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Study of Blockchain Technology in Farmers Portal

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Abstract: *The agricultural sector faces significant challenges due to inefficiencies in supply chains, lack of transparency, and the absence of direct connections between farmers and buyers. These issues contribute to reduced farmer incomes and compromise product quality. Additionally, concerns regarding food safety, corruption, and traceability in globalized agricultural production highlight the need for a secure and efficient system. To address these challenges, this study explores the integration of blockchain technology into a web-based platform that enhances agricultural farmers portal transparency. The proposed system allows farmers to showcase their profiles, making their details accessible to a broader network of buyers, thereby enabling direct negotiations and price updates. Blockchain technology ensures that all transactions are securely recorded in an immutable ledger, eliminating reliance on intermediaries and centralized authorities. By leveraging blockchain's decentralized structure, the system enhances traceability, improves trust, and ensures compliance with quality standards across the portal. This approach not only strengthens food safety measures but also promotes fair trade, efficiency, and sustainability within the agricultural sector.*

Keywords: *Direct marketing, Blockchain, Traceability, Agriculture.*

I. INTRODUCTION

The globalization of agricultural supply chains has significantly increased concerns about food safety, efficiency, and authenticity. Ensuring the quality and traceability of agricultural products is critical, as food safety incidents, contamination risks, and fraudulent practices have raised serious health and economic concerns. Traditional supply chain systems often lack transparency due to their reliance on centralized authorities and intermediaries, making it difficult to track a product's origin, growth stages, and compliance with quality standards. Blockchain technology offers a revolutionary solution to these challenges by providing a decentralized and tamper-proof system for recording transactions. By eliminating intermediaries, blockchain enhances transparency, traceability, and trust across the agricultural supply chain. The immutable ledger system ensures that all stakeholders, including farmers, manufacturers, and consumers, have access to verifiable and secure data regarding food production and distribution. This study proposes a blockchain-based framework for agricultural supply chains, focusing on improving traceability, enhancing efficiency, and ensuring food safety. By integrating blockchain with a web portal, farmers can directly connect with buyers, negotiate prices, and streamline transactions without relying on third parties. This approach not only benefits farmers by increasing their profits but also assures consumers of product authenticity and quality. Furthermore, adopting blockchain technology in agriculture fosters sustainability, reduces fraud, and strengthens compliance with national and international food safety regulations.

To ensure product safety, handling the growth of farming products and effective management of logistics -chain in agricultural supply chain is censorious. That cover about food safety and the risk of contamination has renewed the prominence of tracing power across the supply chain. Moreover, farming goods exchanged across multiple nations require accurate tracking and compliance with nation-specific regulations. Tracing of goods in the agricultural field requires to gather, communicate and maintain critical data by specifically identifying the source, multiple data exchanges in the logistic network. High-spirited nature of data in the agricultural / food supply chain where products are manufactured, processed and sent through multiple intermediaries allows tracking and tracing difficult. Contamination of products and its public health consequences highlight traceability as the required policy instrument for tracking food quality and safety. The present traceability practice in the supply chain of agriculture is mainly affected by data fragmentation and centralized controls that are susceptible to both information modification and management. In case of contamination that identifies the source and isolates the product quickly from the supply chain. Today's supply chain is becoming really complex. At various stage multiple stakeholder are present. All these Stakeholder need to collaborate with each other in various direction for efficient and effective management. To deal with food scares and accidents, the food industry becoming more customer-oriented and need quicker response time. Good traceability mechanisms help reduce the manufacture and sale of dangerous or low quality goods, mitigating the risk for false ads, liability and recalls. Reducing the impacts of food safety. Improving food safety, and providing a means to verify food quality attribute are driving the development of traceability initiatives in agri-food system.

