FOOD SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN

Vimal raj. T [1], Mohan. P [2], Vigneshwara G.B[3], Mr. Mayuranathan. M [4]

[1, 2 ,3] *B. E, Dept. of Computer Science and Engineering, Valliammai Engineering College, Chennai, Tamil Nadu*
[4]*Professor, Dept. of Computer Science and Engineering, Valliammai Engineering college, Chennai, Tamil Nadu*

--***--

Abstract - *Food supply chain management system plays a vital role in getting food products from farmers and supplying it to consumers. With the rapid growth in modern internet technologies so many new techniques have been introduced in the functioning of food supply chain management so that to meet the demand of food products in market and an efficient product is delivered to public. Everything is governed and maintained by a central authority which leads to problems like tampering and falsifying information regarding supply of rice and its processes. Blockchain a revolutionary technology which is decentralized and distributed is not governed by any central authority and provide distributed databases such that creating transparency in the network of supply chain. A supply chain simulation tested for the food product industry is proposed. We start by identifying requirements for such reference datasets, and then we identify the main building blocks. The nodes of the supply chain that represent the farmer who cultivates the crops are built on a simulation model from the measurement and improvement of manufacturing food product.*

*Key Words***: Food supply chain management system, blockchain, decentralized, distributed and transparency.**

1. INTRODUCTION

The Farmers, Distributors, Consumers are the prime source of agriculture. So the transaction made by them has to made transparent and secure to avoid illegal transaction and to cut commission rates between multiple dealers, hence using Blockchain (hyperledger or Ethereum) .These transactions are brought into blocks and the transaction is verified and validated which increases the profits for the farmers .When supply is high and demand is less then the price should be low and when the supply is less and demand is high then the price must be high. This method is done by using the machine learning algorithm. The Blockchain, is designed to achieve peer-to-peer electronic payments directly, without participation of a trusted third party. In blockchain, all peers form a distributed network. Each peer acts as a node of the network and can participate in calculating the solution to a hash-based mathematical problem ensuring integrity of transactions. Each transaction record is encapsulated as a block and added onto the existing block chains. The recorded block contents are collectively referred to as the ledger. All information is then updated synchronously to the entire network so that each peer keeps a record of the same ledger. This method is done by using the machine learning algorithm. When the farmer needs to sell the food product he comes to the online platform and capture the product using the camera and sends to the dealer. The dealer validates the product, then the product will be reached to the particular dealer. When the dealer receives the product, he validates and verify the product using the QR scanner and the block will be added to the chain. Once the block is added to the chain, the money will be transacted to the farmer. This transaction is stored as an archive. When the customer needs the product, the demand arises. So the customer buy the product from the dealer. Once the transaction between the customer and dealer completes, the particular block will be removed from the chain and stores as an archive.

1.1 OBJECTIVES

- The objective of the project is about controlling and avoiding illegal and excess money supply in the hand of intermediaries.

- The farmer cultivates the food product but he depends on intermediate dealers to sells the product to the end customer. But the intermediaries make more profit by selling at high price to the customer.

- This system neither bring profit to the farmers and not be beneficial to the customers.

- Hence to control this activities, our project provides an alternate way by using the blockchain method.

2. SYSTEM REQUIREMENTS AND ANALYSIS

2.1 General:

Using this requirement, our application provides high service with efficiently. Software requirements deal with defining software resource requirements and pre-requisites that need to be installed on a server that provide optimal functioning of an application. These requirements or pre-requisites are generally not included in the software installation package and need to be installed separately before the software is installed. The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware, hardware requirements list is often accompanied by a hardware compatibility list (HCL), especially in case of operating systems. An HCL lists tested, compatible, and sometimes incompatible hardware devices for a particular operating system or application. The

following sub-sections discuss the various aspects of hardware requirements.

2.2. HARDWARE REQUIREMENTS

The hardware requirements may serve as the basis for a contract for the implementation of the system and should therefore be a complete and consistent specification of the whole system. They are used by software engineers as the starting point for the system design. It should what the system do and not how it should be implemented.

