

Block Chain Interventions for Pharmaceutical Supply Chain Management: A Literature Survey

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Abstract : A variety of operational tasks, such as inventory management and supply delivery to point-of-care sites, assist the patient care operations in hospitals. When it comes to delivering top-notch patient treatment, hospitals lug about a lot of stuff, and the logistics of keeping and distributing it all are major concerns. In order to enhance the supply chain system's security, we put up a concept that incorporates the blockchain with location and timestamp data. With the goal of comprehending and enhancing patient safety via the integration of both robust and agile dangers.

Key words: Drug transactions, packet registries, blockchain technology, and pharmaceutical supply chains all use barcodes.

Introduction:

Many different types of businesses and individuals are engaged in the production and distribution of pharmaceuticals; they include both large-scale producers and smaller-scale wholesale distributors. Pharma companies may revitalise their supply chain management practices to increase profitability by making better use of resources. Ineffective supply chain management might hinder an organization's ability to increase shareholder value and favourably meet consumer demand. Making a profit for investors is only one of the many goals of a pharmaceutical supply chain that aims to provide the correct amount of high-quality medication to the right people at the right time at the right price. Interactions between supply chain partners facilitate collaboration, which in turn provide end-to-end insight and the chance to network with other companies. Furthermore, a comprehensive strategy and close cooperation are essential due to the system's

complexity. We integrate the blockchain to improve the pharmaceutical supply chain's efficiency. The supply chain can be tracked more accurately and transparently from beginning to finish, and problems with data storage and security in processing transactions might be solved. Blockchain technology, which is a distributed ledger that can record transactions throughout the supply chain and is protected by cryptographic signatures, allows for an auditable and transparent system.

Security Issues :

1] Block chain technology in pharmaceutical industry to prevent counterfeit drugs

The proposed system is used to track the drugs from its manufacturing unit to patients , the effect of the drug on the patient has recorded to a database where only permissioned block chain is used. For implementation cryptographic alpha numeric key is used , but it has not given solution for security as counterfeit manufacturers uses reasonable brand logo .

2] A secure logistics model based on blockchain

The proposed secure logistic model analyses the security and efficiency of the model. a logistic block chain is build on decentralised and distributed platform using peer to peer network. python based Lbuntu Linux tool is used but it has not given overall security.

3] Benefits and challenges of block chain technology in pharmaceutical supply chain management

The proposed system exploits the benefit and challenges in the pharmaceutical block chain adoption based system by indicating the impact of block chain for four aspects , like suppliers, distributors, producers and customers but it has not given security for delayed recorded data as processing of drug is very fast.

4] Block chain technology in the pharmaceutical supply chain : researching a business model based on Hyperledger Fabric

The proposed system focused on the transparency in the supply chain. Which simplifies the process of control over the official supply chain medicines , a system is designed for controlling the circulation of medicines. Hyper ledger fabric platform is used but it has failed to give solution for security as it unable to track the drugs distributed long outside the official chains.

5] Supply chain security orientation in pharmaceutical industry

The proposed system aims to identify the specific risks and understanding the supply chain security perceptions, Random poly graphs and driver screening strategies are used to implement the system to enhance the security of the supply chain . but it has not given security solution for broader pharmaceutical industry, as sample size becomes small hence finding

gives viewpoints of private sector only .

[6] Real time supply chain – A block chain architecture for project deliveries

The proposed system focused on cloud based real time tracking and tracing methods in supply chain. Which helps to identify the functional and non functional requirements of logistics . a portal system is developed by integrating RFID, IoT and block chain technology for logistics .but it fails to give solution for time management with security , as response rate for data base becomes too slow.

[7] Block chain technology for detecting falsified and substandard drugs in distribution : pharmaceutical supply chain intervention

The proposed system aims to develop a pharma co-surveillance block chain system and tests its function in a simulated network, which helps to consumers for scanning code printed on receipt to see the drug distribution history, a distributed application app and distributed file system is developed using etherem and Hyperledger fabric platform but it has not given solution for security issues as results may change when deployed in real world setting .

8] Block chain impact on supply chain of a pharmaceutical company

The purpose of this study is to eliminate the implications of block

chain technology on the supply chain and procurement on pharmaceutical industry. Where data is collected from peer-reviewed article and semi structured interviews are conducted to analyse the detailed knowledge of block chain potentials, procure to pay activities are performed which can also improve the security of IoT devices

. but this study is based on limited number of interviews.

Scalability issues:

1] Pharmacrypt: block chain for critical pharmaceutical industry to counterfeit drugs

The proposed scalability solution for counterfeit drug problem and solutions given using evaluation and effectiveness , the block chain driven tool is used to record and timestamp the transfer of goods at each point of supply chain . the ledger concept has been used to ensure the security and safety of the product . AWS and oracle blockchain is used for implementation , but it has not given solution to scalability because of large scale deployment.

2] The power of a block chain based supply chain system

The proposed system gives security to supply chain with the power of block chain by combining the theoretical and real world application studies. Which is useful to create a reliable, transparent, authentic and secured system. Ethereum based Ambrosus block chain is used but it has not given scalability solution.

3] Pharmaceutical supply chain specifics and inventory solution for a hospital case

The proposed system aims to improve the current pharmacy inventory management policy , which reveals the trade offs and quantitative tools among the stakeholders. Them in and max par levels parameters used to control the automated ordering system this helps to allocate the safety stocks, but its failed to give solution for uncertainty and reliability issue as examining the multiple objects in multiple criteria becomes difficult.

