DECENTRALIZED TRACEABILITY AND DIRECT MARKETING OF AGRICULTURAL SUPPLY CHAIN

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Abstract-

The agriculture sector is facing the major challenges because of the absence of direct supply chain between farmers and buyers. This will lead to vulnerabilities, reduce the farmers income and compromises productquality. To address these issues, we are developing a web portal which facilitates the visibility of farmers profiles making their details accessible to the wide range of buyers. This approach lets buyers to connect with farmers through the portal, allowing them to negotiate and quickly update price agreements.

To enhance transparency and security, our system incorporates Blockchain technology to record and securely store all transactions. Our innovative web portal strives to bridge the gap between farmers and buyers promoting transparency and trust in agriculture transactions. This approach has the potential to benefit both farmers and consumers while promoting sustainable practices within the agricultural sector.

Food safety and corruption hazards have generated an enormous need of an effective traceability results icing to enough product's safety within the husbandry force chain. Block chain is the revolutionary technological system, which provides the groundbreaking result for commodity traceableness in husbandry and in food force chains.

Keywords:Agriculture supply chain, Direct marketing, Blockchain, Traceability.

I. Introduction

In today's world, the agriculture supply chain faces numerous challenges, including transparency, traceability, and direct marketing.Farmers struggle to find reliable buyers for their crops, and buyers face challenges in sourcing quality products at fair prices. The farmers get less price than the minimum selling price in the market because of many intermediaries present in the current supply chain. There is no clear and reliable record about the crop, origin, quality, and the final price. There is no direct communication and negotiation between the farmer and the buyer. Lack of transparency in transactions makes it difficult for the farmer and the buyer to trust each other leading to disputes.

To address these issues, our project focus on the development of a decentralized traceability and direct marketing system for agriculture

supply chains. This innovative system empowers buyers, sellers, and administrators, fostering a more efficient and transparent marketplace. Buyers can seamlessly register, log in, and access detailed information about sellers' crops, enabling them to make informed decisions. They can also send requests to sellers, view responses, make payments securely, and log out, ensuring a user-friendly experience.Sellers, on the other hand, can register and log in to provide comprehensive crop information, view buyer requests, and track payments effortlessly. This system streamlines the marketing process for sellers, improving their reach and efficiency. Administrators have the capability to log in, manage fixed payments, and maintain the system's integrity. Our decentralized traceability and direct marketing system promise to revolutionize agriculture supply chains, enhancing transparency, trust, and efficiency across the industry.

II. Literaturesurvey

A strategy that levitates the block chain and conducts business operations effectively across the agricultural supply chain for tracking crop prices and traceability. The proposed framework solution discards the need for trusted centralized authority, intermediaries and offers records of the transactions, improving efficient science and safety with high integrity and reliability. All transactions are registered and then stored in block chain's unchangeable ledger with linkages to a decentralized le network, thereby ensuring vary high degree of traceability and transparency in the supply chain ecosystem in a stable, reliable and in efficient manner[1]. Authors in [2] have proposed an approach for efficient transactions of soybean traceability in Agri-Food supply chain. The proposed solution overcomes the problems of centralized solutions and eliminates the need for a trusted third party. It maintains high integrity, reliability and more security. However, authors have not considered the accountability and auditability of the data delivered and automated payments.Food safety in recent times is a growing concern for commercial and academic industries. Most of the solutions till date are centralized and result in serious problems such as fraud, tampering and man-in-the-middle attack [3]. Therefore, literature has introduced several blockchain-based traceability and information security in Agri-Food supply chain systems. Hereof, author in [4] has proposed a traceability scheme based on Hazard Analysis and Critical Control Points (HACCP), blockchain and IoT.