The United Nation Food and Agriculture Organization (FAO) and the International Telecommunications Union (ITU) are continuing to work together to facilitate the use of innovation Information and communication technologies (ICTs) in agriculture. The importance of traceability has significantly increased with the globalization of the food industries. Therefore, the need for a reliable identification and tracking system is necessary to ensure the quality and safety of food which reaches the consumer. Block chain for Supply Chain is a natural fusion of two technologies, built for mutual or common ledge transactions. A supply chain often reflects a distribution of products through industries, and is also cross-border. Food provenance is one of FSC's most difficult issue. This issue companies are facing today. A global supply chain network with asymmetric food regulation and multiple operating procedure between various countries makes end-to-end food tracking incidental to the food industry. Distributed ledger/Block chain is very important technology that can significantly impact the supply chain management. This paper shows the possibility of block chain technology using supply chain for both perishable product and manufacturing. In food supply chain firms are rapidly adopting block chain system. Example for retailers such as Carrefour indicates that block chain can be used to provide access to rich and details information about food product, which is used to reduce the uncertainty about quality and ingredient. Food safety has been an enormous concern in china over the last few years. As conventional agri-food logistic practices can no longer satisfy consumer demands, developing a traceability framework for agri-food supply is becoming increasingly urgent.

Blockchain Process in the Farmers Portal

The proposed farmers portal leverages blockchain technology to create a transparent and efficient digital platform for agricultural transactions. The system operates through a distributed ledger where each transaction—such as planting, harvesting, pricing, and sales—is securely recorded in an immutable block. Each block is cryptographically linked to the previous one, ensuring data integrity and preventing unauthorized modifications. Smart contracts automate key processes within the farmers portal, allowing agreements between farmers, buyers, and logistics providers to be executed only when predefined conditions are met. This reduces fraud, minimizes delays, and streamlines transactions. The portal also enables real-time updates, where farmers can list their produce, set prices, and interact directly with buyers, reducing dependency on intermediaries and ensuring fair pricing. Additionally, blockchain enhances trust by allowing buyers and consumers to verify product authenticity and trace its journey from farm to table. By scanning a QR code linked to the blockchain record, consumers can access crucial details about the product's origin, cultivation methods, and quality certifications. By integrating blockchain technology into a farmers portal, this project ensures fair trade, improves financial opportunities for farmers, and enhances consumer confidence in agricultural products. The decentralized nature of blockchain fosters transparency, efficiency, and sustainability, making it a transformative tool for modernizing agricultural transactions.

A. Motivation

The globalized nature of agricultural supply chains has heightened concerns about food safety, efficiency, and authenticity. Numerous food safety risks and incidents of corruption necessitate robust traceability solutions to ensure product safety. Blockchain, an innovative technology, promises unparalleled traceability in agriculture and food supply chains. Current supply chains, with their complex interactions and multiple stakeholders, face challenges in verifying essential criteria like origin, growth stages, and quality standards. Blockchain eradicates the need for centralized authorities and intermediaries, ensuring efficient, transparent, and reliable traceability, enhancing overall food safety and supply chain integrity.

B. Problem Statement:

The globalized nature of agricultural production and manufacturing has intensified concerns regarding food safety, efficiency, and validation within supply chains. The rising incidents of food safety breaches and corruption highlight the dire need for efficient traceability solutions as vital quality management tools. Contemporary agricultural supply chains are intricate, involving multiple stakeholders, making verification of origin, growth phases, and compliance challenging. Existing systems, reliant on centralized authorities and intermediaries, lack transparency and integrity. There's a pressing demand for a decentralized, reliable solution to ensure transparency, traceability, and efficiency in agricultural supply chains.

C. Object of the project:

The project aims to revolutionize the agricultural supply chain by integrating blockchain technology, enhancing traceability and transparency. This decentralized platform addresses food safety and corruption concerns, ensuring product safety and quality standard compliance.

By eliminating the need for centralized authorities and intermediaries, the strategy offers an immutable record of transactions, bolstering efficiency, security, and trustworthiness. It streamlines the complex supply chain ecosystem, ensuring accurate tracking of crop prices, origin, growth stages, and yield monitoring, fostering a reliable and efficient system.

D. Scope:

The project aims to revolutionize agricultural supply chains using blockchain technology. By decentralizing traceability and eliminating the need for intermediaries, it ensures high-quality standards, enhanced product safety, and verifiable origin tracking. The proposal leverages blockchain's immutable ledger, recording all transactions and offering unparalleled transparency and reliability. This approach simplifies complex supply ecosystems, making crop price tracking, compliance, and yield monitoring more efficient, ultimately fostering a trustworthy, transparent, and streamlined supply chain environment.