HARDWARE REQUIREMENTS

Processor	: Pentium Dual Core 2.00GHZ
Hard disk	: 140 GB
Mouse	: Logitech.
RAM	: 4GB (minimum)
Keyboard	: 110 keys enhanced

2.3 SOFTWARE REQUIREMENTS

The software requirements document is the specification of the system. It should include both a definition and a specification of requirements. It is a set of what the system should do rather than how it should do it. The software requirements provide a basis for creating the software requirements specification. It is useful in estimating cost, planning team activities, performing tasks and tracking the teams and tracking the team's progress throughout the development activity.

Operating system	: Windows7 SP1, 8, 8.1
IDE	: Microsoft Visual Studio .Net 2013
Front End	: ASP.NET
Coding Language	: C#
Backend	: SQL Server 2012

3. RELATED WORKS

[1]. Satoshi Nakamoto in his paper "Bitcoin: A Peer-to-Peer Electronic Cash System", has explained how this digital currency which was built on Blockchain platform could challenge the existing financial systems and eradicate the problems related to high transaction fees, global transactions, double spending, inflation etc

[2]. Blockchain technology is not limited only to Bitcoin as there are various applications which can be built upon this framework. Blockchain groups all the digital transactions into a block and all the blocks are arranged in chronological order thus forming a chain of blocks which is Blockchain

[3]. Blockchain uses some cryptographic functions to encrypt the data so that anonymity of a person or data is maintained throughout the Blockchain network

[4].There are different types of Blockchain such as Public, Private and Consortium Blockchain based on necessity of an organization or individual want to use

[5]. A Public Blockchain is completely decentralized allowing its connected users to read or write data onto the Blockchain. Whereas in Private Blockchain, permissions to read or write data onto the Blockchain are controlled by one organization which is highly trusted by other users. Consortium Blockchain is hybrid of public and private Blockchain. Instead of allowing any person to participate in validation process Consortium Blockchain here allows group of organizations to form together to have full control over Blockchain and users ought to participate are predetermined. Hence, depending on the necessity and type of data to be uploaded anyone of these Blockchain models is to be used.

3.1 EXISTING SYSTEM

In existing system, the farmer cultivates the crop and sell the food product to the intermediaries at a margin price. The food products are reached to end consumer by passing through multiple intermediaries at increasing cost. The farmer sell the products at the lower cost but it reaches to the end customer at higher price where only intermedieries are yields more profit than the farmer who harvest it. They may also hoard the products and create a artificial demand so that they can sell the products at the higher price.

3.2 PROPOSED SYSTEM

In this proposed system, we overcome the drawbacks in the existing system. The Farmers, Distributors, Consumers are the prime source of agriculture. So the transaction made by them has to made transparent and secure to avoid illegal transaction and to cut commission rates between multiple dealers, hence using Blockchain (hyperledger or Ethereum) .These transactions are brought into blocks and the transaction is verified and validated which increases the profits for the farmers .When supply is high and demand is less then the price should be low and when the supply is less and demand is high then the price must be high. This method is done by using the machine learning algorithm.

4. SYSTEM ARCHITECTURE
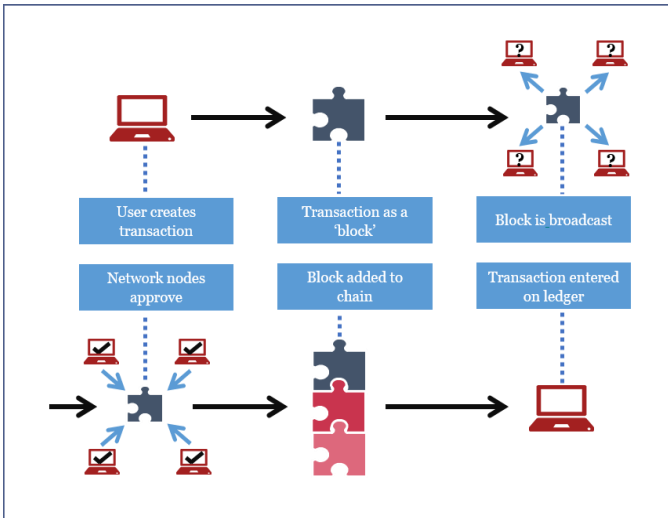
5. PROJECT DESCRIPTION

5.1 GENERAL:

5.2 PROBLEM DEFINITION

The Blockchain, is designed to achieve peer-to-peer electronic payments directly, without participation of a trusted third party. In blockchain, all peers form a distributed network. Each peer acts as a node of the network and can participate in calculating the solution to a hash-based mathematical problem ensuring integrity of transactions. Each transaction record is encapsulated as a block and added onto the existing block chains. The recorded block contents are collectively referred to as the ledger. All information is then updated synchronously to the entire network so that each peer keeps a record of the same ledger.

