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User Interface of Blockchain Based Agri Food Traceability Applications

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ABSTRACT: Blockchain is a new digital technology that enables pervasive financial transactions amongst scattered untrustworthy parties without the use of intermediaries like as banks. This article investigates the influence of blockchain technology on agriculture and the food supply chain, shows active projects and efforts, and evaluates general implications, obstacles, and promise, with a critical eye on project maturity.

Our findings show that blockchain is a potential technology for a transparent food supply chain, with numerous current activities in various food items and food-related difficulties, but there are still many limitations and challenges that limit its widespread appeal among farmers and systems. These difficulties include technological issues, education, legislation, and regulatory frameworks.

I. INTRODUCTION

1.1 BLOCK CHAIN TECHNOLOGY

A blockchain is a growing collection of documents known as blocks that are connected together via encryption. Each block contains the preceding block's cryptographic hash, a timestamp, and transaction data (generally represented as a Merkle tree). The timestamp demonstrates that the transaction data existed at the moment the block was released in order to be included in its hash. Because each block contains information about the one before it, they create a chain, with each new block strengthening the ones before it. As a result, blockchains are resistant to data tampering since, once recorded, the contents in any one block cannot be changed retrospectively without affecting all subsequent blocks. While blockchain technology gains traction and demonstrates its utility in a variety of cryptocurrencies, various organisations and other entities seek to leverage its transparency and fault tolerance to solve problems in scenarios where a large number of untrustworthy actors are involved in the distribution of a resource. Agriculture and the food supply chain are two major and very relevant domains. Agriculture and food supply chains are inextricably intertwined since agricultural goods are nearly always employed as inputs in some multi-actor dispersed supply chain, with the consumer as the end customer.

1.2 DIGITAL AGRICULTURE

Digital agriculture tools capture, store, analyse, and distribute electronic data and/or information digitally along the agricultural value chain. Other definitions, such as those provided by the United Nations Project Breakthrough, Cornell University, and Purdue University, stress the use of digital technology in food system efficiency. Digital agriculture, sometimes known as "smart farming" or "e-agricultural," includes (but is not limited to) precision agriculture. Digital agriculture, as opposed to precision agriculture, has an influence on the whole agri-food value chain before, during, and after on-farm production. As a result, on-farm technology like as yield mapping, GPS guiding systems, and variable-rate application are classified as precision agriculture and digital agriculture. Digital technologies used in e-commerce platforms, e-extension services, warehouse receipt systems, blockchain-enabled food traceability systems, tractor rental apps, and other applications, on the other hand, fall under the banner of digital agriculture but not precision agriculture.

SUPPLY CHAIN

Smallholder farmers supply raw ingredients to many agribusinesses and food processors. This is especially true in specific industries, such as coffee, chocolate, and sugar. A move toward more traceable supply chains has occurred. Firms are now procuring directly from farmers or trusted aggregators rather than acquiring commodities that have travelled through numerous levels of collectors. Concerns about food safety, child labour, and environmental sustainability, as well as a desire to boost production and crop quality, are driving this shift.

1.3 BLOCKCHAIN IN AGRICULTURE AND FOOD SUPPLY CHAIN

While blockchain technology gains popularity and demonstrates its utility in a variety of cryptocurrencies, various organisations and other entities seek to leverage its transparency and fault tolerance to solve problems in scenarios where a large number of untrustworthy actors are involved in the distribution of a resource. Agriculture and food supply chains are inextricably intertwined since agricultural goods are nearly always employed as inputs in some multi-actor dispersed supply chain, with the consumer as the end customer.
Several efforts have been discovered in which blockchain technology may be utilised to tackle real-world practical challenges in the agricultural supply chain. A keyword-based online search was conducted to discover related projects.

