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SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN FOR AGRICULTURE

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ABSTRACT

The project "Supply chain management using blockchain for agriculture" contributes to a better comprehension of the blockchain technology (BCT) and its implications for agriculture, particularly in terms of how it can affect specific supply chain components and the prerequisites for implementing BCT in agriculture chains. The growing number of issues related to food safety and contamination risks has established an immense need for effective traceability solution that acts as an essential quality management tool ensuring adequate safety of products in the agricultural supply chain. Blockchain is a disruptive technology that can provide an innovative solution for product traceability in agriculture and food supply chains. By using blockchain in supply chain we can provide good quality of products as well as proof of work

Keywords: Blockchain, SCM, Traceability, Proof Of Work, SHA-256, Transparency.

I. INTRODUCTION

From farmers to retailers, the agricultural supply chain is a complicated system with many players. However, it faces several challenges such as food safety concerns, fraud, inefficiencies, and a lack of transparency. As the demand for safe, high-quality, and ethically sourced food grows, there is a need for better solutions to address these problems. Blockchain technology is one promising approach. The secure digital ledger system known as blockchain makes it possible to store data in a way that cannot be altered or tampered with. As a result, it is an excellent tool for monitoring agricultural products throughout their supply chains. Every step of a product's journey, from the farm to the consumer, can be recorded and verified with the help of blockchain, ensuring that food safety standards are met and product quality is maintained. By making all transactions visible and verifiable by everyone involved in the supply chain, blockchain also helps reduce counterfeiting and fraud. This builds consumer trust by confirming the authenticity of products, such as organic certifications or fair trade claims. In addition, blockchain can automate processes through smart contracts, making operations more efficient and reducing human errors.

Blockchain has the potential to enhance the efficiency of agricultural supply chains when used in conjunction with other technologies like the Internet of Things (IoT) and artificial intelligence (AI). IoT devices can collect data on things like temperature and humidity to ensure products are stored and transported properly, while AI can analyze this data to find inefficiencies or potential risks. Blockchain will ensure the transparency and safety of all of this data.

II. LITERATURE SURVEY

1. Khaled Salah [1] “Blockchain Based Soybean Traceability in Agricultural Supply Chain”,This paper,explain the approach that leverages the Ethereum blockchain and smart contracts efficiently perform business transactions for soybean tracking.

2. Xinting Yang [2] “Blockchain Based Soyabean Traceability in Agricultural Supply Chain”,This paper explains about ,The short storage time and the low storage temperature of storage requirements for fruit and vegetable agricultural products.

3. Weijun Lin [3], “Blockchain Technology in Current Agricultural Systems: From Techniques to Applications”, This paper explains about ,They have presented a comprehensive survey on current blockchain based agricultural applications and innovations. they have explained various concepts of blockchain technology.

4. Affaf Shahid [4], “Blockchain Based Agri Food Supply Chain: A Complete Solution”,In this paper they proposed the credibility of the Agri-Food supply chain entities and quality ratings of the products also discussed algorithms and smart contracts in detail.

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III. METHODOLOGY

A structured approach is required to implement blockchain technology in agricultural supply chain management. This approach begins with an understanding of the sector's difficulties. Through interviews with farmers, distributors, and retailers, requirements will be gathered in the first phase. This step assists in determining the essential data that must be tracked, such as the origin of the product, quality standards, and transport and storage conditions. This is the foundation for a blockchain system that automates processes through smart contracts to ensure transparency and reduce human error while also securely recording all supply chain transactions.

These devices will collect real-time data on factors such as temperature, humidity, and location, which will be transmitted securely to the blockchain, ensuring that the information remains immutable and accessible to all stakeholders. In order to guarantee efficiency and lessen the likelihood of fraud, smart contracts will be developed to automate crucial processes like payment transfers, quality checks, and updates to product certifications. A user-friendly web application will also be developed to allow stakeholders to easily trace products, access certification information, and monitor the supply chain's progress in real-time.

IV. OBJECTIVE

1. To refund to the customer if product is replace/return by consumer. If the customer bought the wrong item or changed their mind once they received it.
2. To automate payments and proof of delivery. a confirmation that an order was delivered to its intended location successfully.
3. To collect user feedback and update the application in response to it.
4. To trace product journey by scanning QR code. An efficient method for inventory tracking is the QR code.
5. To increase consumer trust in order to maintain healthy relationships with customers.
6. Increases profit margins by increasing customer satisfaction, retention, and loyalty. It also helps to improve their sales.

