GUARDING HEALTH

USING BLOCKCHAIN TO BATTLE COUNTERFEITS IN PHARMA

A blockchain is a software offering a digital ledger system. With it, you can record and log transactions by a chronological combination of the items into ordered blocks. These blocks are linked and secured for safe access.

The security features of these blockchains ensure equal distribution of information across various networks. There is no need for centralised entry for hackers. Also, with the unified network grid, users can check real-time transactions and revisions to blockchains. It reduces the possibility of human errors.

Currently, the industry is dealing with a plethora of challenges. They threaten patient safety and the integrity of healthcare systems. Amongst them, the most concerning ones are the complex and non-transparent supply chains, counterfeit drugs and stringent regulatory requirements.

The best way to face these hurdles is through innovative technology. This is where blockchain comes into the picture.

WHY BLOCKCHAIN?

Blockchain technology brings in decentralisation, security, and transparency. It has answers to many challenges that the pharma industry is going through now. Blockchain was created to be the underpinning technology for digital currencies but has since evolved into a versatile tool applicable to industries beyond the world of finance, pharma being one of them.

The global blockchain in healthcare market size shows an estimated growth from **USD 58 million in 2023 to USD 641 million by 2035.**

It can provide transparent and immutable records of transactions, making it apt for enhancing supply chain integrity. What it does is ensure compliance with regulatory standards, protecting patient data.

Since the industry has high stakes, adopting cutting-edge technologies, like blockchain is crucial. Adopting these technologies helps pharma companies overcome existing challenges and paves the way for a more secure, efficient healthcare system.

In the world of pharma, blockchain contributes to an efficient supply chain around the globe. You get the benefit of an evenly distributed network that ensures end-to-end supply chain management for every company and product.

With multiple stakeholders in the network, you will need a secured database.

THE CURRENT SCENARIO OF BLOCKCHAIN IN PHARMA

The **$1.48 trillion** pharmaceutical industry has a good value in the healthcare industry. This sector is focused on patients with not so much attention on innovation. The entire process of this industry includes the discovery, development, and distribution of drug products.

The discovery process is critical, considering that most drugs do not even reach the clinical trial phase. Also, pharma industries face various challenges like data disparity, increased competition in the generic domain, increasing customer expectations, and poor supply chains.

The pharmaceutical industry needs a technology that can streamline the process and face the challenges. Amongst all, here is the greatest challenge of all-fake drugs.

THE PROBLEM OF FAKE DRUGS AND HOW BLOCKCHAIN HELPS

Fake drugs are becoming an increasingly serious issue in the healthcare industry. It is unethical and also poses great health risks to the society and environment. Tracing the drugs at every step of the pharma supply chain is crucial. Companies must research to make a blockchain-based model that forestalls drug forging in the store networks.

There is scope for research on the irregularities in the pharmaceutical supply chain as these could affect public health and the economy. With advanced blockchain technology, companies can ensure the complete identification of medications from the producer to the patient. This prevents fake prescriptions or medications.

Blockchain technology offers a solution by providing a secure, tamper-proof ledger. It tracks the entire journey of a drug from manufacturer to consumer. Each transaction is recorded and verified on the blockchain.

You can be assured of authenticity. Blockchain also reduces the risk of counterfeits, enhancing trust, safety, and integrity in the pharmaceutical supply chain, ultimately protecting patients.

We will see how blockchain resolves all of the problems in the pharma industry.

HOW BLOCKCHAIN CAN SOLVE PHARMACEUTICAL CHALLENGES

Blockchain can solve many challenges in the pharmaceutical industry. For instance, it may streamline the entire pharmaceutical process into three categories: privacy, transparency, and traceability. This may set the standards for industry practices and laws. Here are some of the challenges this industry faces:

AUTHENTICITY OF RETURNED DRUGS

Overstocking by wholesalers and failure to meet market demands result in pharmaceutical companies dealing with returned drugs. Approximately 2-3% of these drugs are returned, amounting to $7-10 billion annually.

A significant concern is that many of these returned drugs are counterfeit, making it a daunting task for companies to identify and separate them before reselling. A decentralised blockchain can address this issue by recording package serial numbers, allowing drugs to be verified from anywhere in the country, ensuring authenticity and reducing the risk of counterfeits re-entering the market.

A decentralised blockchain may resolve this issue by recording package serial numbers on the blockchain. This way, the drugs can be verified from across the country.

