International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 01 | January - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

E-FARMER Agriculture and Rural Development Using Block Chain Technology

Mr. SAI CHANDAN KUMAR.M, Mr. DANDUGALA ASHOK KUMAR,
Mr. SHAIK SHAJEER ABID
School of CSE & IS
Presidency University, Bangaluru

Abstract:

The efficiency, validity, and health of many essential criteria in the food and agricultural supply chain are receiving more attention as a result of the globalisation of industrial and agricultural production. Due to the increasing risks to food safety and corruption, there is a great need for effective traceability solutions. These solutions serve as crucial quality management tools, guaranteeing the safety of the products across the agricultural supply chain. Block chain is a cutting-edge technological approach that yields groundbreaking results for commodity traceability in food supply chains and agriculture. Today's agricultural supply chains are intricate ecosystems that involve a number of stakeholders, making it challenging to validate a number of important needs, mostly related to yield monitoring, crop growth stages, compliance with quality standards, and the nation of first origin. In order to manage crop prices and traceability, this study suggests a system that levitates the block chain and efficiently executes business operations across the agricultural supply chain. The suggested framework method improves effective science and safety with high integrity and dependability by doing away with the necessity for intermediaries, centralised authorities, and records of the transactions. All transactions are first recorded, after which they are kept in the immutable ledger of the block chain and connected to a decentralised network. This ensures a robust, dependable, and effective supply chain ecosystem with a high degree of traceability and transparency.

Keywords: Blockchain technology, Agriculture, Supply chain, Traceability, Food safety.

Introduction:

1.1 Motivation:

The motivation behind exploring blockchain technology in agriculture product supply chains lies in the need for greater transparency, efficiency, and security within this vital industry. Traditional supply chain processes often involve numerous stakeholders, complex logistics, and potential risks related to food safety and authenticity. Blockchain technology has the potential to revolutionize how agricultural products are tracked, verified, and authenticated throughout their journey from farm to table. By harnessing the decentralized and tamper-resistant nature of blockchain, we can address critical issues and ensure the integrity and safety of agricultural products for both producers and consumers.

1.2 Problem Statement:

The current globalized delivery of manufacturing and agricultural production has underscored the critical importance of ensuring health, efficiency, and validation within the food and agricultural supply chain. The prevalence of food safety and corruption hazards has created a pressing need for efficient traceability solutions to guarantee product safety. In the complex landscape of today's agricultural supply chains, characterized by multiple stakeholders and diverse requirements, including origin verification, quality compliance, and yield monitoring, a significant problem exists. This paper addresses this problem by proposing the adoption of blockchain technology to enhance traceability and transparency across the agricultural supply chain, eliminating the need for centralized authorities and intermediaries. The problem statement centers on the challenges associated with ensuring traceability and safety in agricultural supply chains and the potential solution offered by blockchain technology.

1.3 Objective of the project:

The aim of this initiative is to improve the agricultural supply chain's transparency and traceability by utilising blockchain technology. It attempts to solve the urgent problems of food safety and corruption risks by putting in place a productive traceability system that guarantees product safety. The project aims to develop a ground-breaking system that verifies essential conditions, including crop development phases, agricultural product provenance, quality standard compliance, and yield monitoring. By doing this, it hopes to do away with the requirement for dependable, centralised authorities and middlemen and provide a high-integrity, dependable, and effective system that logs and records every transaction in an unchangeable

blockchain ledger. The project's ultimate goal is to attain extremely high levels of transparency and traceability throughout the agricultural supply chain ecosystem.

1.4 Scope:

The project's scope entails the thorough integration of blockchain technology into the supply chain for agricultural products. A blockchain-based system for tracking and validating many components of the supply chain, like crop prices, product provenance, quality compliance, and yield monitoring, is being developed and put into use as part of this. The project will involve designing a decentralized framework that ensures high levels of traceability, transparency, data integrity, and reliability by doing away with the need for centralized authority and intermediaries. It will also entail investigating the possible advantages and difficulties of blockchain implementation in agriculture, with an emphasis on improving safety, effectiveness, and validation along the entire supply chain.

