the conventional payments system. Contrary to the block chain's digital currency component, the distributed ledger feature has the potential to be widely used in agricultural and trade financing, particularly if processes involve several partners and there is no reliable central authority.*

**Keywords:** Advanced Encryption Standard, block-chain (AES).

## I. INTRODUCTION

A growing lack of trust and the desire for more openness are reflected in society's need for more knowledge about food. The risk of fraud (selling untrained product with high-quality labels or claims) and adulteration is rising as a growing number of food and beverage items are branded and supported by a variety of certification systems. Currently, a large portion of compliance data and information is audited by reliable third parties and kept either on paper or in a centralised database. It is well known that these approaches have numerous informational flaws, including the high cost and inefficiency of paper-based processes, as well as fraud, corruption, and error both on paper and in IT systems. These informational issues constitute a serious danger to food safety, food quality, and sustainability since they show that current methods for promoting openness and trust have not been able to address or, in some cases, have made the issues of low transparency and trust in agrifood chains worse. Integrity of food in particular has grown to be a significant problem. Food integrity refers to the fairness and authenticity of food in food value chains at both the physical layer and the digital layer, with the digital layer being expected to give trustworthy and reliable information on the provenance and origin of food items at the physical layer. Blockchain technology offers a way to guarantee the longevity of records and may make it easier for different players in the food value chain to share data. This possibility may result in an exhilarating paradigm change that promotes transparency and confidence in food chains and guarantees the integrity of the food.

## II. RELATED WORK

Agricultural Supply Chain Soybean Traceability Using Blockchain, Mohammad Omar, Khaled Salah, Nishara Nizamuddin, Raja Jayaraman, and The suggested approach, which was published in IEEE Access (Volume: 7), does away with the need for middlemen, centralised authorities, and transaction records, improving efficiency and safety

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with a high level of integrity, dependability, and security. The focus of the suggested solution is on the use of smart contracts to regulate and manage all interactions and transactions among all parties participating in the supply chain ecosystem. With linkages to a decentralised file system (IPFS) and the immutable ledger of the blockchain, all transactions are tracked and saved, giving everyone access to a high degree of traceability and transparency into the supply chain ecosystem in a safe, dependable, trustworthy, and effective way. Implementing blockchain-based traceability in the Agri-Food supply chain in a real-world setting Massimo Vecchio, Raffaele Giaffreda, Muhammad Salek Ali, Miguel Pincheira Caro, and Printed in: Tuscany's 2018 IoT Vertical and Topical Summit on Agriculture (IOT Tuscany) This article introduces AgriBlockIoT, a completely decentralised blockchain-based traceability system for managing the agri-food supply chain that can seamlessly connect IoT devices that produce and consume digital data throughout the chain. We initially developed a traditional use-case inside the specified vertical domain, namely "from-farm-to-fork," in order to properly evaluate Agri BlockET. Then, utilising two alternative blockchain technologies, namely Ethereum and Hyperledger Sawtooth, we designed and implemented such a use-case to achieve traceability. Finally, we assessed and compared the installations' performance in terms of latency, CPU, and network utilisation, while also emphasising their key advantages and disadvantages. A Distributed Platform with Duplicated and Shared Bookkeeping for Blockchain-Based Provenance for Agricultural Products Mengzhen Kang, Jing Hua, Xiujuan Wang, Haoyu Wang, and Fei-Yue Wang 2018 IEEE Intelligent Vehicles Symposium (IV) In order to address the trust issue in the supply chain for goods, we suggest in this study a blockchain-based agricultural provenance system that is characterised by decentralisation, collaborative maintenance, consensus trust, and trustworthy data. The management activities (such as fertilisation, irrigation, etc.) with a certain data structure are included in the recorded information. In addition to expanding the application space for blockchain, using it to track the origin of agricultural products helps create a trustworthy community among various agriculture industry players. An RFID and blockchain-based solution for China's food and agriculture supply chain traceability 13th International Conference on Service Systems and Service Management, 2016, Feng Tian (ICSSSM) In this paper, we first examine how RFID (Radio-Frequency IDentification) and blockchain technology are being used and developed. We then examine the benefits and drawbacks of utilising RFID and blockchain technology in the construction of the agri-food supply chain traceability system, and we finally present the system's construction process. By acquiring, transmitting, and exchanging the genuine data of agri-food in the production, processing, warehousing, distribution, and selling linkages, it may achieve traceability with reliable information across the full agri-food supply chain, effectively guaranteeing the food safety. Security of the food supply using blockchain technology Bowen Zhang, Daniel Tse, Yuchen Yang, Chenli Cheng, and Haoran Mu released in 2017 Industrial Engineering and Engineering Management IEEE International Conference (IEEM) This article presents the idea of blockchain technology, argues for its use in the food supply chain's information security, and contrasts it with the established supply chain structure.