II. LITERATURE SURVEY

2.1 EMERGING OPPORTUNITIES FOR BLOCKCHAIN APPLICATION IN THE AGRI-FOOD INDUSTRY

The designations used and the presentation of material in this information product do not imply the expression of any opinion on the part of the Food and Agriculture Organization of the United Nations (FAO) or the International Centre for Trade and Sustainable Development (ICTSD) regarding the legal or development status of any country, territory, city, or area, or its authorities, or the delimitation of its frontiers or boundaries. The naming of specific firms or goods of manufacturers, whether or not patented, does not indicate endorsement or recommendation by FAO or ICTSD over others of a similar sort that are not mentioned. Humans are continually exchanging value all around the world, regardless of economic development level. The transfer of value is a fundamental human activity that allows individuals to exchange commodities and services while also accumulating productive capital and saves for their future well-being. Institutions are employed to ensure trust and limit risk between buyers and sellers in order to reduce uncertainty during the exchange of value.

2.2 SUPPLY CHAIN MANAGEMENT SYSTEM WITH INTELLIGENCE

The Internet of Things intends to connect networked information systems to physical items. It links items such as smart phones, sensors, LED displays, and automobiles to the internet, allowing them to communicate and exchange information with one another. In today's world, IoT has found applications in almost every aspect of life, including supply chain management. Supply chains are growing increasingly complicated, with suppliers and customers spanning many nations and continents. Manufacturers' main challenge is optimising supply chain efficiency and lowering operating costs over such wide geographical swaths. IoT provides a solution to this problem by enabling the deployment of Wireless Sensor Networks (WSN) to link all of the various entities in a supply chain.

2.3 FUTURE DIFFICULTIES IN USING BLOCKCHAIN FOR FOOD TRACEABILITY ANALYSIS

According to A. M. Turri et al. Food falsification has become a major issue for producers, academics, governments, consumers, and other stakeholders, causing huge economic losses and eroding consumer trust. Tracking and authenticating the food supply chain in order to understand provenance is crucial for detecting and managing sources of contamination in the global food supply chain. One method for addressing traceability difficulties and assuring transparency is to use blockchain technology to keep data from chemical analyses in chronological sequence, making it impossible to change them afterwards. The potential of blockchain technology for ensuring traceability and authenticity in the food supply chain is examined in this analysis. It is a very innovative and relevant way to ensuring the quality of the third phase of the analytical processes: data collecting and administration. Blockchain technology first appeared as a key component of the bitcoin cryptocurrency in 2008.

2.4 RFID PRIVACY ISSUES AND TECHNICAL DIFFICULTIES

According to Alexander Schaub et al. RFID tags will be connected to various sorts of items and other physical objects, including people, in the future ubiquitous computing environment, and might become a core technology for ubiquitous

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services in which the tags are used to automatically identify things and people. Despite this promise, the potential abuse (or just excessive usage) of RFID's monitoring capacity by shops and government organisations raises concerns about potential abuses of personal privacy. We analyse two protest efforts, one against the Italian clothing giant Benetton and the other against Tesco in the United Kingdom, that represent the rising worry among consumer-privacy activists about how RFID can damage personal data. Consumers Against Supermarket Numbering and Privacy Invasion The normal-tag technique protects privacy by prohibiting unauthorised reading of the tag's output, blocking electric waves using aluminium foil, or jamming waves to interfere with an adversary's unauthenticated reader reading a tag's ID. The block-tag technique created by RSA Security is one example.

2.5 A SYSTEM OF PRIVACY PROTECTION WITHOUT TRUST

Schaub and colleagues Reputation systems are critical for distributed applications, such as ecommerce websites, where users must be held accountable for their behaviour. However, present systems frequently reveal the identities of the raters, which may discourage honest individuals from publishing ratings for fear of reprisal from the rates. While several privacy-preserving reputation systems have been developed, none of them were really decentralised, trustless, and acceptable for real-world use in applications like as e-commerce. Following a discussion of the shortcomings and shortcomings of existing solutions, we will present our unique blockchain-based trustless reputation system and assess its accuracy and security guarantees. Nowadays, reputation systems are used in a variety of websites, where they are critical for the consumer experience. The reputation system was one of the first and most thoroughly researched systems in the e-commerce business.