1.5 Project Introduction:

Handling the expansion of farming products and efficiently managing the logistics chain in the agricultural supply chain are critical to ensuring product safety. The article on food safety and the possibility of contamination has brought tracking power back into the spotlight along the supply chain. Furthermore, farming products that are traded between countries need to be accurately tracked and subject to national laws. In the agricultural sector, tracking commodities necessitates the collection, sharing, and preservation of vital information by pinpointing the origin and facilitating numerous data transfers throughout the supply chain. The agricultural and food supply chain, where items are manufactured, processed, and distributed through various intermediaries, has high-spirited data that makes monitoring and tracing challenging. Product contamination and its effects on public health Emphasize that traceability is a necessary policy tool for monitoring the safety and quality of food. The current agricultural supply chain's traceability practices are mostly impacted by data fragmentation and centralized controls that are vulnerable to information management and alteration. In the event of contamination, promptly separate the product from the supply chain and identify the source. The supply chain of today is become increasingly intricate [1]. Several parties are involved at different stages. It is imperative that these stakeholders work together in a variety of ways to ensure efficient and successful management. The food sector is becoming more customer-oriented and requires faster response times to deal with food scares and mishaps.

1.OBJECTIVES

This initiative aims to improve the agricultural supply chain's transparency and traceability by utilizing blockchain technology. It attempts to solve the urgent problems of food safety and corruption risks by putting in place a productive traceability system that guarantees product safety. The project aims to develop a cutting-edge system that verifies essential specifications, including the provenance of agricultural products, crop growth stages, adherence to quality standards, and yield surveillance. By doing this, it hopes to do away with the requirement for dependable, centralized authorities and middlemen and provide a high-integrity, dependable, and effective system that logs and records every transaction in an unchangeable blockchain ledger. The project's ultimate goal is to attain extremely high levels of transparency and traceability throughout the ecosystem of the agricultural supply chain.

2. LITERATURE SURVEY

2.1 Related Work:

[1] M. M. Aung and Y. S. Chang, ``Traceability in a food supply chain: Safety and quality perspectives,'' Food Control, vol. 39, pp. 172_184, May 2014.

In order to handle food crises and events, the food sector is growing increasingly focused on the demands of its customers and requires faster response times. Effective traceability systems reduce the likelihood of hazardous product publicity, legal liability, and product recalls by reducing the manufacture and sale of inferior or dangerous goods. The authenticity, quality, and safety of the product cannot be guaranteed by the current food labelling system. For this reason, traceability is used as a tool to help ensure food safety and quality and to win over customers. This study provides a thorough analysis of traceability in relation to food supply chain safety and quality.

[2] T. Bosona and G. Gebresenbet, ``Food traceability as an integral part of logistics management in food and agricultural supply chain,'' Food Control, vol. 33, no. 2, pp. 32_48, 2013.

This review has shown that creating a full chain FTS that works well is a complicated task that calls for a greater comprehension of actual processes from a variety of angles, including social, legal, technological, and economic ones. Consequently, the following areas should be the focus of future research on traceability (as suggested here): the relationship between various drivers of traceability, strategies for improving traceability, technological aspects of traceability systems, the relationship between food production units and traceability systems, standardisation of data collection and information exchange, strategies for raising

awareness, continuity of information flow, and effective communication of traceability information to consumers and other stakeholders.

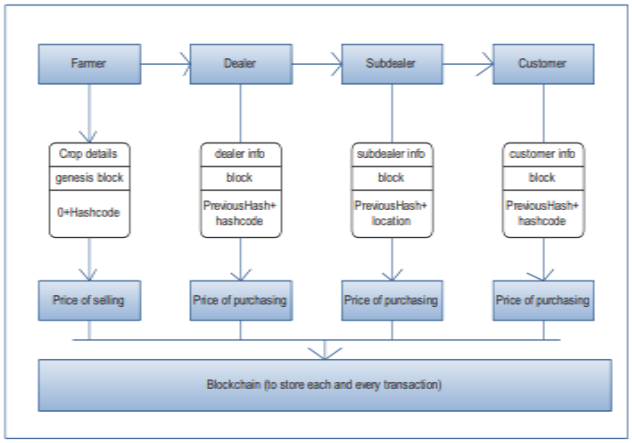
[3] J. Hobbs, ``Liability and traceability in agri-food supply chains,'' in Quan- tifying the Agri-Food Supply Chain. Springer, 2006, pp. 87_102.

Initiatives to improve food safety, lessen the effects of food safety issues, and offer a way to confirm food quality characteristics are driving the development of traceability in agri-food systems. There are many other types of instances, such as supply-chain systems that integrate quality verification and traceability, industry-wide animal traceability programmes, and regulatory traceability programmes. In order to determine how much traceability can increase liability incentives for businesses to exercise due diligence, this article investigates the economic functions of traceability. Using survey and experimental auction data, an empirical assessment is conducted about the relative importance that customers place on traceability vs the verifiable quality assurances that traceability provides.