SUPPLY CHAIN MANAGEMENT

The pharma supply chain is huge, and blockchain can set the tone for effective management. The entire global chain is focusing on improved visibility, reducing counterfeit drugs, and better shipping while adhering to regulatory standards.

TRACKING SENSITIVE DRUGS

You need to track some sensitive drugs as per various parameters such as humidity, air quality, temperature, and so forth. Not properly monitoring these parameters can cause deterioration of the drug product. Blockchain can help. The supply chain can connect the devices that give real-time humidity, temperature or data regarding other parameters. This way, you can take all the necessary precautions.

BETTER CLINICAL TRIALS

As blockchain stores patient information, it may improve the clinical trial process. Companies can use blockchain to communicate with patients and educate them about every step of that process. Also, you can make clinical trial protocols more transparent for both patients and stakeholders. It ensures the confirmed consent of both parties.

INVENTORY MANAGEMENT

An efficient supply chain helps pharmaceutical companies handle their inventory. It ensures that products are flowing and their demand forecasts are steadily being met while eliminating waste.

This is what blockchain technology could do, automating the management of inventories from different suppliers and triggering actions automatically based on fluctuations in demand or supply.

If there's a spike in demand, the system can instantly request additional production, ensuring that supply meets market needs. This technology enables companies to monitor every stage of the process, improving overall efficiency and responsiveness.

HOW DOES THE BLOCKCHAIN TECHNOLOGY WORK?

Now, we'll see how blockchain-based pharmaceutical supply chain management works. For instance, we have a secured and trusted network, where only the trusted parties have permission to join the network.

On the backend, there is a permissioned blockchain that stores all required transactions, and once you enter the information into it, it cannot be changed.

- Also, you get a user-friendly mobile APP that participants can use to make transactions to the blockchain. When the factory manufactures a new product, they will make a new unique ID.
- The product will become a digital asset on the blockchain network, and you can use it to track the hash at any time on the network. Any additional information about the product is stored off-chain or on-chain, depending on the manufacturer's choice. Off-chain data gets merged with on-chain data using some kind of identifier.
- In most blockchain applications, a hash (like SHA-256) of off-chain data is created and linked to on-chain data. However, a better method is to store large files like images, off-chain and keep text data on-chain.
- After a product is registered on the blockchain by the manufacturer, its ownership can be easily transferred to another participant using a simple mobile app.

For instance, the wholesaler wants to buy the drugs from the manufacturer. The manufacturer will give the drugs to the wholesaler, and a transfer transaction will be registered to the blockchain. This will be done by the wholesaler to the distributor and then to the pharmacies.

Pharmaceutical companies are not just randomly supporting blockchain technology in their operations. Several benefits accrue to pharma from investing in blockchain technology, improving business practices and enhancing the entire sector.

ADVANTAGES OF BLOCKCHAIN TECHNOLOGY IN THE PHARMACEUTICAL SUPPLY CHAIN

TIMELY DATA AND DATA AUTHENTICITY

Blockchain technology can address issues in the pharma supply chain by giving timely data and increasing the authenticity of the shared data, integrity, and invariability. This can reduce the willingness for counterfeit and less accurate data.

COMPATIBLE WITH OTHER TECHNOLOGIES

Future integration with other technologies is another area where Blockchain has proved to be promising for pharma. Possible high-end technologies that the companies could have access to include: The high-end technologies are for instance Radio Frequency Identification(RFID) and barcodes. With them, you can have heightened accessibility through the supply channel in real time.

Blockchain technology can be applied to the pharmaceutical industry and two of the examples are IBM collaborating with KPMG, Merck, and Walmart to construct a new blockchain for tracking drugs and prescriptions.

IMPROVED TRACEABILITY

This system is implemented within the framework of the FDA experiment under the **Drug Supply Chain Security Act (DSCSA)** intended to address the issue of drug traceability in supply chains.

With blockchain, they can be assured of the secure and open nature of the system that allows tracking of drugs from the manufacturer up to the pharmacy level. These measures hinder the inflow of substandard and fake drugs into the market, guaranteeing that patients receive genuine and quality drugs.

COUNTERFEIT DRUG DETECTION

Through touching almost every corner of the globe through its distribution systems, it is quite easy for fake drugs to be concealed. Thus, the best approach here would be to utilise the framework which includes smart contracts and distributed ledgers to address this challenge.

The pervasiveness and audit capability play a key role in sustaining the drug quality, legitimacy, and conformity in the respective chain of supply.