In traditional storage schemes, the data is stored in centralized storage. After the invention of blockchain, many decentralized storage systems are used to store the data in a decentralized manner. In [5], authors proposed an efficient storage scheme for Agri-Food product tacking. Authors used IPFS along with secondary database to achieve the traceability. IPFS is a network used to store and share data in a decentralized file system. To retrieve data from IPFS, the transaction hash is accessed from secondary database. Using that transaction hash, IPFS hash is retrieved from the blockchain. However, if the secondary database fails, whole system will fail. Paper [6] has proposed an auditable protocol for transparent, tamper-proof and verifiable transactions between entities. Ethereum blockchain support for online Supply Chain systems and its feasibility in Business-to-Consumer (B2C) business model. They propose Consumer Ordering Consensus Protocol (COCP) for B2C online retail stores to securely and efficiently process orders. They compare three different systemsRetail Store outlet, Online Retail Store, Smart Contract based Online Retail Store based on order requests. They have developed an application to demonstrate smart contracts in the B2C Supply Chain system. The research and development activity mainly focuses on tamper-proof and immutable records in turn enables trust and reliability among untrusted peers within the financial technology.

In addition to this, a case study on product traceability is presented in[7]. According to the authors, tracing the provenance of products in force chain must be transparent, tamper-evidence and adaptive to the changing

surroundings. thus, they've designed an origin-chain that uses private and public blockchain. As blockchain has limited storehouse, origin-chain stores the data on- chain and offchain. On- chain storehouse includes the hashes of data while out- chain storehouse has the raw lines and addresses of smart contracts. In[8], authors have proposed blockchain- grounded decentralized traceability process and handed a case study. They created a use case for traceability of product from ranch to the table and compared the results using different perpetration platforms, i.e. ethereum and hyperledger.

Problem Definition:

Farmers struggle to find reliable buyers for their crops, and buyers face challenges in sourcing quality products at fair prices.The farmers get less price than the minimum selling price in the market because of many intermediaries present in the current supply chain.There is no clear and reliable record about the crop, origin, quality, and the final price.There is no direct communication and negotiation between the farmer and the buyer.Lack of transparency in transactions makes it difficult for the farmer and the buyer to trust each other leading to disputes.

III. ProposedSystem:

The proposed system aims to establish a decentralized traceability and direct marketing platform for agricultural supply chains. Buyers can easily access the system through registration and login, enabling them to view seller crops, send requests, and make payments seamlessly. Sellers, after registering and logging in, can provide crop information, view buyer requests, and track payments received. Additionally, the system empowers the admin to log in, manage fixed payments, and ensure smooth operations. This platform enhances transparency, efficiency, and trust within the agriculture supply chain, promoting fair and direct interactions among stakeholders.

IV. BlockDiagram:

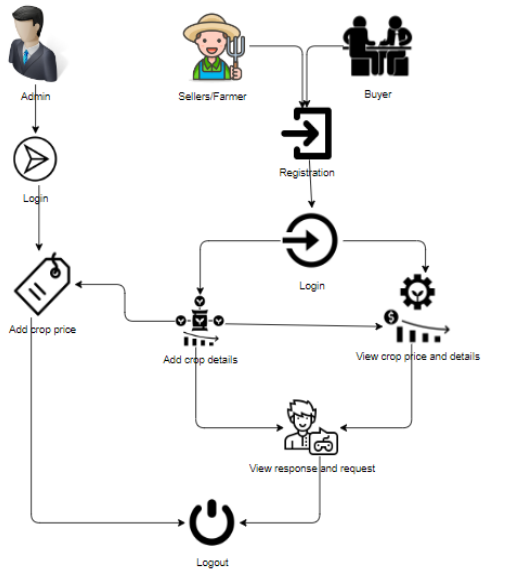

Fig1:Block Diagram

Architecture

Theflowdiagramthatfollowsprovidesanexplanation of how the system operates. The stepsthat makeuptheoverall processareasfollows.

