IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 11, Issue 3, March 2024

DOI: 10.17148/IARJSET.2024.11324

TRACING THE ORIGINS OF ORGANIC FOOD WITH BLOCKCHAIN TECHNOLOGY

M. Chaitanya Kumari[1], B. Anjani Priya[2], CH. Naga Srilekha[3], B. Madhuri[4]

M. Tech., (Ph.D), Computer Science and Engineering, Bapatla Women's Engineering College, Bapatla, INDIA[1]

B. Tech, Computer Science and Engineering, Bapatla Women's Engineering College, Bapatla, INDIA[2-4]

Abstract: The innovation known as block chain is highly valued for its ability to record and distribute transactions in the enduring, jumbled record. Customers cannot be guaranteed of the products' legitimacy in a typical supply chain because there is no means to question the hygienist and genuineness. Building a decentralised, blockchain-based system to verify the product's source and quality is the aim of this research. We are going to establish a certified organic food supply chain system in order to confirm the authenticity of the commodities. This study aims to explain the application of block chain technology to enhance the security of supply chain participants' data. We will lower the danger of fraud and data tampering by utilising blockchain technology in "smart contracts," and by offering a quality certification certificate, customers can be certain of the product's quality. This article helps people from a variety of industries comprehend the benefits of the blockchain-based system and put it into practice to improve the system's overall efficiency.

Keywords: Transparency, Ethereum, smart-contract, quality assurance, food supply chain.

I. INTRODUCTION

Blockchain technology provides a transparent, decentralised method of recording, storing, and validating transactions. Applying it to the supply chain for organic food can assist in addressing issues with fraud, mislabelling, and lack of transparency. Every stage of the organic food supply chain, from farm to table, may be tracked as a transaction on the blockchain in a blockchain-based traceability system. This contains details regarding the organic products' place of origin, the farming methods employed, the certifications attained, the mode of transportation, and any processing or packaging done. Customers and other stakeholders can obtain real-time, unchangeable information on the organic items they buy by utilising blockchain technology. They can confirm that items fulfil the required standards by authenticating claims of being organic. The organic food business is more trustworthy and confident as a result of this greater transparency. Furthermore, supply chain activities can be made more efficient by using blockchain technology.

It can simplify procedures, cut down on paperwork, and make product tracking quicker and more precise. The blockchain can speed up the identification and removal of impacted products in the event of a recall or other incident, reducing any possible health hazards. All things considered, the incorporation of blockchain technology into the organic food supply chain has great promise for transforming traceability and bringing about beneficial shifts within the sector. It encourages customer trust, helps environmental initiatives, and guarantees that claims about organic products are supported by trustworthy evidence. One kind of distributed ledger technology (DLT) is a blockchain, which is a shared data ledger used by several organisations connected via a dispersed network. Every transaction that occurs over the network is captured and stored by this technology in a block structure that is cryptographically linked and copied amongst network users.

II. RELATED WORK

These days, technology has greatly improved every industry. Everything in the modern world is automated, including supply chain management, robotics, vehicle registration, national identity card management, sentiment analysis, blockchain-based payment systems, stock market prediction, network systems, and much more. Examples of automated processes include electronic voting, supply chain management, supply chain management, robotics, and vehicle registration. Many studies have been conducted to integrate blockchain technology into supply chain systems, a modern industry like supply chain management [3]. Blockchain technology improved the supply chain by securing transaction systems and enabling traceability of operations and raw materials. A block chain-based supply chain framework that is successful must guarantee the authenticity of the items. demands both the on-chain capacity and the

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III. METHODOLOGY AND ALGORITHMS

3. 1 METHODOLOGY

The system comprises 3 modules and their sub-modules as follows:

User:

- The system is made up of the following three modules and their sub-modules:
- User:
- Sign up:
- In order to use the system, the user would need to register. Individuals have the option to register as a
  - Farmer
  - Manufacturer
  - Distributor
  - Retailer
  - Consumer

- **Sign in:**

With their login information, the user can log in.

•Overview:
They have control of their profile.

- **Change Password**:

If they so choose, they are able to alter the password.

- **Manage Products:**

This section is exclusive to farmers and manufacturers.
The product that a consumer or store needs can be added, updated, and seen by the user. Using the "By product" filter, they can look for and products.

- **Entry Product Listing:**

Products in the entry list are addable and seen by the user.
Users can use the following filters to search for product listings: by date, by product, and by user. They have access to the complete supply chain view.

They have access to the complete supply chain-view.

- **Exit Product Listing:**

By selecting items from the entry list, the user can add or see products.
Users can be assigned products, and listings can be found by applying filters such as date, product, or user. They have access to the complete supply chain view.