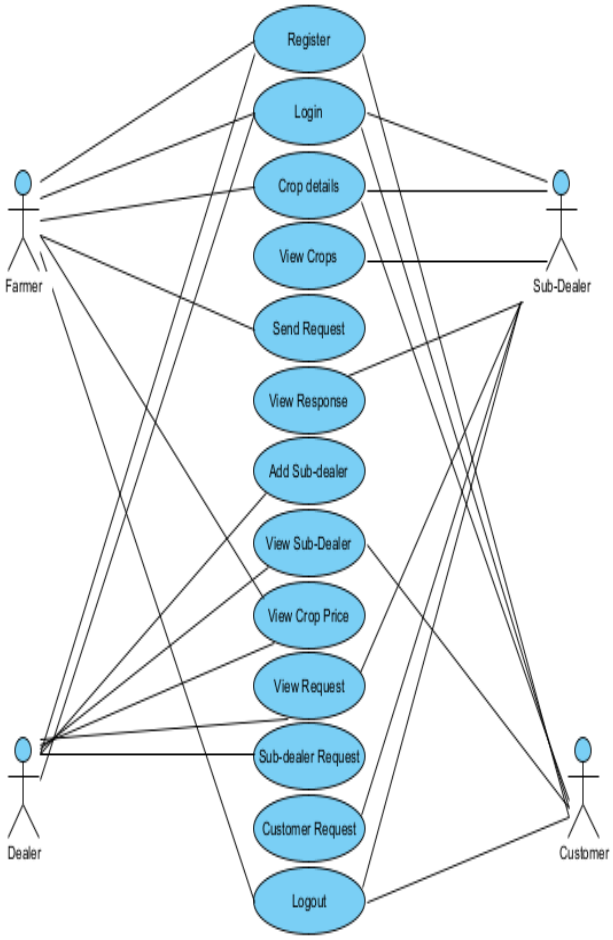
3. ARCHITECTURE OF THE PROPOSED SYSTEM

According to the Unified Modeling Language (UML), a use case diagram is a particular kind of behavioral diagram that is produced from and defined by a use case study. Its objective is to provide a graphical summary of the functionality that a system offers in terms of actors, use cases (representations of their goals), and any interdependencies among those use cases. A use case diagram's primary goal is to display which actors receive which system functionalities.

.



Architecture Diagram of E-Farmer



Use case Diagram of E-Farmer

4.SYSTEM ANALYSIS

The cost of agriculture is not tracked by any computerised method. A farmer cannot receive agricultural products.In India, the farming sector employs 72% of the total population. Farmers receive massive amounts of crop manufacturing, but because they can endure the current conditions, they do not receive the right price. Thus, people commit suicide, and the government does nothing about it. Therefore, we are tracking the cost of the agricultural product from farmer to client in the proposed scheme in an attempt to resolve this issue.

5.REQUIREMENT ANALYSIS

4.1 Functional and non-functional requirements

Requirement's analysis is very critical process that enables the success of a system or software project to be assessed. Requirements are generally split into two types: Functional and non-functional requirements.

Functional Requirements: These are the requirements that the end user specifically demands as basic facilities that the system should offer. All these functionalities need to be necessarily incorporated into the system as a part of the contract. These are represented or stated in the form of input to be given to the system, the operation performed and the output expected. They are basically the requirements stated by the user which one can see directly in the final product, unlike the non-functional requirements.

Examples of functional requirements:

1) Authentication of user whenever he/she logs into the system
2) System shutdown in case of a cyber-attack
3) A verification email is sent to user whenever he/she register for the first time on some software system.

Non-functional requirements: These are basically the quality constraints that the system must satisfy according to the project contract. The priority or extent to which these factors are implemented varies from one project to other. They are also called non-behavioral requirements.

6.MODULES

In an information system, input is the raw data that is processed to produce output. During the input design, the developers must consider the input devices such as PC, MICR, OMR, etc.

Therefore, the quality of system input determines the quality of the system output. Well-designed input forms and screens have the following properties −

- It should serve specific purposes effectively such as storing, recording, and retrieving the information.
- It ensures proper completion with accuracy.
- It should be easy to fill and straightforward.
- It should focus on the user's attention, consistency, and simplicity.