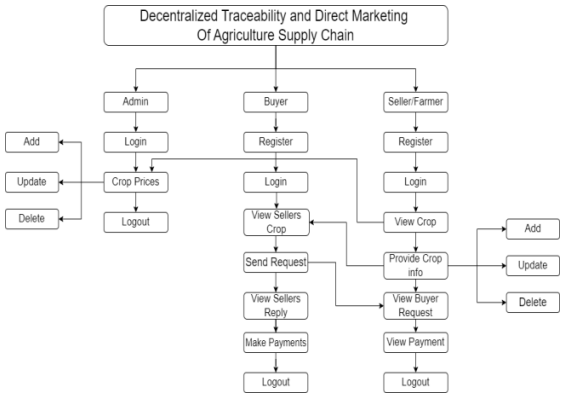

Fig2:FlowDiagram

V. SystemImplementation:

Modules:

To develop a decentralized traceability for agriculture supply chains, you can break down the functionality into several modules for the

different user roles: Buyer, Seller, and Admin. Here are the modules for each role:

Buyer:

1. Register: The buyer will register with their details like name, email, password, address, contact, so after that the buyer will login.

2. Login: After registration the buyer will login with their details.

3. View Seller's Crop Information: Once the sellers will add the details the buyer can view those details here.

4. Send Request to Seller: If the buyer wants the details of crop then buyer will send request to seller.

5. View Seller Requests: Displays responses from sellers to the buyer's requests.

6. Make Payment: Once the seller accept the request for the crop the buyer has to pay the amount for that crop.

7. Logout: Allows buyers to logout securely.

Seller:

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

2. Login: After registration the seller will login with their details.

3. Provide Crop Information: The seller will add there crop details like (crop name, crop category, and quantity and quality).

4.View Buyer Requests: When the buyer will send the request for the crop, here the buyer will view and he/she has to accept the request.

5. View Payments: Once the buyer will pay the amount for the crops. The seller can view the details of the payment.

6. Logout: Allows sellers to logout securely.

Admin:

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

2. 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.

3. Logout: Allows the admin to log out securely.

A sequence diagram is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart.

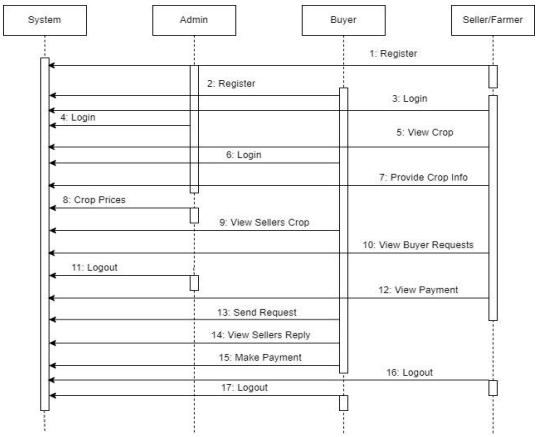

Fig- 3 : Sequence diagram

The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

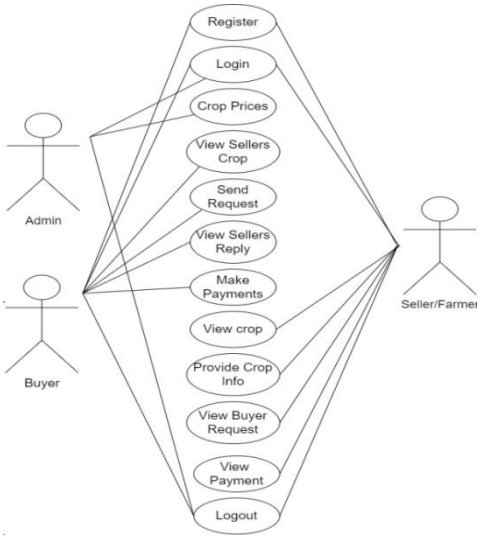

Fig- 3 :Usecase diagram

VI. Results and Discussion:

Given that we are using a webpage to demonstrate how the system functions. The outputs from the first to the last step, or from the registration stage to the payement viewing stage, are displayed in the photos below. Admin can login and set minimum cost price for the crops. Sellers can register, login, provide crop details and accept the requests of buyers for payment process.Buyerscanalso register,login, view the crop details,send request to sellers for payment.