V. ADVANTAGES

1. Enhanced Traceability: Blockchain makes it possible to track agricultural products from beginning to end, ensuring transparency and lowering the likelihood of fraud. The origin and quality of products can be checked out by customers.
2. Improved Food Safety: Blockchain makes it possible to quickly identify the affected batches in the event of contamination or a problem with food safety, thereby reducing response times and preventing widespread health risks.
3. Increased Trust: Stakeholders across the supply chain can trust the authenticity of data, as blockchain creates tamper-proof records verified by all participants.
4. Efficient Operations: Smart contracts that automate processes in the supply chain speed up transactions, reduce paperwork, and eliminate intermediaries..

VI. DISADVANTAGES

1. High Implementation Costs: Small-scale farmers may find it difficult to set up blockchain infrastructure because it requires a significant investment in technology, hardware, and training.
2. Complexity: In order to develop, deploy, and maintain the technology, specialized skills are required.
3. Problems with Scalability: Managing a lot of agricultural data on a blockchain can be hard because of problems with processing speed, storage capacity, and the cost of transactions.
4. Consumption of Energy Blockchain systems like proof-of-work can use a lot of energy, which raises environmental concerns, especially when used on a large scale.

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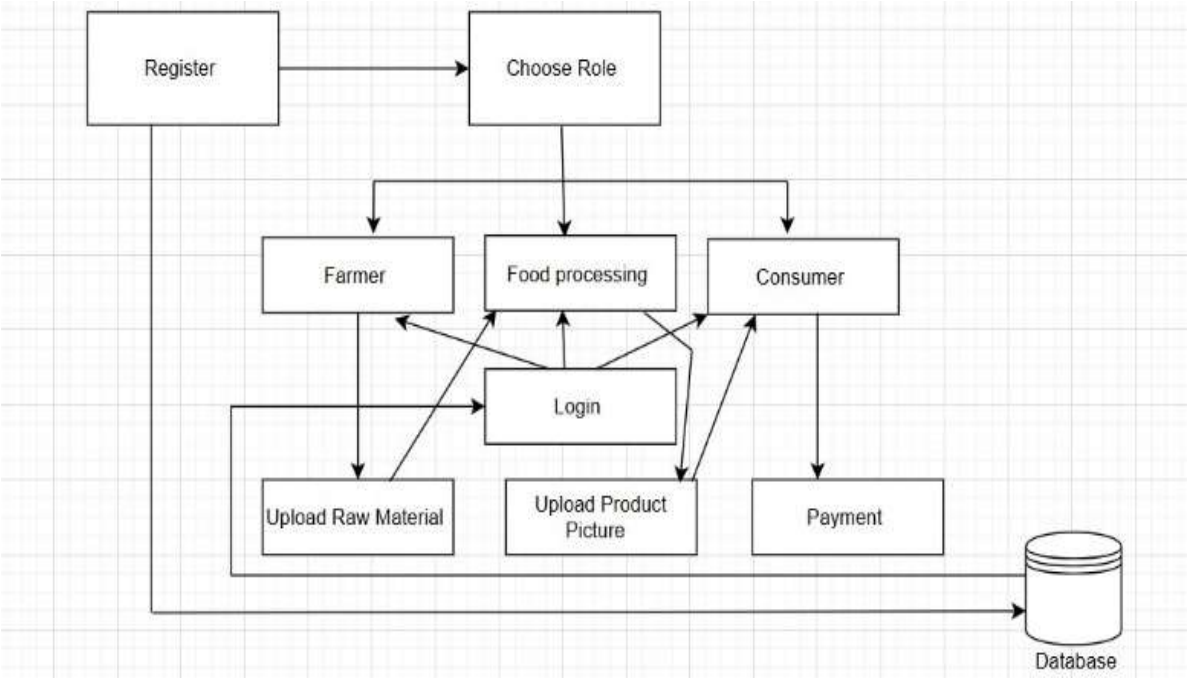
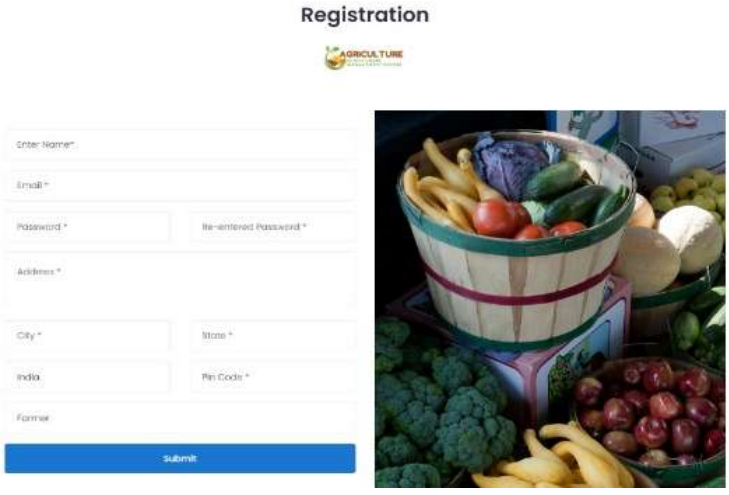
VII. SYSTEM ARCHITECTURE



