SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN FOR PHARMACEUTICAL

[1].Darshan Bajirao Parab, [2].Sairaj Sachin Shinde

ASM's Institute of Management & Computer Studies Thane 400604,India Email: darshanparab26@gmail.com
ASM's Institute of Management & Computer Studies Thane 400604,India Email: sairajshinde85@gmail.co

ABSTRACT:

In today's economy, blockchain technology is the newest and most promising innovation. A blockchain is simply a publicly accessible ledger or distributed database that contains records of all digital transactions or events that have been carried out and shared by all involved parties. For the transfer of value within a corporate network, it offers provenance, immutability, and finality. It lowers expenses and errors by facilitating value exchange in real time. based on a network consensus methodology, wherein cryptography provides the necessary confidence between the parties to a transaction. The goal of this paper is to provide a quick understanding of blockchain technology.

Keywords: network security, cryptography, digital transaction, and cryptocurrency

Introduction :

The digitalization of supply chains is causing a fundamental transformation in the associated supply chain activities. The process of creating new revenue streams and commercial value for enterprises through the intelligent, value-driven, and effective digitization of supply chains is known as "leverage approaches" and makes use of new technical and analytical techniques. By enabling businesses to lower operating costs and raise quality while boosting sales revenue through growing market shares, creating new products that satisfy consumer demands, and gaining a competitive edge that enhances all business operations, digitalized supply chains improve related capabilities. Block-chain applications in the supply chain have drawn a lot of attention in this regard. Block chain technology can therefore be used to greatly enhance supply chain operations.

Businesses have already begun to integrate blockchain technology into their supply networks. The benefit is that blockchain technology can provide a dependable and safe system that guarantees data immutability and transparency, and smart contracts improve operational efficiency. Supply chains can benefit from increased end-to-end data transparency, lower costs and risks, and more sustainable operations thanks to blockchain technology. Because the pharmaceutical sector demands more responsive and effective supply chain handling strategies—inadequate supply chains have the potential to negatively impact a company's reputation and customer satisfaction—blockchain technology appears to be a promising use in this domain.

An extensive examination of the possibilities of block-chain technology in supply chain management can be found in the "SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN FOR PHARMACEUTICAL" project. We will examine the robust security features and intricacy of block-chain technology.

Our study attempts to show significant influence on the supply-chain sector by offering fixes for existing issues.We see a future where medical information is not only widely available and safe, but also controlled by individuals, thanks to the power of the supply chain.

Literature Review :

[1]A block chain approach to the pharmaceutical supply chain:
In this study, we propose a decentralized online pharmaceutical product sales framework based on blockchain, free from middlemen like pharmacies or hospitals. The suggested method is predicated on the use of MATIC smart contracts, which track participant interactions and cause documented events to enable participants stay informed about sales transactions.In order to guarantee the safe delivery of medications, smart contracts manage specific situations including customer reimbursements in the event that contract terms are broken.

[1] Blockchain Technology for Supply Chain Management Study (2021)
Users gain greatly from the rapidly expanding usage of new technology known as "block chain technologies" in a variety of fields, despite worries about security, transparency, and decentralization. Data, transactional information, time, money, and other types of information are all captured and kept in one place by the system. By doing this, security is guaranteed and corrupted data is prevented. To guarantee the security level, a number of patterns and algorithms were met. The majority of automations, including supply chains and electronic voting, employ blockchain technology. They are

quite vulnerable since hackers might attack or tamper with this data. Block chain technologies are utilized as a key tool to guarantee security outside the system and transparency inside the system.

A thorough analysis of the many approaches and strategies applied in the supply chain domain under block chain technologies has been provided.

[1]Supply chain management based on blockchain (2022):

In recent years, blockchain technology has expanded beyond finance into a wide range of industries, an unprecedented expansion. The technology's effectiveness in supply chain management has been demonstrated by theoretical models in industries including pharmaceuticals, fashion, and logistics as a whole. Operations related to disaster relief, medical missions, and other circumstances can all profit from supply chain management (SCM) expertise. Members of the supply chain can benefit from help in documenting cost, date, location, quality, certification, and other relevant data by using blockchain technology.

[3] To give a comprehensive picture of the possible benefits and impact of block-chain technology on the long-term performance of supply chains, we present a systematic mapping of the literature in this work.PROBLEM STATEMENT

Lack of transparency

The challenge of tracking down the source of a problem is one of the most prevalent supply chain concerns in the pharmaceutical sector. When drugs are shipped in extremely unfit state for human consumption, when a fake medication is found in the cargo, or when costs increase for no apparent reason.

Digitization

The automation, smart contracts, block-chain, digital signatures for regulatory documents, digitization of documentation, and standardization across industry platforms. The primary obstacle facing the pharmaceutical industry is how to implement changes in a secure manner while improving data security to support post-Covid19 work conditions. and how to monitor the transformation and innovation of supply chain instruments and methods for ongoing enhancement in the digital realm.

Explanation:

Creating a user-platform web application especially for the procedures connected to blockchain and transparency is the difficult part of the job. For users to register, browse, and view data, a smart contract system must be created. User-friendliness should be the application's first priority, and it should include effective communication channels to let customers and retailers communicate. The final objective is to create a strong platform that supports the SCM delivery of medications to patients while guaranteeing compliance and authenticity.

Methodology

Blockchain Platform: -

●Ethereum: The project makes use of the Ethereum block-chain platform, which is well-known for its extensive acceptance in the block-chain ecosystem and its smart contract capabilities.

●Alchemy: Our project's software specification heavily relies on the blockchain development platform Alchemy. Alchemy is a full-featured package of infrastructure services and developer tools that makes it easier for us to design and implement our blockchain-based supply chain management system.