- **In use today:** (This module is exclusive to consumers or retailers.)

Users are able to view and add goods. From the list of entry products, they can select the items they want. Users can browse the complete supply chain and utilize the filter to search for a product by date or product/user.

- **Track your Food:**

By using its name, the user can look up food products. They may view the supply chain and all of the history, and they can use the filter to search for it by date or dates.

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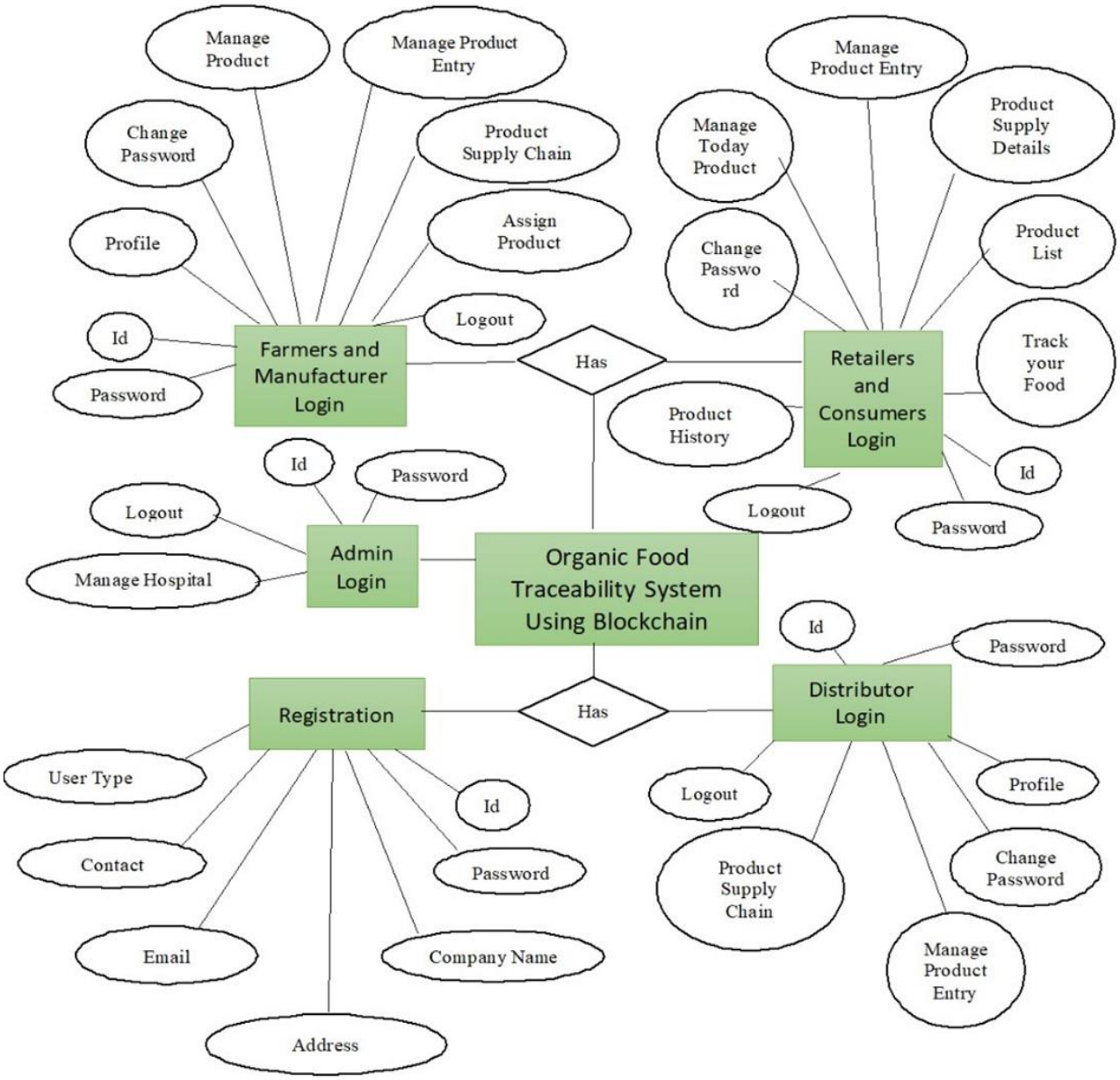

Fig 1: Architecture

3. 2 ALGORITHM:

Blockchain technology and its components are the main focus of the organic food supply chain traceability algorithms. The following are some of the crucial technologies and algorithms found in recent studies:

Blockchain technology: It ensures control over food goods' traceability from origin to consumer by offering a safe, unchangeable record for tracking them across the supply chain.