## III. MOTIVATION

In the past three years, interest in blockchain technology (BCT) has exploded, with many businesses and academic organisations concentrating on the possible uses of this technology in a variety of financial, industrial, and social areas. However, there has also been a lot of hype and hyperbole surrounding the technology, which has led to unrealistic expectations and misunderstandings. BCT is still in its infancy as a technology, but it has a lot of promise for commercial use. It is believed that innovation in blockchain architectures, applications, and business concepts is disruptive to established players in many industries and is frequently characterised by decentralized, open source development.

## IV. PROBLEM STATEMENT AND OBJECTIVES

In the past three years, interest in blockchain technology (BCT) has exploded, with many businesses and academic organisations concentrating on the possible uses of this technology in a variety of financial, industrial, and social areas. However, there has also been a lot of hype and hyperbole surrounding the technology, which has led to unrealistic expectations and misunderstandings. BCT is still in its infancy as a technology, but it has a lot of promise for commercial use. It is believed that innovation in blockchain architectures, applications, and business concepts is

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disruptive to established players in many industries and is frequently characterised by decentralized, open source development.

## V. SYSTEM ARCHITECTURE

A conceptual model known as "system architecture" outlines the project's overall procedure in detail. With the use of a flow, it outlines each phase in the creation of the project. Each and every stage is described in detail. Following is the system architecture: Every time a transaction takes place in the system, a block will contain a hash value that serves as a record of that transaction. A virtual block chain will form when each subsequent block is joined to the one before it. The data from a current block and the hash of the previous block are used to create the hash value of a current block. In this manner, if one block is tempered, the succeeding blocks' hashes must all be modified. These numerous copies are kept on several servers, guaranteeing the privacy and security of the data. The agricultural supply chain management will remain transparent because everything is done through an application interface.

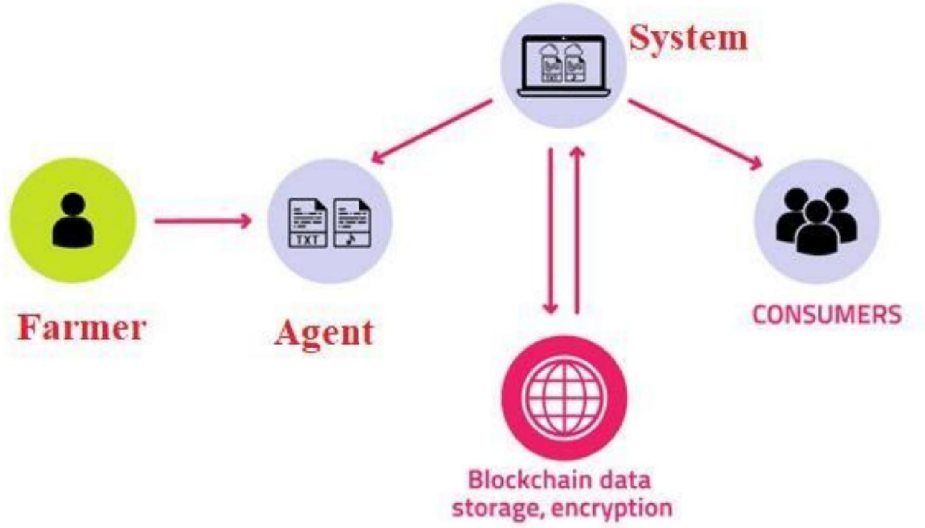


**Figure 1:** System Architecture

## 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

In order to apply BCT in supply chain management, we are going to create a prototype web-based software application in Java. We'll put into practise blockchain functions like:

1. Decentralization
2. Hash Algorithm
3. Secure database.

As a result, the agricultural supply chain can be tracked, and a minimum price may be set for agricultural goods.

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