Smart Contract Development Tools:-

Remix (v2.8.1): Remix is a smart contract writing, testing, and deployment tool. The most recent version provides an integrated development environment (IDE) that is easy to use, complete with features like code completion, syntax highlighting, and an integrated compiler for Solidity smart contracts.

Network Infrastructure:

Block-chain Node:
- Mumbai Test-net Polygon Block-chain node configured for Polygon Mumbai Test-net smart contract deployment and interaction.
- Before releasing their applications and smart contracts into the production mainnet, developers need to test, debug, and improve them using the Polygon Mumbai Test-net, a secure and controlled environment.

Verification Tool:

Polygon-Scan-used the most recent iteration of Polygon Scan in combination with the Mumbai test-net to confirm the smart contracts that have been placed on the Polygon network. We were able to verify the correct deployment of our smart contracts on the Mumbai testnet and certify their integrity by utilizing Polygon-Scan. This procedure for verification was crucial to preserving .

Proposed System

- User is navigated to landing page comprising home, worker, product, status, and data pages on navigation bar.

- To insert data set, user must upload the dataset on POLYGONSCAN web software which presents the data on the project.

- User must connect to web3 to write data in contract for insertion of datasets on polygon scan web software.

- After inserting the data, user must click "write" and connect to the METAMASK to finish the transaction.
- METAMASK is wallet software that provides flexibility to use token (MATIC)

- Once the transaction is completed, user can browse to the main homepage and inspect the data that uploaded using polygon scan, users can access various sections:
- Home Page: Contains comprehensive project details.
- Product Page: Provides information on listed items, including name, ID, description, price, temperature, and production data.
- Status Page: Enables users to search for and check the status of ordered products.
- Data Page: Displays temperature-related information for all items, including temperature, humidity, and heat index
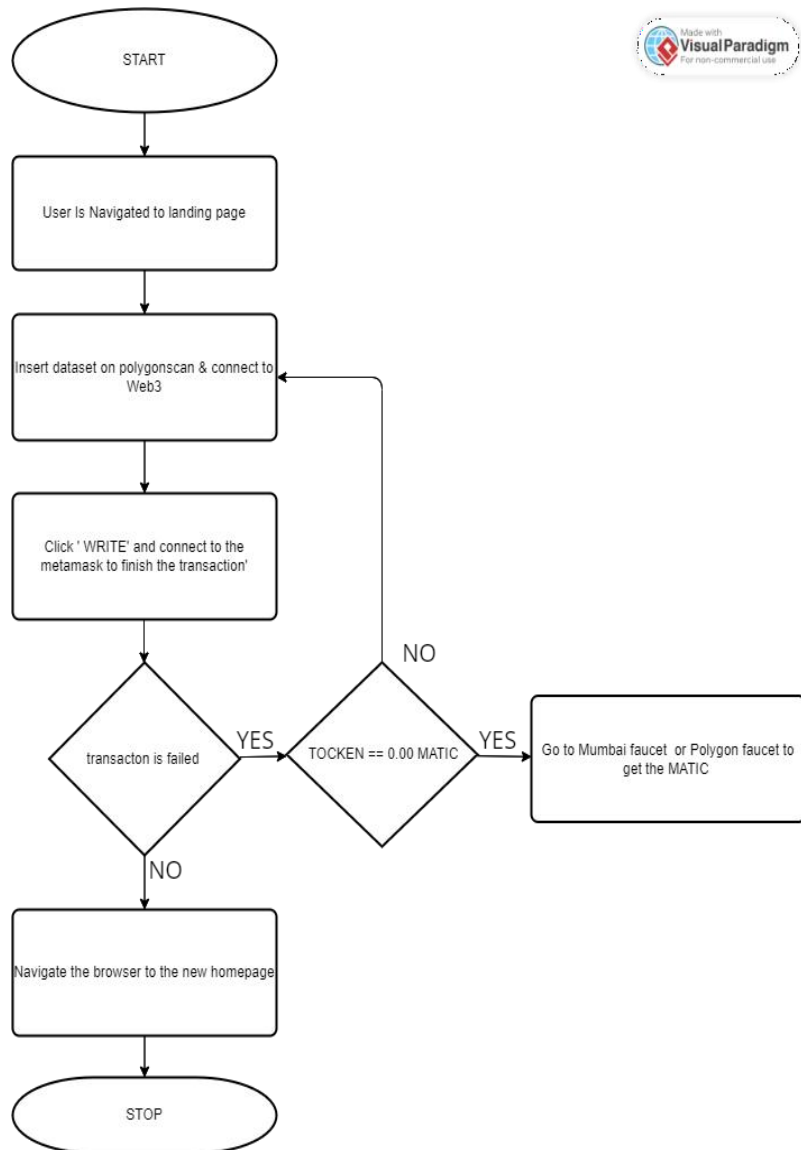

Figure 5.1

Conclusion :

We have used the design research model in this study to provide a fix for the pharmaceutical supply chain sector. The suggested framework would use smart contract-powered block chain technology to ensure that reliable pharmaceutical items are delivered to the final customer. Although the pharmaceutical supply chain is the primary emphasis of our suggested framework, our solution structure, smart contract code, and algorithms are sufficiently general to be modified .

The project also demonstrates how to use the block-chain network's permission system efficiently. By granting consumers access to their medical records, users can promote improved and more transparent data interchange. This could alter the way the medical information is managed in the healthcare sector, improving user-friendliness.

Furthermore, all transactions made using block-chain technology are guaranteed to be both irreversible and reversible, which helps support accountability. This initiative provides evidence of the revolutionary potential of block-chain technology and how it might change phrama medical records.

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