II. EXISTING SYSTEM

There is no computerized system in place to trace the cost of agriculture. Agricultural products cannot be obtained by the farmer. 72 percent of the population in India is dependent on the farming industry. Farmers get enormous quantities of crop manufacturing, but they have not got the correct price because they can survive the present circumstances. So they are suicide and nothing is done by the government. So we are attempting to fix this issue in the suggested scheme by tracing the cost of the agricultural product from farmer to client.

Disadvantages

1) Complexity in Implementation

Setting up decentralized systems can be intricate, demanding expertise and resources, making it challenging for smaller agricultural players.

2) Interoperability Issues

Ensuring compatibility among various decentralized platforms and technologies can be a hurdle, potentially leading to data silos and inefficiencies.

3) Scalability Constraints

Expanding a decentralized system to accommodate a growing number of users and transactions can be challenging, causing performance issues.

4) Security Risks

Decentralized systems are not immune to security threats like smart contract vulnerabilities and hacking, posing risks to data integrity and user trust.

III. PROPOSED SYSTEM

In proposed system we are using a Block chain helps which helps in maintaining the integrity and transparency of the whole process right from inception of crop details. Blockchain helps in managing and tracing the crop information transparent distribution.

The proposed system leverages blockchain technology to enhance transparency, integrity, and efficiency in agricultural transactions through a farmers portal. This system ensures that every step, from crop inception to final distribution, is securely recorded, verifiable, and tamper-proof. Blockchain-Enabled Crop Tracking: Farmers enter detailed crop information, including seed type, cultivation methods, growth progress, and harvesting details. This data is securely stored on the blockchain ledger, ensuring real-time traceability and eliminating data manipulation risks.

Advantages:

1) Enhanced Transparency

Decentralized traceability allows consumers to track the journey of agricultural products from farm to table, fostering trust.

2) Reduced Fraud

Direct marketing eliminates intermediaries, reducing the risk of counterfeit goods and fraud in the supply chain.

3) *Fair Pricing*

Farmers receive a fair share of profits by selling directly to buyers, avoiding price manipulation by middlemen.

4) *Efficient Logistics*

Real-time data improves inventory management and logistics, reducing wastage and optimizing distribution.

Work Flow of Proposed system:

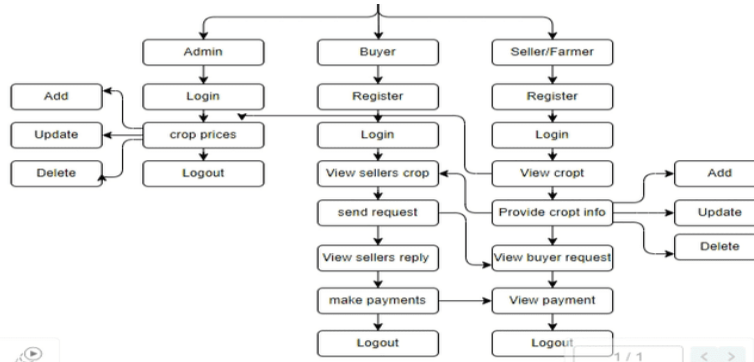


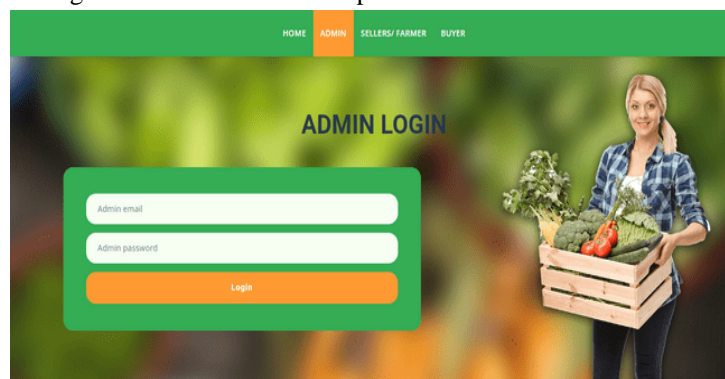
Fig: work Flow of Proposed System

IV. RESULT

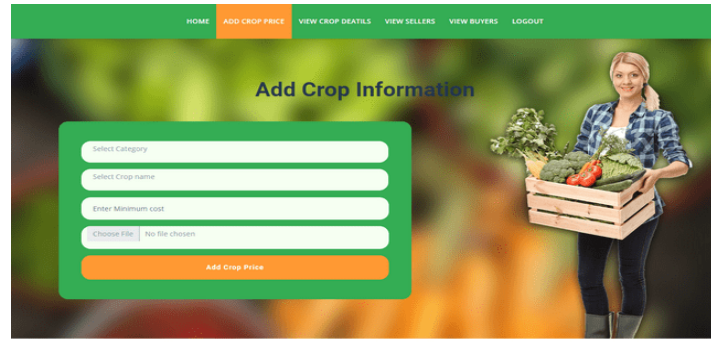
Home Page: Study of blockchain technology in farmers portal.



