

BLOCKCHAIN IN FOOD SUPPLY CHAIN AND AGRICULTURE

Humairaa Shaikh

B.E IT MHSSCOE, Mumbai,

India

Amir Chappalwala

B.E IT MHSSCOE, Mumbai,

India

Khan Tausif

B.E IT MHSSCOE, Mumbai,

India

Prof. Vikas Baloda Assistant Professor
, IT MHSSCOE, Mumbai, India

Abstract - The center reason for this work is to combine the traditional supply chain with the blockchain to follow a food bundle from farm to fork with one of a kind character for every food bundle while keeping it simple for the specialists. It will keep the deals sealed and available to partners as indicated by the business arrangements and concurred agreements of information dividing among the organizations without including any incorporated expert for checking. Blockchain can get a progressive change in the Food Supply Chain industry. The current Food Supply Chain needs guaranteeing the trust of food cleanliness to the buyers. By following the food we consume at each stage, blockchain can guarantee sanitation and assemble trust in customers. Consequently, our work centers around utilizing blockchain innovation to accomplish information security, integrity, food traceability and smart contracts.

Keywords – Blockchain, traceability, smart contracts.

I. INTRODUCTION

These days buyers stress over their food item quality, wellbeing and sustenance. In spite of the fact that the food frameworks are a bit complex and change time to time, every year around the world, perilous food causes 600 million instances of foodborne sickness and 420,000 passings. 30% of foodborne passings happen among kids under 5 years old. WHO assessed that 33 million of solid lives are lost because of eating dangerous food around the world every year, and this number is likely an underestimation.

Food store network can be a lifeline by saving it from food frailty. Food supply chains guarantee traceability which can make critical commitment in food wellbeing. Food transportation were reliant upon paper based framework or inward PC frameworks which can be effectively lost, adjusted, changed and so forth. As

blockchain ensures a safe chain, which nobody can adjust or change. It is a decentralized stage that not just permits shared direct exchange that wipes out go betweens, yet additionally approves data by cryptography and records history forever. A safe perpetual record for each exchange is saved in a specific block and is sealed. Areas, for example, horticulture area which incorporates crops, animals, food fabricating industry and then again the advertising area which gives dispersion, wholesales and retails. Critical wellsprings of food like harvests, domesticated animals and fish yields ought to have higher needs.

Utilizing blockchain for food supply can demolish food fraudster's arrangements. Food misrepresentation is the demonstration of deliberately adjusting, distorting, mislabelling or messing with any food item anytime along the homestead to-table food inventory network. Fake and deliberate replacement, weakening or expansion to a crude material or food item, or distortion of the material or item for monetary profit (by expanding its evident worth or decreasing its expense of creation) is 'food extortion'. Utilizing blockchain in the food business production network, they can associate with better providers where the providers have to bring to the table provenance of their quality. In this way, blockchain can make a commercial center where providers can interface with the purchasers and bid on specific activities dependent on their quality. The existing system proposes two model – a) Blockchain Application Theory b) Decentralized Food Supply Chain Authentication Model. [2]. An existing paper applies a six-stage refinement measure that was proposed by Durach et al. : characterize research question, set incorporation and rejection standards, decide looking through data sets, apply measures, blend important writings, and report discoveries. [1].

II. METHODOLOGY

2.1 System Introduction

The main purpose of the system is to make the stored value alter proof so the food fraud cannot take place. Blockchain technology is used to make the system alter proof, this system can be used for supply chain monitoring. Starting from the manufacturer of the product, the manufacturer will add/save the data of the product to the block of the blockchain and that data will be passed to the end user i.e. consumer.[3]

We made the system like a marketplace where manufacturers add their products and distributors buy them. After the distributor buys it, he also cannot alter the value of the product because once the data is stored in the blockchain then it cannot be changed highlighting the Immutability feature.

The same procedure takes place for all the entities of the supply chain. Thus, consumers (end- users) need not worry about the product they buy because the data of each product is added to the blocks and is monitored and is authentic and protected using blockchain.

2.2 Project Scope

The Blockchain is the assortment of information and records, known as the technological data set which is connected together utilizing cryptography. The Blockchain in Agriculture and natural pecking order is utilized to make clarity between the cultivating cycle and store network (supply chain). It will assist with finding the transaction cost and accordingly sets aside them cash and time associated with the cycle. It is generally appropriate to improve coordinations, quality affirmation, nutrient management plans, and others. It likewise guarantees information privacy, information security and information integrity in the food supply network. Blockchain innovation is changing the food and farming areas by improving the dynamic capacities of associations. Blockchain helps in setting up direct relationship among ranchers and purchasers/retailers because of which ranchers can acquire experiences on spending conveyance and genuine market cost for their items and furthermore altering of information is not possible which makes the framework safer. [5] [6]