6. METHODOLOGIES

When the farmer needs to sell the food product he comes to the online platform and capture the product using the camera and sends to the dealer. The dealer validates the product, then the product will be reached to the particular dealer.When the dealer receives the product, he validates and verify the product using the QR scanner and the block will be added to the chain.Once the block is added to the chain, the money will be transacted to the farmer. This transaction is stored as an archive.When the customer needs the product, the demand arises. So the customer buy the product from the dealer.Once the transaction between the customer and dealer completes, the particular block will be removed from the chain and stores as an archive.

7. MODULES AND ITS DESCRIPTION
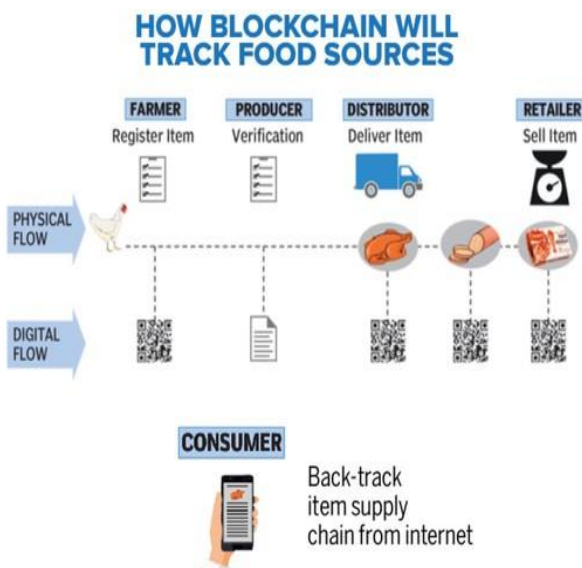
FARMER:

1. AUTHENTICATION.

2. SEND PRODUCT

3. VIEW SALES DETAILS

DISTRIBUTOR:

4. AUTHENTICATION.

5. PURCHASE PRODUCT

6. GENERATE KEY

7. POST PRODUCT PORTAL

RETAILER:

8. AUTHENTICATION.

9. PURCHASE PRODUCT

10. GENERATE KEY

11. POST PRODUCT PORTALUSER

12. AUTHENTICATION.

13. BUY PRODUCT

14. RECEIVE PRODUCT

7.1 MODULE DISCRIPTIONS:

FARMER:

Authentication

Login

The farmer needs to enter exact username and password. If login success means it will take up to upload page else it will remain in the login page itself.

7.2 SEND PRODUCT:

Farmer can send the Product to the Distributor Person.

7.3 VIEW SALES DETAILS:

View the Sales Details of farmer how much he got sales from distributor

7.4 DISTRIBUTOR:

Authentication

Login

The Distributor needs to enter exact username and password. If login success means it will take up to upload page else it will remain in the login page itself.

7.5 PURCHASE PRODUCT:

Distributor can purchase product from the farmer he will pay for that product.

7.6 GENERATE KEY:

Distributor will generate the Key and send the key to Retailer.

7.7 POST PRODUCT IN PORTAL:

Generate key and send the key to Manager Person.

7.8 RETAILER:

Authentication:

Login

The Retailer needs to enter exact username and password. If login success means it will take up to upload page else it will remain in the login page itself.

PURCHASE PRODUCT:

Retailer can purchase product from the Distributor he will pay for that product.

7.9 GENERATE KEY:

Retailer will generate the Key and send the key to Customer.

7.10 POST PRODUCT IN PORTAL:

Generate key and send the key to Manager Person.

7.11 USER:

Authentication

Registration

If you are the new user going to login into the application then you have to register first by providing necessary details. After successful completion of sign up process, the user has to login into the application by providing username and exact password.