[4] Traceability of counterfeit medicine supply chain through block chain

In order to secure the drugs in the supply chain system from manufacturers to the patients, the proposed system aims to address the issues of drugs safety using block chain and encrypted QR code security, public key ID and digital signature methods are used to prevent the man in middle attack . but it failed to give solution for scalability.

5] Reliable identification of counterfeit medicine using camera equipped mobile phones

The proposed system presents a solution which is resistant against different attacks and allows reliable verification of medicine using simple camera phone. Here data matrix is used for verification code but it failed to give solution for complexity issue as there are high number of possible identifiers.

[6] Anti counterfeiting using memory spots

The proposed system provides solutions for anti counter fitting which gives product authentication directly into the hands of the end user. A temper resistant hard ware chip memory spot used for demonstration. But this method suitable for only high value items.

[7] Legal implementation of block chain technology in Pharmacy

The aim of this study is to explore the potential of block chain technology in ensuring patient rights to quality products by examining the grounds for legal provision of block chain. The necessity of legal regulation used by private parties is substantiated taking into account. Dialectical, comparative, analytic synthetic and comprehensive research methods are used for study. But the problems of legal provision of block chain in pharmacy has not been cleared sufficiently.

Complexity issues.

1] Forces , trends , and decisions in pharmaceutical supply chain management

The study helps to identify and verify the major forces of supply chain system which are altering the biopharmaceutical medications, which are purchased , distributed and sold through the supply chain. For approach , multiple interviews are conducted and combined with manifest text analysis . but fails to give solution for complexity as there are multiple interviews based on convenience sample.

2] Block chain applications in supply chain transactions

The purpose of this study is to clarify the discussion about blockchain application areas in supply chain transactions, by combining the findings from three methodological approaches. An extant literature review, delphi study , and survey of german machinery equipment sectors which helps to address the disruptive forces of new technologies and enhances the bond between practitioners but it has not given solution for low ranking applications.

3] Potential of Block chain Technology in Supply chain management: a literature review.

The purpose of this study is to review the existing literature on block chain technology trends and its potential values in supply chain management. The papers which contain 'Block Chain' in their titles and keywords were selected for conducting trend analysis using single comprehensive multi-disciplinary data base, which helps academics for further understanding of block chain technology and also useful for researchers to identify the areas where block chain more desirable and can be implemented.

4] A unified model of supply chain agility: the work design

The purpose of this proposed system is to provide a theoretical model of supply chain agility. Based on that developed a research frame work for investigating the linkage between supply chain

agility and particular competitiveness using interdisciplinary review. Which helps to find comprehensive conceptual models built from a work design perspective and also offers a theoretical platform for guiding future research.

[5] Traceability of counterfeit medicine supply chain through block chain

In order to secure the drugs in the supply chain system from manufacturers to the patients, the proposed system aims to address the issues of drugs safety using block chain and encrypted QR code security, public key ID and digital signature methods are used to prevent the man in middle attack . but it failed to give solution for scalability.

[6] Trace and Track: Enhanced pharma supply chain infrastructure to prevent fraud

For the security of the drugs across the security system a highly scalable and enhanced trace and track system is proposed. Integrated block chain with IoT frame work Global Data Plane (GDP) novel is used for study. Which offers more flexibility and trust but it fails to give solution for complexity issue.

[7] Secure authentication scheme for medicin anti counterfeiting system in IoT environment

A new authentication scheme is proposed for medicin and anti counterfeiting in the internet of things. The proposed system utilizes the near fied communication (NFC)

and real and random (ROR) models to provide session security. Automation validation of internet security protocols and applications (AVSPIA) tools used. But it failed to give solution for complexity as it is based on high computational method.

Summary :

Previous research in the field of blockchain has provided solutions to several difficulties. To protect the supply chain from incursion, security measures are used, such as the use of random polygraphs and driver screening strategies, and cryptographic alpha numeric key methods to prevent the sale of phoney drugs. A blockchain-driven tool that records and time-stamps the transfer of items at each stage of the supply chain can help with scalability issues. Another approach is to examine the current policy on pharmacy inventory management, which reveals the stakeholder-level trade-offs and quantitative tools. While delphi studies are used for complex problems, surveys like the one conducted in Germany's machinery equipment business help with things like dealing with the disruptive demands of new technologies and improving relationships amongst practitioners. In this work, we lay the groundwork for future research by developing comprehensive theoretical frameworks from the perspective of work design. The primary variables impacting the purchase, transfer, and sale of biopharmaceutical medications were identified in this research via a mix of manifest text analysis and several interviews.

Recommended structure: It is possible to build a standard for supply chain operations using blockchain technology. Here, before completing a delivery, each node will verify their purchase details with the maker and quantity of drugs, their whereabouts, and the date and time. Details such as the whereabouts of the drugs, their timestamps, who owns them, and their manufacturer ID are all part of the transaction record. Each freshly registered packet is given a unique transaction ID by the ledger. The supply

chain records the current status of the medication, while the blockchain records information about previous and future drug delivery requests. The safety of the supply chain network is therefore enhanced.

Conclusion :

The current research yielded the following findings: 1. A careful review of the literature may lead to better new methods for the pharmaceutical supply chain's future development.

2. The pharmaceutical industry stands to benefit from blockchain technology, which has the potential to revolutionise the supply chain by enabling new services and values.

3. Our study suggests a supply chain model that combines blockchain technology with timestamps and location data to enhance the authentication and security of the pharmaceutical supply chain system. The objective is to validate the brand and quantity of the medicine during delivery.

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