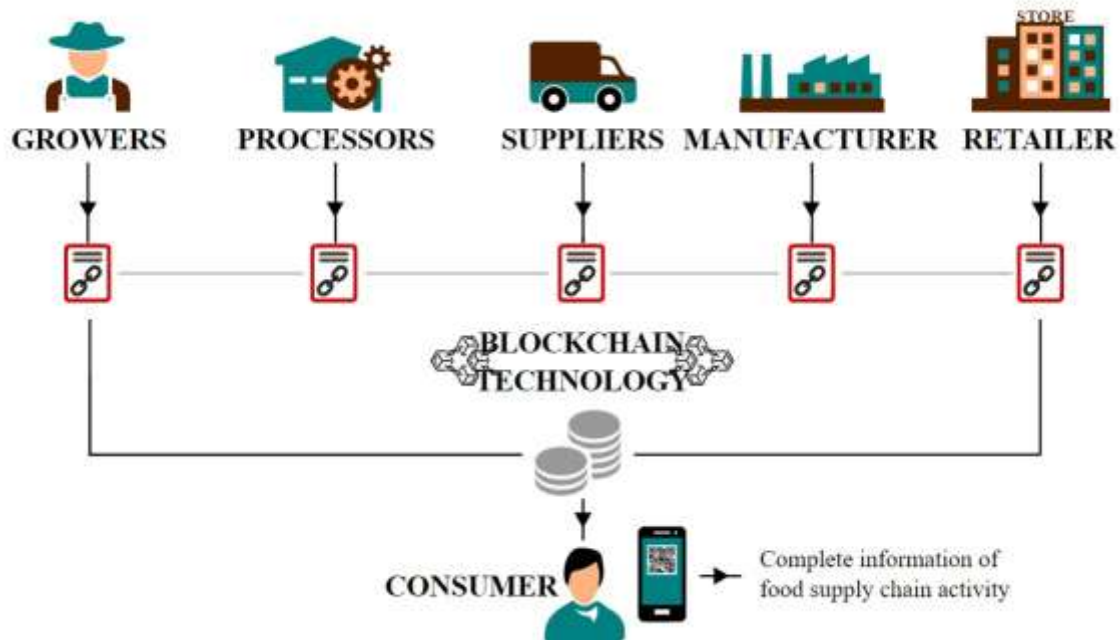
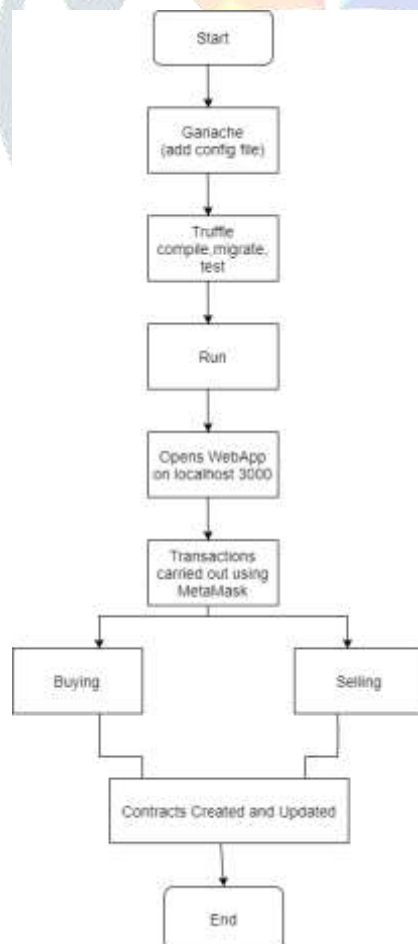


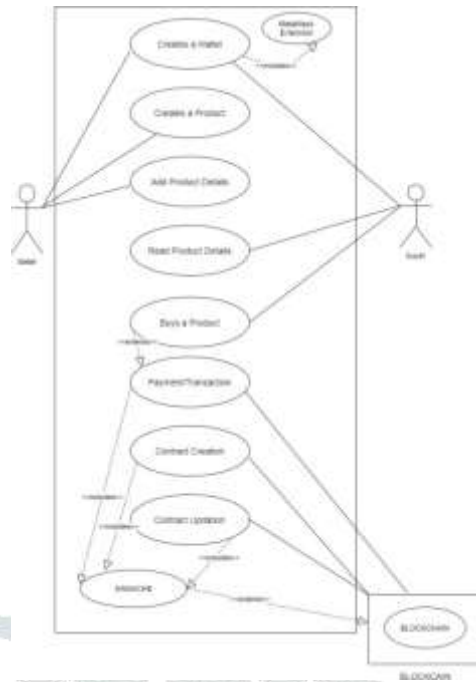
Figure 1. Blockchain in Food Supply Chain - Flowchart

