



SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN TECHNOLOGY

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Abstract: Nowadays Current product supply chain is not reliable .The Current System is prone to man-in-middle attack. Although conventional technologies, such as RFID, barcode scanning, and mobile technology, have been applied for tracking and tracing product, counterfeit product is still significantly high. Duplicate Products are sold on large scale. This impacts the economical and manufacturing system. To overcome this problem we are introducing blockchain in production industry. The proposed Framework represents blockchain based secure infrastructure and provides reliable product's supply chain . It Prevents from man-in-middle attack which results in safe transaction.

Keywords— Blockchain, Peer to Peer Network, Security, Ledger, Supply Chain Management

I. INTRODUCTION

Supply chain management system refers to the system in which the management of the flow of the material, goods and services involves processing inventions of finished goods from point of origin to the point of consumption. According to the National Institution for Transforming India current logistics cost in India GDP is about 14% due to current supply chain management system's inadequacy. This current logistics cost can be decreased by applying changes in supply chain management system in a smart way that is by using blockchain technology .Wide range of industries are affected by counterfeit products which leads to main big global problem such as illegal counterfeit drugs. Pharmaceutical industry providing fake and nonlegitimate medicines which are hazardous to life. If the quality of materials and the source of supply is not checked properly the final product can be turned into fake product. After the completion of finished product the distributors must check if the product is not mislabelled or if fake product is not delivered. Also if the storage condition and transportation service is unsatisfactory and improper manufacturing processes leads to consumer's life in danger. These flaws can be overcome using blockchain in supply chain management. The features of blockchain in supply chain management are prevention of man-in-middle attack, immutability and advanced security. Manufacturing industries, financial sectors and e-commerce websites grows financially by the increased use of blockchain technology.

The current product supply chain is not reliable. System that is used nowadays is prone to man-in-middle attack. Although conventional technologies, such as RFID, barcode scanning, and mobile technology, have been applied for tracking and tracing product, counterfeit product is still significantly high. The supply chain management uses centralized system for storing information about the products. It is difficult to check the status of lifecycle of the product from manufacturer to consumer. Without transparency the relationship between every participants can be affected. It can lead to trust issues between them .In India every year 1.05 lakh crore is lost due to counterfeiting.

The product in supply chain management has a lifecycle. That lifecycle includes various stages like supplying, manufacturing, distributing, shipping, delivery. If a single stage is compromised then it can affect things like quality of product, relationship between participants. If the product is not acceptable to the consumer due to poor quality it affects the sales quantity which leads to financial problems. The current system has no transparency, less traceability and communication problem due to old ledger system. The current system has to depend on third party. Lack of digital services leads to more man power. The data of every transaction is not secure and is easy to change. This problem can be overcome by new technology of blockchain. The proposed system has benefits of security, transparency, traceability and immutability. The role of blockchain technology in the supply chain system gives mainly safety transportation system in secured manner from the factory to the customer which leads to customer's satisfaction and no economical loss.

II. SYSTEM ARCHITECTURE

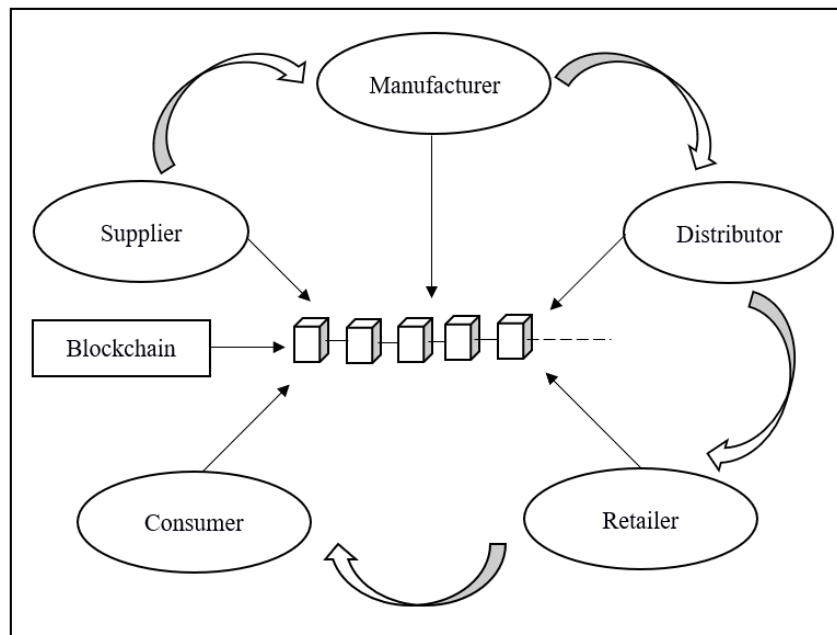


Figure 1. System Architecture

III. LITERATURE SURVEY

Randhir Kumar and Rakesh Tripathi [1] used Blockchain Technology in tracking of counterfeit medications in supply chains. Mainly addressed safety purposes of supply of drugs by using QR-code technology.

N.Nasurudeen Ahamed, Karthikeyan, Anandaraj, Vignesh R [2] used many technologies viz. NFC, QR-code and RFID for current status of the sea food from the manufacturer to consumer by using special tags.

Victoria Ahmadi, Benjjelloun, Tanvi Sharma [3] uses supervision of drugs of the government with the help of blockchain technology along with Internet of Things. RFID technology is used to solve the counterfeiting problems of drugs.