III. EXISTING SYSTEM

Existing impediments to blockchain adoption in agriculture and the food supply chain, Blockchain has to become more accessible, which is a significant problem given that the underlying digital technology can get increasingly sophisticated as additional components are added into blockchain. In truth, blockchains must rely on other systems to collect correct information from the actual world in order to work. In examining the present permission-less blockchains, the latency of transactions may range from several minutes to several hours, until all participants update their ledgers and the smart contracts become publicly visible. Such design decisions have an impact on the functioning of the blockchain system, resulting in a lack of flexibility that, in some circumstances, may render blockchain solutions less efficient than similar conventional centralised alternatives. These are the so-called oracles that connect the physical and digital worlds and are often derived from automated sensor readings (i.e., hardware oracles), web application databases, and manual records. Despite the relatively lengthy list of projects described in this analysis, convincing business cases are still limited, owing to the vast number of variables involved and the technology's early phases.

IV. PROPOSED SYSTEM

We describe the current status of research on the issue and highlight the benefits and limitations of dispersed supply chain organisation and management. Our objective is to evaluate the usability of blockchains in the supply chain sector and to lay the groundwork for practitioners and academics to drive future efforts toward enhancing the technology and its applications. The bulk of the suggested blockchain-based frameworks have only been tested in a supply chain context. Although blockchain provides increased security, there are significant dangers associated with fund loss simply because the account owner may have accidentally lost the private keys required to access and control the account. A blockchain algorithm, such as the Bitcoin SHA-256 HASH algorithm, is a cryptographic hash function that returns a 256-bit result. Three characteristics make SHA-256 so safe.

Reconstructing the original data from the hash value is nearly difficult. Second, two messages with the same hash value (referred to as a collision) are exceedingly improbable. The possibility of two being identical is infinitesimally, impossibly minuscule. Finally, the avalanche effect occurs when a tiny modification to the original data modifies the hash value so significantly that it is not obvious the new hash value is generated from identical data. A unique private key will be produced.

4.1 PROCESSING

The blockchain address will be displayed in the processing menu, as will the private key creation with the block chain, the purchase of crops, and the distribution of food with the deposit amount on the block chain. Noise Removal Data stressed the necessity of noise reduction, and by employing an iterative technique, key generation will be unique for each processing stage

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4.2 PRODUCER

With the private key, the private key will be generated in the producer module. The deposit amount on blockchain tab will display the block chain address with the id and the available amount as the amount that may be placed. Short food supply chain configurations encompass a wide range of food production-distribution-consumption setups (SFSCs).

4.3 DISTRIBUTION

Under the distribution login, the block id can be selected, and the processing blockchain address with the price and storage location id can be added to transfer the money. All smart lock creation and upload with the blockchain food supply chain disruptions caused by climate change and greater geopolitical competition should not be regarded black swans.

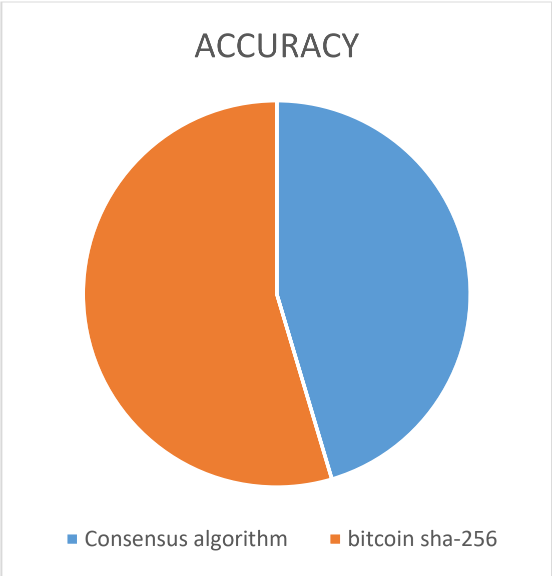
4.4 RETAILER

Choose block id with the distribution blockchain address with the price and storage location from the retailer menu. With the rise of customer-facing meal delivery services. The modern consumer has greater access to food supply networks and wants more quick results than ever before. Baum envisions merchants with flexible, responsive supply networks flourishing in this new economy of immediacy.