III. SYSTEM ARCHITECTURE

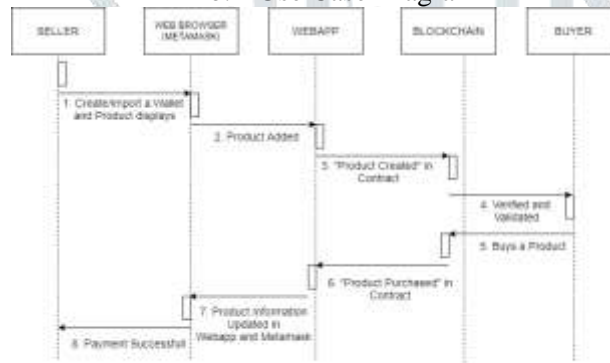
One of the major functions of this project is establishing proper security in the food supply chain and agriculture. Although the main focus is on security, there are also other functions like transactions , buying and selling options etc. Also , timestamp , date of expiry , date of manufacture are other relevant details will also be added in the block to ensure traceability and safety of the products which in turn will ensure the well being of the consumers as well.[4]



a. System Flowchart



b. Use Case Diagram



SEQUENCE DIAGRAM

c. Sequence Diagram



Communication Diagram

d. Communication Diagram

IV. RESULT

The system consists of Ganache and Truffle which is used to create, convey and test the webApp. It uses MetaMask extension (digital wallet) to connect with the Ethereum blockchain. Contracts are written using an Object oriented language – Solidity.



Figure 2. WebApp opened on localhost : 3000



Figure 3. Adding a product



Figure 4. MetaMask pop-up



Figure 5. Importing account from Ganache



Figure 6. Product added to the table



Figure 7. Product bought by distributor

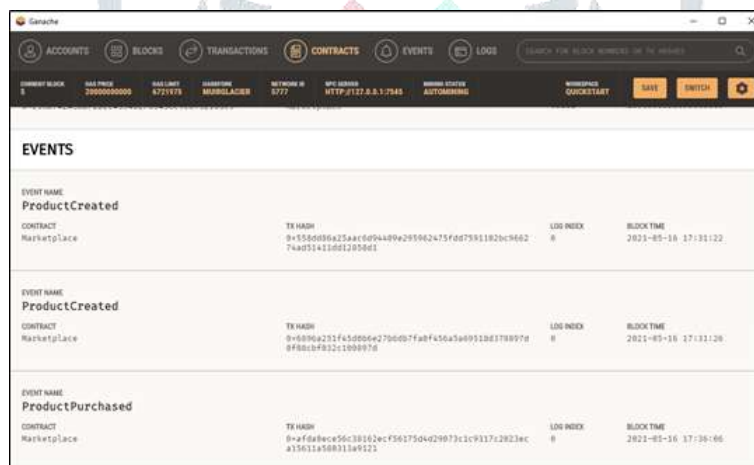


Figure 8. Transactions recorded in Ganache (Smart Contract)

V. CONCLUSION

Thus, the work focuses on using blockchain technology to achieve data security, integrity, food traceability and smart contracts. The developed system allows buying and selling of products in a secure manner. Each and every transaction gets recorded and can be monitored easily thereby eradicating the possibility of food-fraud otherwise. All the objectives of blockchain are introduced in the system, thereby making it absolute and reliable.

REFERENECESES

- [1] Jiang Duan, Chen Zhang, Yu Gong, Steve Brown and Zhi Li, “A Content-Analysis Based Literature Review in Blockchain Adoption within Food Supply Chain”, March 2020.
- [2] Dinesh Kumar K, Manoj Kumar D.S, Anandh R, “Blockchain Technology In Food Supply Chain

- Security”, January 2020.
- [3] Adnan Iftexhar , Xiaohui Cui , Mir Hassan and Wasif Afzal, “Application of Blockchain and Internet of Things to Ensure Tamper-Proof Data Availability for Food Safety”, May 2020.
- [4] Mischa Tripoli, Josef Schmidhuber, “Emerging Opportunities for the Application of Blockchain in the Agri-food Industry”, August 2018.
- [5] Lakshmi Sripathi, “Adoption of Blockchain Technology in Food supply chain management”, 2019.
- [6] Miguel Pincheira Caro, Muhammad Salek Ali, Massimo Vecchio, Raffaele Giaffreda, “Blockchain-based traceability in Agri-Food supply chain management: A practical implementation”, 2018.
- [7] <https://www.trufflesuite.com/docs/ganache/reference/ganache-settings>
- [8] <https://metamask.io/>
- [9] <https://web3js.readthedocs.io/en/v1.3.4/>
- [10] <https://docs.soliditylang.org/en/v0.8.4/>

