Farm To Fork Supply System

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Abstract: Blockchain technology holds the potential to transform the agricultural and food supply chain by introducing transparency and automation through smart contracts and other integral blockchain features. This paper explores the functionality of blockchain systems, their possible integration into existing Supply Chain Management (SCM) frameworks, and the implications for legal and regulatory bodies. The increasing adoption of blockchain challenges traditional institutions, especially government entities historically trusted with transaction verification. Therefore, the Agri-Food sector demands a robust, transparent, and reliable system that ensures traceability and efficient product flow. This study aims to highlight how blockchain can bring a paradigm shift to existing systems.

Keywords: Agricultural product, food delivery, consumer, NGO, web application

I. INTRODUCTION

A significant portion of India's population depends on agriculture for their livelihood. Despite being the backbone of the food system, Indian farmers are often marginalized in terms of economic progress. Technological advancements, however, are paving the way for improving their condition.

The primary objective of this system is to empower farmers both economically and operationally. Through e-agriculture solutions, farmers can enhance their productivity and secure fair compensation for their produce. Consumers, on the other hand, benefit from stable pricing and improved access to agricultural goods. The system also supports social initiatives, enabling food redistribution to reduce waste. By leveraging a data-driven online marketplace, the model ensures a seamless and intuitive interface for connecting farmers with consumers. This fosters direct interactions, fair pricing, and timely delivery of fresh products within a defined geographical area.

II. RELATED WORK

According to [1], a complete blockchain-driven agricultural supply chain has been implemented on Ethereum, utilizing smart contracts and core blockchain features. While the system ensures immutability, challenges like participant trustworthiness, transactional integrity, and product traceability remain unresolved. Thus, there's a pressing need for a trustworthy architecture that supports visibility, transparency, and effective logistics in the Agri-Food network.

As per [2], Edgence is a blockchain-integrated edge computing platform designed for handling large-scale decentralized applications (dApps) in IoT ecosystems. It connects real-world applications to a blockchain-based system using edge nodes, combining blockchain cores with edge cloud resources to manage IoT dApps efficiently.

[3] proposes HCloud, a JointCloud infrastructure that adopts a serverless model for IoT systems. It distributes tasks across multiple cloud platforms based on predefined user policies including performance, cost, and latency. Blockchain integration ensures the authenticity of cloud operations and prevents fraudulent deployment.

[4] introduces a decentralized gamified service exchange framework where IoT service providers can freely trade and request services. Cost and selection are dynamically managed using blockchain-based token economies and smart contracts to optimize service interactions.

In [5], a blockchain-based secure networking system is presented for smart home IoT health devices aimed at assisting the elderly and specially-abled individuals. The framework uses off-chain storage for multimedia data and leverages blockchain for managing digital identities and secure health-related token transactions.
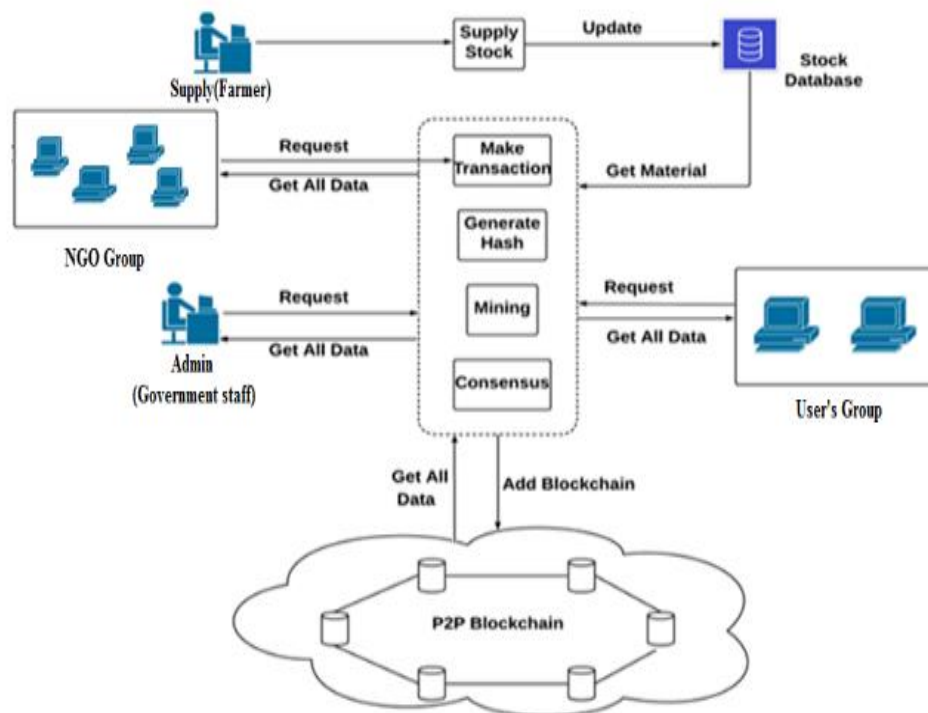
III. SYSTEM ARCHITECTURE

Fig: - System Architecture

The system comprises several core modules designed to streamline the Agri-Food supply process using blockchain:

- **Farmer Module (Supply Initiator):** Farmers initiate the smart contract processes and serve as the entry point for product sourcing.
- **Consumer/User Module:** Consumers manage warehousing operations, including product handling, storage, and validation. They also oversee quality control and product certification.
- **NGO Module:** Non-profits are responsible for acquiring consumer products and redistributing leftover food from various contributors to those in need.
- **Blockchain Layer:** A decentralized ledger system that governs permissions and maintains the state of all transactions. Role-based access is managed by designated authorities (Root and Attribute Authorities).

IV. RESULT AND DISCUSSION
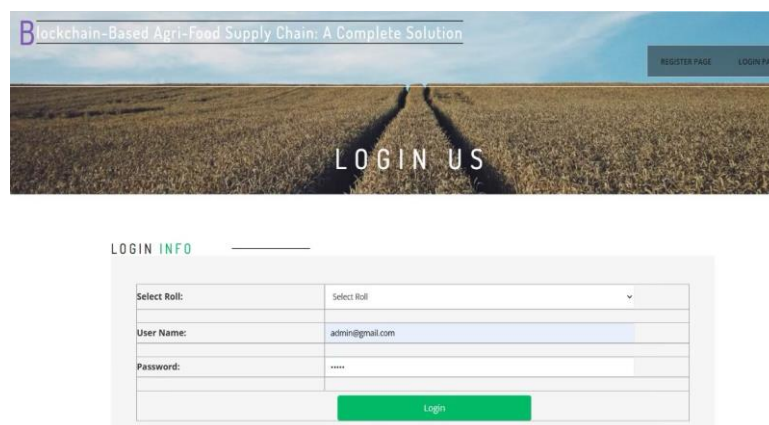
V. CONCLUSION

The proposed system establishes a digital marketplace facilitating the buying and selling of agricultural goods while ensuring fair pricing, safety standards, and efficient resource allocation. It helps reduce food wastage by redirecting excess food to the underprivileged and ensures a streamlined supply chain for all stakeholders—farmers, NGOs, and end-users. By integrating blockchain technology, the system maintains transparency, accountability, and traceability across all operations.

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