Smart Contracts: These are algorithms built into blockchain systems that automatically validate and verify important information, such the country of origin of a product and its certification status.

Internet of Things (IoT): IoT gadgets gather and handle data in real time, and they can be combined with blockchain technology to improve traceability.3. The algorithm TAB-PSO: These handles optimized chronological data within the

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IoT framework by combining particle swarm optimization (PSO) with Tree-Augmented Naïve Bayes (TANB).

Together, these technologies enable the digitization of food supply chains, improving traceability, accountability, sustainability, automation, efficiency, tracking, monitoring, response times, and provenance throughout food supply chains.

3. 3 IMPLEMENTATION

3. 3. 1 Farmer:

The first block in the block chain is the farmer, and it contains information about the farmer such as name, address, phone number, crop name, and crop selling price (FRP). Every detail is added to the smart contract, which uses the sha256 method to build the hash code. After that, the block is mined by block chain and added to the network.

3. 3. 2 Manufacturer:

The blockchain gives the manufacturer access to the farmer's name, address, and crop information. By doing this, the supply chain is made more visible and traceable and the manufacturer is given precise information regarding the crops' place of origin.

The blockchain can be used by farmers and manufacturers to trace and authenticate the provenance of crops. Manufacturers can quickly access farmer details by putting them in a blockchain network, including name, address, and crop information. This makes it easier for them to verify the legitimacy and traceability of the goods they buy from farmers. It's an effective instrument for promoting transparency and confidence in supply networks.

3. 3. 3 Distributor:

Distributor have access to login registrations that contain details about crop prices set by specific organizations and the government. Since the block chain is unchangeable, nobody can alter the farmer's information or the crop price. Thus, the dealer has access to both the farmer's prior hash code and his own data.

3. 3. 4 Retailer:

Retailer are able to purchase products from dealers at fixed prices set by the government. Furthermore, a retailer is not allowed to raise the product's price. Every time data changes, a block can produce a unique hash code since the block chain is immutable.

3. 3. 5 Consumer:

The final party in the block chain to buy a goods is the consumer. Since he is unaware of the product's exact price, we may authenticate his consent to verify the price of the goods when it is being sold by the farmer to the client. so that the client can obtain pricing and chain facts.

3. 4 RESULT

3. 4. 1 Farmer:

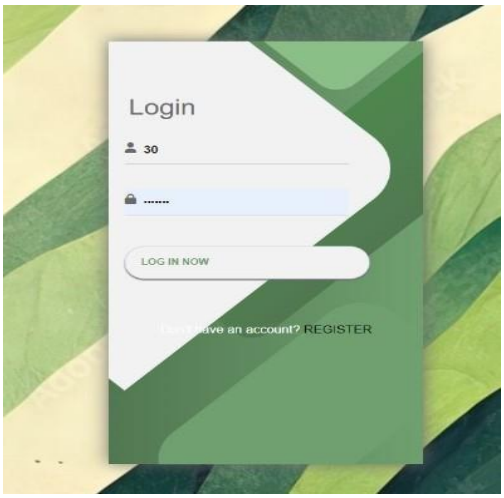

Fig 2: Farmer Login page

Fig 3: Farmer Product page

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3. 4 .2 Manufacture:

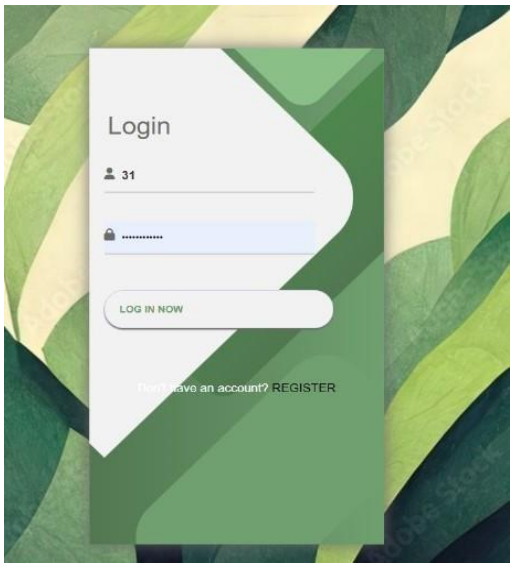

Fig 4: Manufacture Login Page

Fig 5: Manufacture Materials Page

3. 5. 3 Distributor:

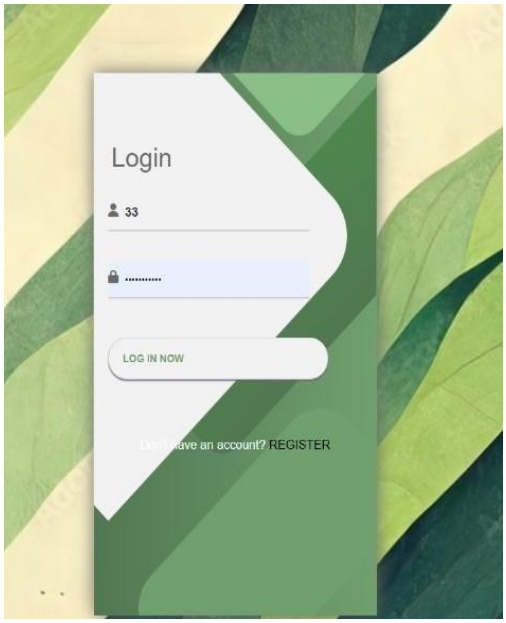

Fig 6: Distributor Login Page

Fig 7: Distributor Material Page

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3. 5. 4 Retailer:

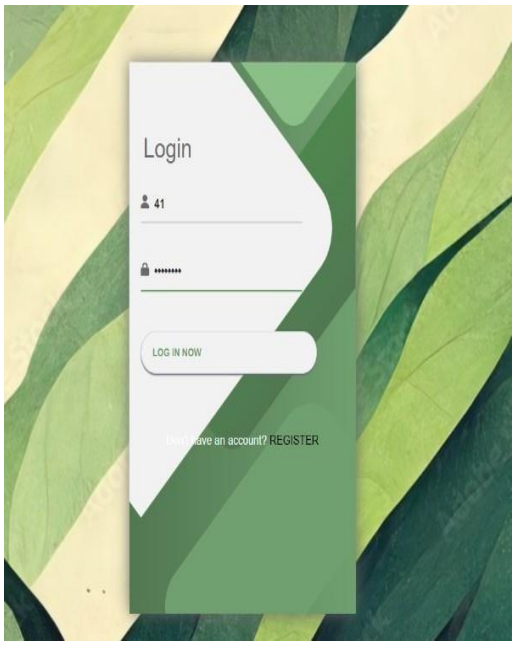

Fig 8: Retailer Login Page

Fig 9: Retailer Material Page

3. 5 .5 Consumer:

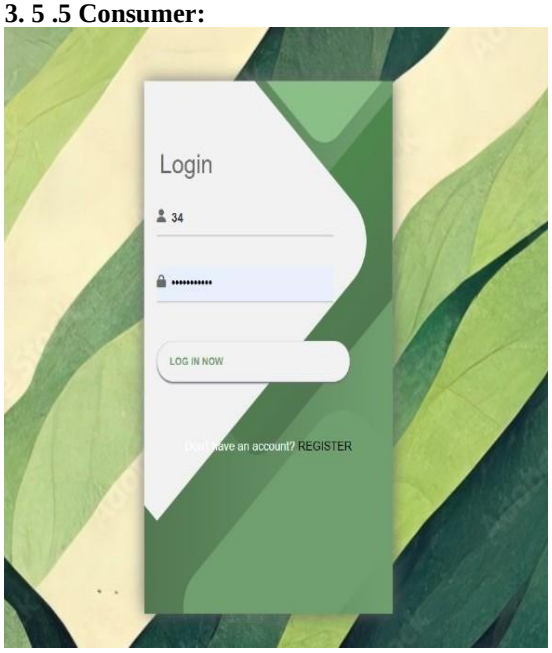

Fig 11: Consumer Login Page

Fig 12: Consumer Materials Page

III. CONCLUSION

This was our Asp.Net programming project for the System Design for Organic Food Traceability System. Our system development requires a significant amount of work on our part. We believe that this system made all of us very happy. Even if there is never a guarantee that a task in the development area will be flawless, this application could yet use further refinement. We acquired a great deal of expertise and learnt a great deal about the development industry. We're hoping this will work out well for us.

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BIOGRAPHY

Mrs. M. Chaitanya Kumari M. Tech.,(Ph.D) working as Assistant Professor in Department of CSE, Bapatla Women's Engineering College, Bapatla.

B. Anjani Priya B. Tech with Specialization of Computer Science and Engineering in Bapatla Women's Engineering college, Bapatla.

CH. Naga SriLekha B. Tech with Specialization of Computer Science and Engineering in Bapatla Women's Engineering college, Bapatla.

B. Madhuri B. Tech with Specialization of Computer Science and Engineering in Bapatla Women's Engineering college, Bapatla.