All these objectives are obtained using the knowledge of basic design principles regarding

7.CONCLUSION

In conclusion, given the several issues with food safety and corruption, the globalized food and agriculture supply chain necessitates a greater focus on traceability and safety. Blockchain technology offers a novel approach to improve commodity traceability in food supply chains and agriculture. Efficient operations and data integrity are guaranteed by the suggested approach, which functions without the need for middlemen or centralized authorities. An unchangeable blockchain ledger securely registers and stores transactions, providing a very high level of traceability and transparency. This strategy aims to create an ecosystem that is steady, dependable, and effective. It also addresses important needs in contemporary agricultural supply chains and, in the end, fosters industry safety and confidence

8.REFERANCES

[1] T.-T. Kuo, H.-E. Kim, and L. Ohno-Machado, ‘‘Blockchain distributed ledger technologies for biomedical and health care applications,’’ J. Amer. Med. Inf. Assoc., vol. 24, no. 6, pp. 1211–1220, 2017.

[2] M. Mettler, ‘‘Blockchain technology in healthcare: The revolution starts here,’’ in Proc. 18th IEEE Int. Conf e-Health Net., Appl. Services, Sep. 2016, pp. 1–3.

[3] W. J. Gordon and C. Catalini, ‘‘Blockchain technology for healthcare: Facilitating the transition to patient-driven interoperability,’’ Comput. Struct. Biotechnol J., vol. 16, pp. 224–230, 2018.

[4] A. Dubovitskaya, Z. Xu, S. Ryu, M. Schumacher, and F. Wang, ‘‘Secure and trustable electronic medical records sharing using blockchain,’’ in Proc. AMIA Annu. Symp., 2017, pp. 650–659.

[5] M. Hölbl, M. Kompara, A. Kamišalic, and L. N. Zlatolas, ‘‘A systematic review of the use of blockchain in healthcare,’’ Symmetry, vol. 10, no. 10, p. 470, 2018.

[6] S. Jiang, J. Cao, H. Wu, Y. Yang, M. Ma, and J. He, ‘‘BlocHIE: A blockchain-based platform for healthcare information exchange,’’ in Proc. IEEE Int. Conf. Smart Comput. (SMARTCOMP), Jun. 2018, pp. 49–56.

[7] L. A. Tawalbeh, R. Mehmood, E. Benkhlifa, and H. Song, ‘‘Mobile cloud computing model and big data analysis for healthcare applications,’’ IEEE Access, vol. 4, pp. 6171–6180, 2016.

[8] S. M. R. Islam, D. Kwak, M. H. Kabir, M. Hossain, and K.-S. Kwak, ‘‘The Internet of Things for health care: A comprehensive survey,’’ IEEE Access, vol. 3, pp. 678–708, Jun. 2015.

[9] A. Bahga and V. K. Madisetti, ‘‘A cloud-based approach for interoperable electronic health records (EHRs),’’ IEEE J. Biomed. Health Inform., vol. 17, no. 5, pp. 894–906, Sep. 2013.

[10] E. AbuKhousa, N. Mohamed, and J. Al-Jaroodi, ‘‘e-Health cloud: Opportunities and challenges,’’ Future Internet, vol. 4, no. 3, pp. 621–645, 2012.

[11] M. Meingast, T. Roosta, and S. Sastry, ‘‘Security and privacy issues with health care information technology,’’ in Proc. Int. Conf. IEEE Eng. Med. Biol. Soc., Aug./Sep. 2006, pp. 5453–5458.

[12] A. Ghazvini and Z. Shukur, ‘‘Security challenges and success factors of electronic healthcare system,’’ Procedia Technol., vol. 11, pp. 212–219, 2013.

[13] C. Esposito, A. De Santis, G. Tortora, H. Chang, and K.-K. R. Choo, ‘‘Blockchain: A panacea for healthcare cloud-based data security and privacy?’’ IEEE Cloud Comput., vol. 5, no. 1, pp. 31–37, Jan./Feb. 2018.

[14] R. Wu, G.-J. Ahn, and H. Hu, ‘‘Secure sharing of electronic health records in clouds,’’ in Proc. 8th Int. Conf. Collaborative Comput., Netw., Appl. Worksharing (CollaborateCom), Oct. 2012, pp. 711–718.

ss[15] A. Ibrahim, B. Mahmood, and M. Singhal, ‘‘A secure framework for sharing electronic health records over clouds,’’ in Proc. IEEE Serious Games Appl. Health, May 2016, pp. 1–8.