VIII. RESULTS



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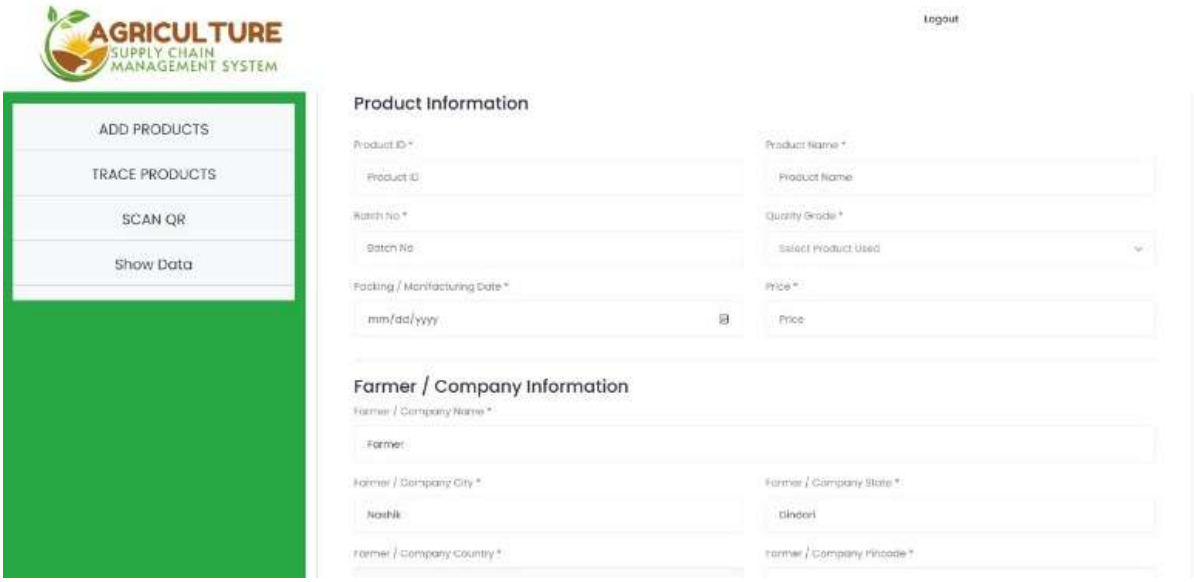

IX. FUTURE SCOPE

1. Improving decision-making and predictive analytics by combining blockchain with IoT, AI, and machine learning.
2. Governments and regulatory bodies can establish standards for blockchain use in agriculture, promoting wider adoption.
3. With blockchain providing verifiable proof of product origin and quality, there is potential for international trade.

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X. CONCLUSION

The integration of blockchain technology into agricultural supply chains offers a powerful solution to address the critical issues of food safety and traceability. By providing an immutable, transparent ledger of transactions, blockchain ensures the authenticity and quality of agricultural products from farm to consumer. This traceability acts as a vital quality management tool, mitigating contamination risks and enhancing consumer trust. The implementation of blockchain can streamline processes, reduce fraud, and improve overall supply chain efficiency, making it a disruptive yet promising innovation in agriculture. The Internet of Things (IoT) and smart contracts could be used even more in future developments in this field to improve agricultural supply chains and guarantee the delivery of safe, high-quality goods.

XI. REFERENCES

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