Bhagya Hegde, Dr. B Ravishankar, Mayur Appaiah [4] analysed to get rid of problems in the agriculture supply chain of India, blockchain technology is implemented for the verification of data and storage for reliability.

Anitha Premkumar and Srimathi C [5] used blockchain and IOT technology in pharmaceutical industry to ensure safety and confirmation of right product. For the violations in the system and frauds this problems are overcome by RFID chip is used to every shipment.

Sidra Malik, Volkan Dedeoglu, Salil Kanhere and Raja Jurdak [6] used similar technology named as Trustchain which has security of 3 levels to interaction between participants in the supply chain system for the incorruptibility.

Ms.S.Madhumidha, Dr.P.Siva Ranjani, Ms.S Sree Varsinee, Ms.P.S.Sundari [7] used encryption and authentication for the logistic transformation in the supply chain in a convenient way. For enhancing the supply chain management system devices like IOT and RFID tags are used.

Sina Niya, Danijel Dordevic, Atif Nabi, Tanbir Mann, Burkhard Stiller [8] considered traditional supply chain system need to upgrade with the help of Ethereum blockchain and application with the absence of hardware. For the tracking of the products application of QR-code is utilized like transportation combination and transformation.

IV. PROPOSED FRAMEWORK

In product lifecycle several processes are conducted. Initially raw material or resources are supplied by the supplier to the manufacturer for the development of the product. Manufacturer arranges this raw material standardly and develops the particular product as per requirement. This finished product is shipped towards to the distributor. Then distributor distributes desired product to the various retailers. Retailers offer the sales on the product for the customer. At Last consumer buys the product from retailer. All these transactions data are stored in the specific blocks which later connects to the blockchain.

V. ADVANTAGES

Real transparency is acquired by blockchain technology. All participants in the supply chain management has to give the information of their each work digitally. This leads to overcome the problem of trusting issues.

A retailer can login the blockchain system and check that their product is in warehouse that is to be packaged for shipment. If the product is damaged then it will be returned and customer will get a refund or replacement.

Blockchain uses decentralized distributed ledger which stores data into the blocks in a secure manner. If a hacker wants to change a single block's data ,then he has to change entire blocks data which is not possible.

Blockchain gives the facility of tracking of the product in each lifecycle. The details of the product assures that information is accurate.

Immutability in the blockchain is achieved by cryptography. Every transaction in the blockchain system has particular nonce.

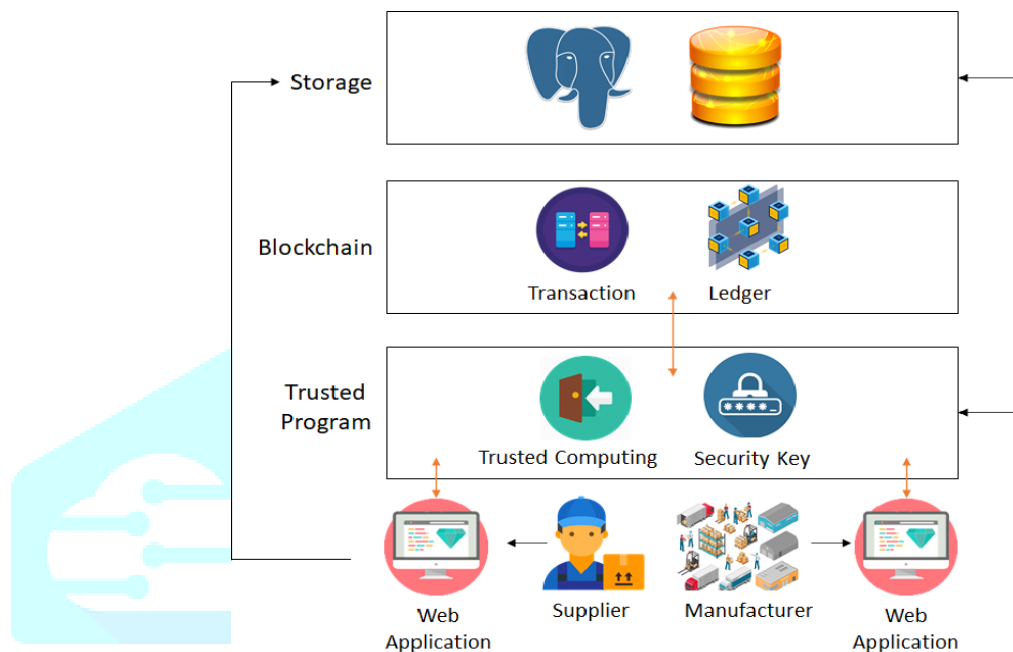


Figure 2. Supply Chain Management System

The proposed system includes mainly five participants which are Supplier, Manufacturer, Distributor, Retailer, Customer. Considering communication between supplier and manufacturer for the transpose of logistics, each participants will have login in the web based system. While entering in the trusted program participants need trusted computing and particular security key. On successful authentication participants ready to communicate with each other. Participant's entry in the system is saved in the form of transaction later on which will be converted in blockchain ledger. This secured ledger is stored in high secured SQL database.

VI. CONCLUSION & FUTURE WORK

The proposed Framework represents blockchain based secure infrastructure and provides reliable product's supply chain . It Prevents from man-in-middle attack which results in safe transaction .This system gives legitimate product with quality assurance to get the customer satisfaction. Digital implementation of manufacturing industry is an objective in e-commerce system. This digitization process decreases man power.

It is believed that change is necessary to current supply chain management system for better technology which blockchain provides. With the help of sponsorship we can add new technologies like RFID, QR code, NFC and Geo tag.

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