IMPORTANCE OF TRACEABILITY AND TRANSPARENCY IN THE PHARMACEUTICAL INDUSTRY

Transparency and traceability are not mere buzzwords in the pharmaceutical industry. They form the backbone of safety, quality, and ethical practices. So, let's see the important reasons why these concepts have an indomitable significance in the pharma industry:

- **Patient Safety -** Patient well-being is at the centre of every pharmaceutical endeavour. Transparent supply chains and processes that you can trace ensure that the medicines are manufactured, stored, and distributed in stringent conditions. This minimises the risk of giving the patients compromised products.

- **Regulatory Compliance -** Transparency and traceability help companies demonstrate compliance with compliances and requirements. It avoids legal complications and reputational damage.

- **Counterfeit Drugs Mitigation -** Counterfeit drugs pose a significant threat to patient health. It can also hamper the credibility of the industry. Counterfeiters find it difficult to infiltrate the system, as each product undergoes verification.

- **Quality Assurance -** Pharmaceuticals undergo a complex process journey from raw materials to finished products. Transparent processes and data that you can trace enable real-time monitoring. This ensures early detection of quality deviations so there can be timely interventions.

- **Data Integrity -** In a digital era, maintaining data integrity is more important. Tamper-proof and transparent blockchain records reduce the chances of data manipulation. With them, people can try clinical trials, research, and regulatory submissions.

CHALLENGES TO ENSURING TRANSPARENCY AND TRACEABILITY

- **Complex Supply Chains -** Pharma supply chains are around the globe. This involves multiple middle players. Such a vast network can make tracking and transparency quite challenging.

- **Counterfeit Drugs -** Counterfeiters take advantage of information gaps and lack of transparency. This may be dangerous for patients who can unknowingly use substandard or even dangerous products.

- **Data Fragmentation -** While data fragmentation helps maintain focus within individual silos, it often leads to inefficiencies in cross-departmental communication and collaboration. It's a struggle to break down these silos for seamless information sharing and traceability without compromising data privacy or stakeholder autonomy.

- **Regulatory Variability -** Varying regional regulations can lead to inconsistencies in tracking and reporting methods.

- **Data Privacy -** While transparency is essential, safeguarding sensitive patient information is equally critical. Balancing transparency with privacy is a challenging task.

EXAMPLES OF PHARMACEUTICAL COMPANIES USING BLOCKCHAIN

PFIZER

Pfizer relies on the MediLedger blockchain to create a closed ecosystem. They also use it for tracking drugs to the very last detail. The system also ensures that there is no counterfeit. Overall, Pfizer is already using this technology with success.

ROCHE

Roche, a major pharmaceutical giant alongside Pfizer, is partnering with Abbvie and Pfizer to pilot-test their supply chain through its Genentech division. Additionally, Roche is developing a real-time system to aggregate blood data from heart patients.

UNITED HEALTHCARE

United Healthcare is partnering with Optum and collaborating with Multiplan, Humana, and Quest Diagnostics to reduce administrative costs. The company is leveraging blockchain technology to streamline operations and improve efficiency.

So, what does the future of the blockchain hold in the pharma industry? How is it evolving? Let's see.

FUTURE OF BLOCKCHAIN IN THE PHARMACEUTICAL INDUSTRY

A private blockchain ledger shows great potential in the pharmaceutical industry, though adoption is in its early stages. The hesitation comes from concerns about meeting privacy and the challenges to finding administrators willing to overhaul their system. Changes in healthcare facilities can disrupt staff and come with financial costs.

PREVENTING PRESCRIPTION FRAUD

Using blockchain to store prescription data creates a tamper-proof record of all prescription information. No one can alter them. This prevents prescription fraud, improving patient safety, and also makes it easy to transition to different systems. It's similar to how blockchain prevents money laundering in a cashless society.

BETTER PRESCRIPTION TRACKING

Using blockchain technology, pharmacies ensure patient prescription data is kept private and secure. Blockchain-based systems protect both data and personal information for patients sharing their details.

STREAMLINE PRESCRIPTION FULFILLMENT

Blockchain enables quick, secure access to patient prescription data, allowing for more efficient and accurate dispensing. This reduces errors and enhances patient outcomes.

COMPLIANCE WITH REGULATIONS

Storing prescription data on the blockchain ensures automatic compliance with regulations and guidelines for data storage and sharing.

Overall, blockchain holds great potential for enhancing prescription security. However, it requires significant investment. The pharmaceutical supply chain is booming with major advancements that will boost efficiency, safety, and quality.

These improvements stop wasted time and resources from increasing medication costs and negatively impact patient outcomes.

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