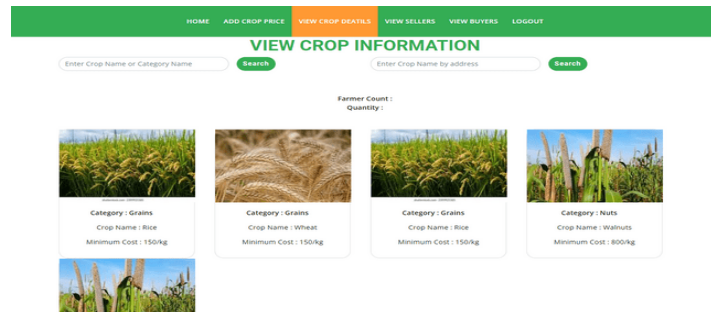
Admin Login page: The admin will login with default email and password.



Add crop price: The admin is the person he/ she will add the crop price for each and every crop details with that crop name, category, maximum cost, minimum cost and quantity.



View crop details: After the he can view here.



Sellers registration page: The seller will register with their details like name, email, password, address, contact, so after that the seller will login.



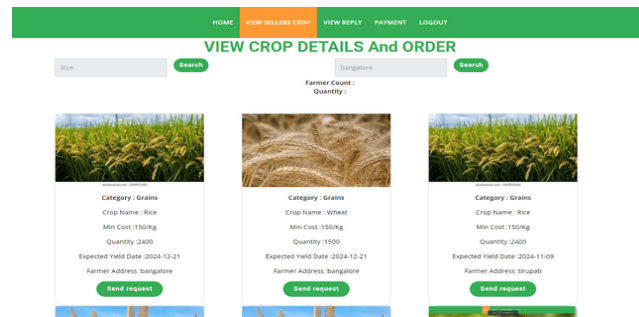
Sellers login page: After registration the seller will login with their details.



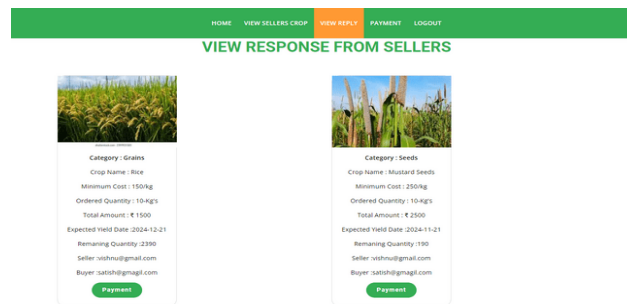
Update crop details: Based on the crop they are going to add the crop details how much they are going to produce.



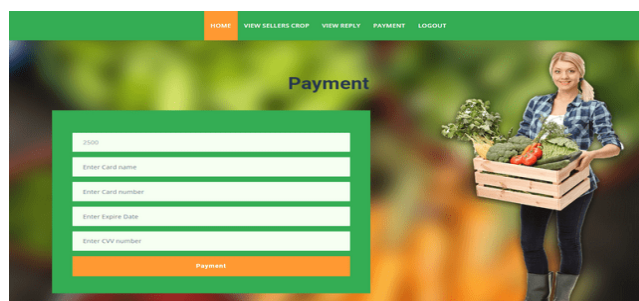
View crop details:



View Reply:



Payment:



V. CONCLUSION

The convergence of decentralized traceability and direct marketing is a transformative force in agriculture supply chains. It promotes transparency and trust while empowering farmers through direct consumer connections, reducing reliance on middlemen and increasing profitability. For consumers, this means heightened confidence in food safety and quality through traceability.

Additionally, the streamlined supply chains contribute to environmental sustainability by minimizing food miles. This holistic approach aligns economic interests with environmental responsibility, making it a pivotal advancement in agriculture that benefits all stakeholders.

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