4.5 PROVIDER

Crop seed name, paddy seed, corn seed, maze seed, price, and storage location id may all be chosen. The goal is to provide food supply chain management (FSCM) systems and implementations so that observations and lessons may be drawn from this study.

V. EXPERIMENTAL SETUP



ALGORITHM	ACCURACY
Consensus algorithm	79
bitcoin sha-256	95

The numbers for the accuracy in the existing and suggested consensus algorithms of the consensus algorithm are 79% and 95%, respectively, according to the above chart and table.

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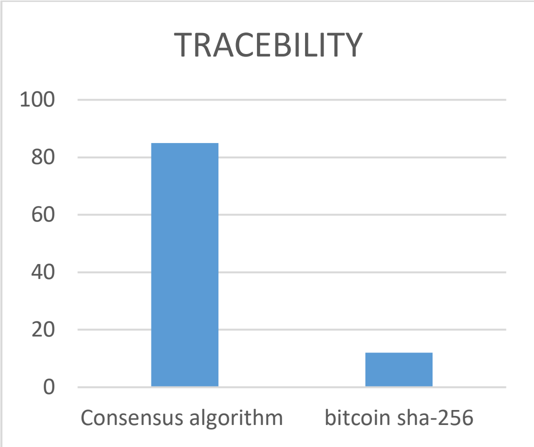
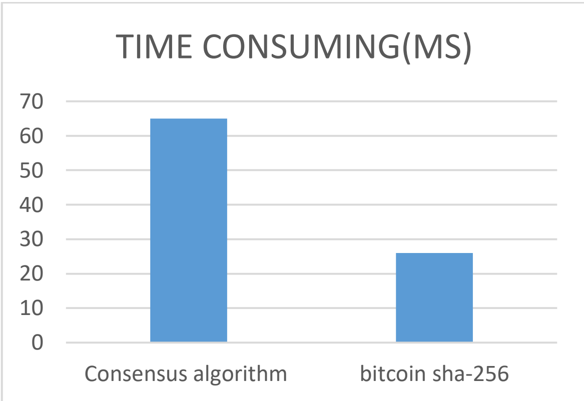
5.1 TRACEBILITY



ALGORITHM	TRACEBILITY
Consensus algorithm	85
bitcoin sha-256	12

For improved security, the food chain supply with block chain traceability should be reduced. The consensus algorithm offers up to 85%, however security is degraded. The traceability of bitcoin sha-256 will be just 12%.

5.2 TIME CONSUMPTION



ALGORITHM	TIME CONSUMING(MS)
Consensus algorithm	65
bitcoin sha-256	26

In this module the time consumption is high in consensus algorithm than the bitcoin sha – 256 which mean the proposed algorithm is more faster.

VI. CONCLUSION

To summarise, blockchain is a potential technology for a transparent food supply chain, but numerous limitations and problems remain, limiting its wider adoption among farmers and food supply networks. The near future will reveal if and how governmental and commercial initiatives can overcome these problems in order to establish blockchain technology as a secure, dependable, and transparent mechanism to maintain food safety and integrity. It will be fascinating to watch how blockchain will be integrated with other new technologies to achieve more automation of

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food supply systems while maintaining complete transparency and traceability. As a consequence, as compared to the previous technique, the bitcoin sha - 256 algorithm is quicker, more accurate, and less likely to be traceable.

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