Login

The user needs to enter exact username and password. If login success means it will take up to upload page else it will remain in the login page itself.
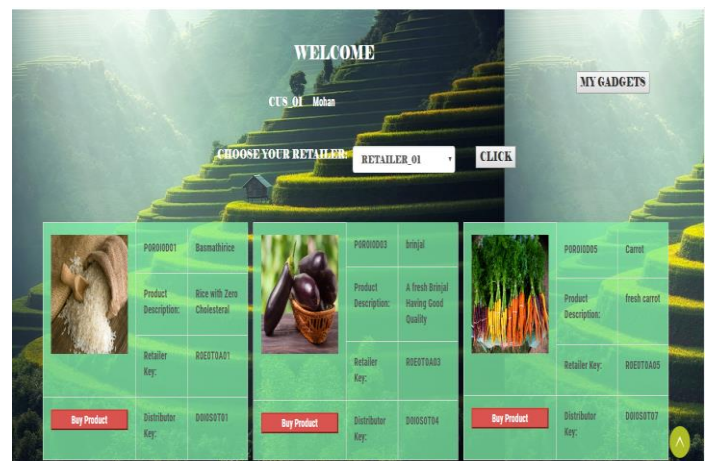
7.12 BUY PRODUCT:

User can buy a product by selecting particular retailer from the portal.
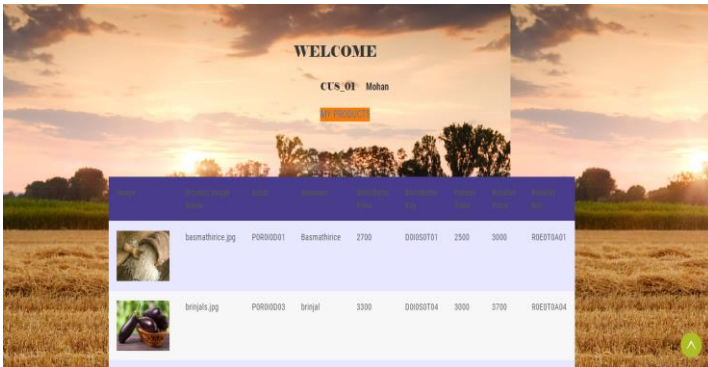
7.13 RECEIVE PRODUCT:

User can receive the Product from the Retailer Person.

8. SAMPLE SNAPSHOTS:
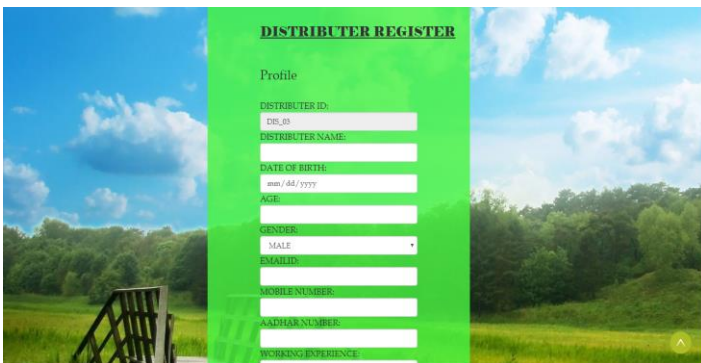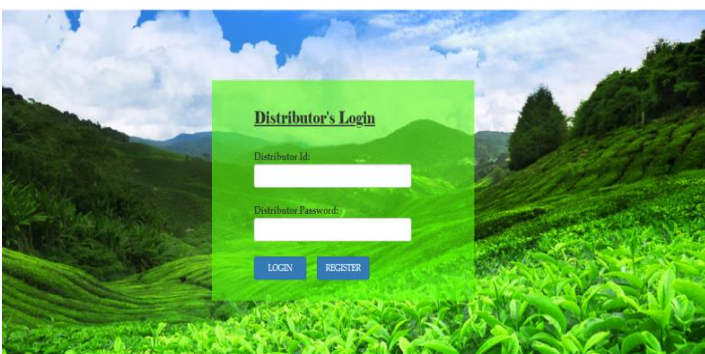
8.1 CUSTOMER SHOPPING PAGE:

8.2 CUSTOMER PRODUCTS:
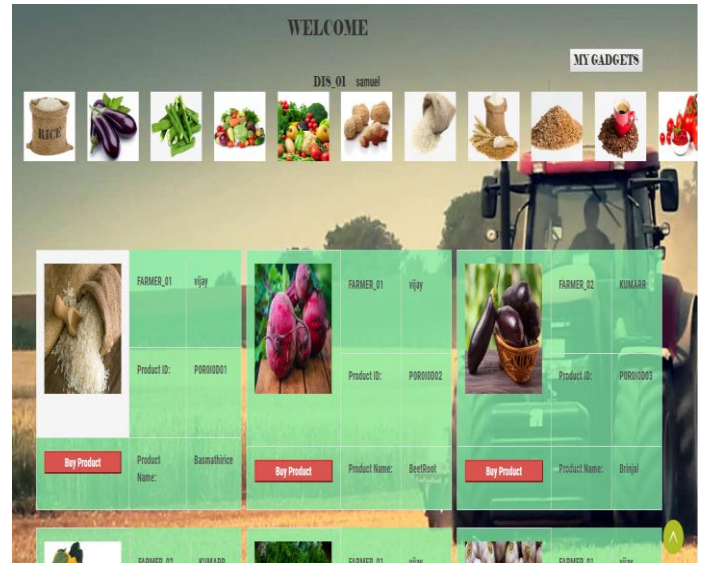

8.3 CUSTOMER PAYMENT:
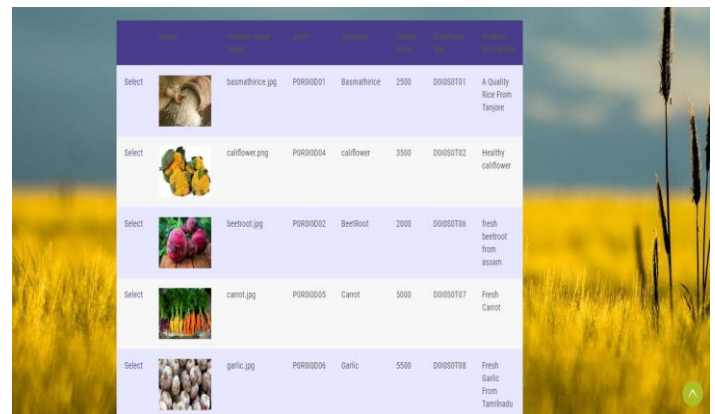

8.4 DISTRIBUTOR REGISTER:

8.5 DISTRIBUTOR LOGIN:

8.6 DISTRIBUTOR PAGE:

8.7 DISTRIBUTOR PRODUCT DELIVERY:

9. CONCLUSION

We have proposed an supply chain management system using block chain which makes the transaction between the farmer and the end customer transparent. This transaction are brought into blocks using hyperledger to verify and validate which increases the profit for the farmers and also for the customers.

10. REFERENCES

[1] L. Mönch, J. W. Fowler, and S. J. Mason, Production Planning and Control for Semiconductor Wafer Fabrication Facilities: Modeling, Analysis, and Systems (Operations Research/Computer Science Interfaces), vol. 52. New York, NY, USA: Springer, 2013.

[2] I. M. Ovacik and W. Weng, "A framework for supply chain management in semiconductor manufacturing industry," in Proc. 7th IEEE/CPMT Int. Electron. Manuf. Technol. Symp., Austin, TX, USA, 1995, pp. 47–50.

[3] Y. H. Lee and K. H. Kang, "Diverse production and distribution models in supply chains: A semiconductor industry case," in Trends in Supply Chain Design and Management: Technologies and Methodologies, H. Jung, B. Jeong, and F. Chen, Eds. London, U.K.: Springer, 2007, pp. 269–287.

[4] C.-F. Chien, Y.-J. Chen, and J.-T. Peng, "Manufacturing intelligence for semiconductor demand forecast based on technology diffusion and product life cycle," Int. J. Prod. Econ., vol. 128, no. 2, pp. 496–509, 2010.

[5] C.-F. Chien et al., "Modelling and analysis of semiconductor manufacturing in a shrinking world: Challenges and successes," Eur. J. Ind. Eng., vol. 5, no. 3, pp. 254–271, 2011.

[6] MASM. (1997). Data Sets. [Online]. Available: http://p2schedgen.fernuni-hagen.de/index.php?id=242

[7] Van Der Vorst J G A J. Performance measurement in agri-food supplychain networks[M]//Quantifying the agri-food supply chain. Springer Netherlands, 2006: 15-26.

[8]Souza Monteiro D M. Theoretical and empirical analysis of the economics of traceability adoption in food supply chains[J]. 2007.

[9]Blackburn J, Scudder G. Supply chain strategies for perishable products: the case of fresh produce[J]. Production and Operations Management, 2009, 18(2): 129-137.