Home: this is the initial page of the project

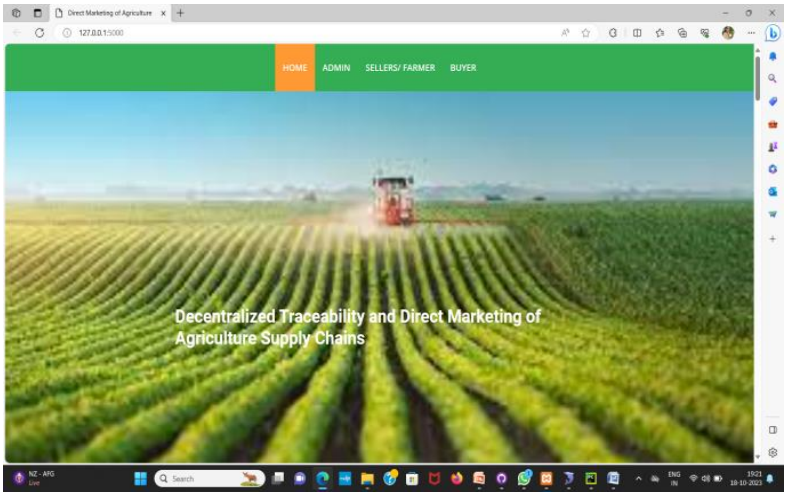

Fig5 :HomePage

User Registration:

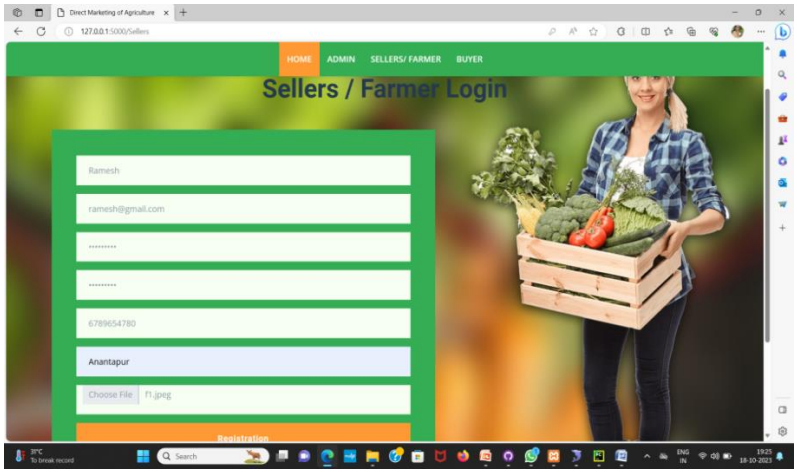

Fig6:Registration page

User login:

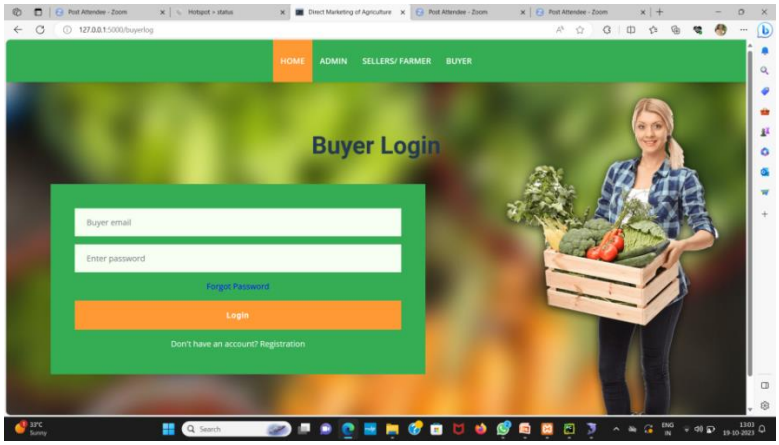

Fig7:LoginPage

Adding crop information

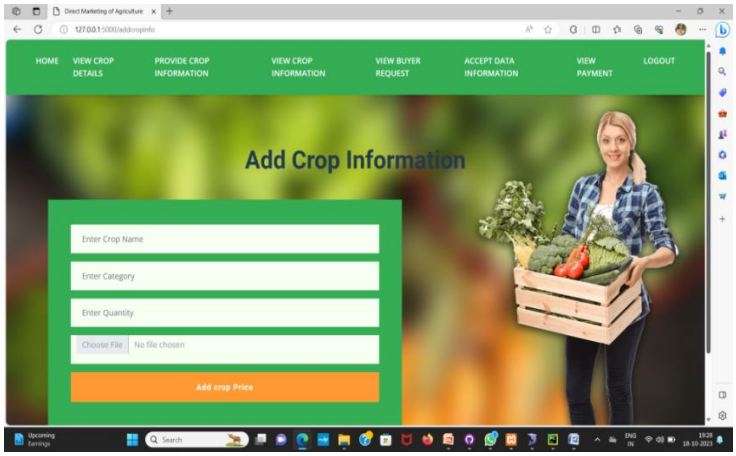

Fig8:Seller adding crop details

View Crop Information:

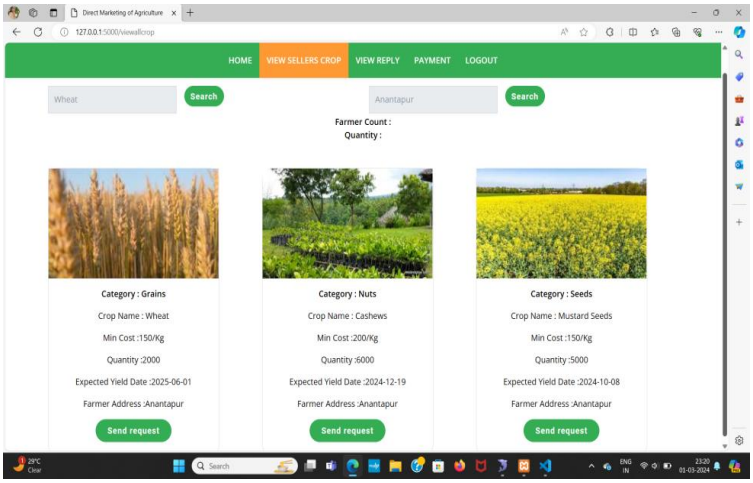

Fig9: BuyerViewingcrop details

Sending Request:

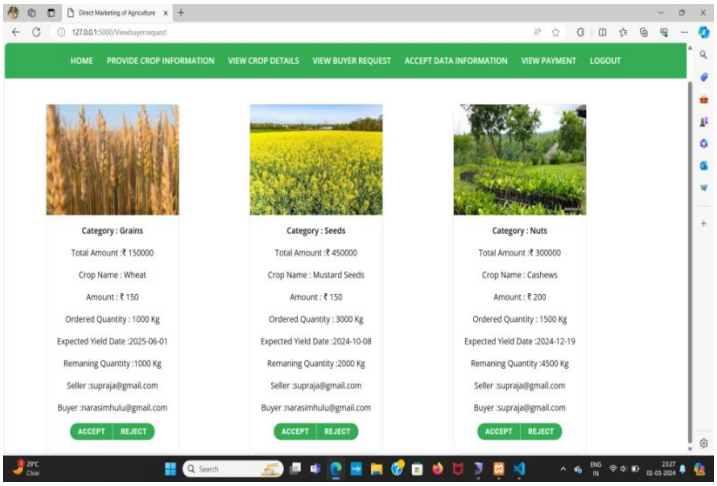

Fig10: Sending request to seller

View Response from Sellers:

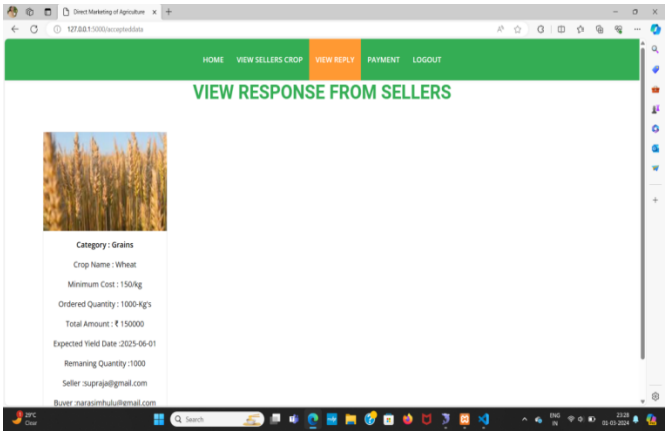

Fig11:RequestAcceptance

Payment:

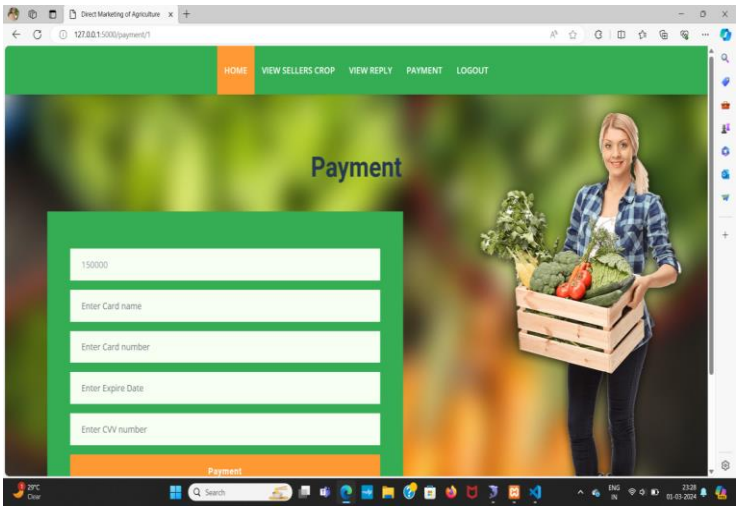

Fig 12: Payment Page

Payment Status:

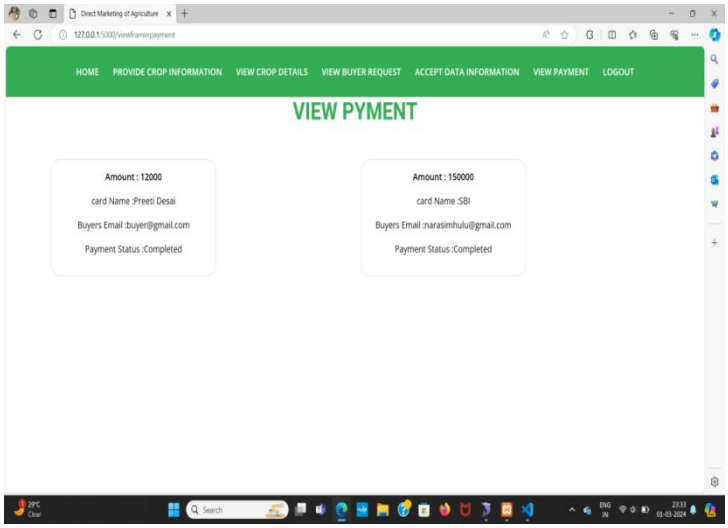

Fig 13: Payment Status

VII. Conclusion

In this paper, we proposed a Blockchain based web portal that facilitates farmers to sell their products in a transparent manner. All the data is stored in the database. There is an direct interaction between sellers and buyers which is crucial for trust and making the payment easier. This system enhance transparency, traceability and trust in the whole process.

VIII. FutureScope:

InfuturewecanimplementtoMoresecurity, provideEmailAuthentication and add rating system .

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