Blockchain Technology based Smart Contract Model in Indonesia

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Abstract

The primary task of integrated product supply chain management is distribution. The processing, storage, and distribution of high-quality pharmaceutical products makes the drug distribution process crucial in the pharmaceutical sector. The distribution of fake medications by associated parties, such as unauthorized or unregistered distributors or data collecting for unregistered medications distributed by distributors, is a concern in the pharmaceutical industry. Drug production permits that are misused up until they are distributed or circulated do not adhere to the Food and Drug Supervisory Agencies standard requirements. In order to facilitate the distribution process by recording data distribution, providing data security, and giving traceability of transactions between linked parties, these issues must be rapidly resolved with technology help. By utilizing blockchain technology, this study suggests a beneficial medicine delivery approach. A user-centered design and a qualitative methodology are used in the model creation. This study’s output is a blockchain-based drug delivery mechanism that has been verified. Transparency, security, traceability, decentralization, automation, immutability, and reliability are all features of the model. By ensuring that the pharmaceuticals supplied are of high quality, this strategy can assist the government in promoting community safety, health, and trust in the drugs that are in use.

Keywords: Blockchain, Distributed ledger, IOT based application, Industry 4.0

1. Introduction

The fundamental knowledge and data about the common resources that support all forms of cultivating are concealed within the agri-food frameworks. Similar to the budgetary stream from output to inputs, contributions to output go through many worthwhile stages [1]. According to their needs and constraints, various on-screen actors and partners produce and manage information and data [2]. The usage of ICT, the web of things (IoT), and other modern information gathering and investigation breakthroughs like unmanned airborne vehicles (UAV), sensors, and AI emphasize keen farming [3]. Building a comprehensive security framework that promotes the use and management of information is a crucial aspect of developing sensitive farming. Traditional methods manage information in an integrated fashion but are prone to inaccurate information, information manipulation and abuse, as well as digital attack. For instance, the majority of the time, incorporated government entities with personal interests oversee natural checking information [4]. They have power over the information-driven dynamic.
2. Blockchain

Members of the framework must agree to update the blockchain, and once new data is added, it cannot be removed. It is a write-once approach; incorporate several innovations to turn it into an auditable and irrefutable record of each exchange. The word "bitcoin" first appeared in Satoshi Nakamoto's paper on blockchain in 2008 [5]. Blockchain technology can be used to create "keen agreements," or business robotization contents, which are executed when specific legally required criteria are met [6]. For instance, Walmart and IBM created a Blockchain-based flexible chain to track vegetables from the farm to the table when a bad batch of lettuce led to customers dying from e-col [7]. By September 2019, Walmart has asked that its produce suppliers enter their data into the Blockchain database. Produce may be consequently tracked by smart contracts from point to point once it is on the Blockchain, eliminating human intervention and error [8]. Blockchain technology can be used to create a permanent, open, and simple record foundation for collecting data on transactions, paying for computerized use, and making payments to content creators like remote customers or agricultural entrepreneurs. In order to receive Blockchain innovation in music distribution in 2017, IBM joined together with ASCAP and PRS for Music [9].

![Conceptual Framework Blockchain](image_url)

Source: ResearchGate

Figure 1. Conceptual Framework Blockchain

3. Supply chain Management

The process of managing the raw materials required to make items, the manufacturing process, and the delivery of the finished goods is known as supply chain management. It is possible to say that the management is created as a chain that is connected to the supply chain [10]. An extra benefit that is efficient and cost-effective in corporate operations is supply chain management as a whole. The company's ability to know and ensure that a product is manufactured from good materials from suppliers, the production process to ensure that the product is made to arrive properly and with quality in consumers' hands, is the positive influence that occurs [11].

4. Good Distribution Practice

GDP, or good distribution practices, are used in Indonesia. referred to as “Cara
distribusi obat yang baik” (CDOB) [7]. To guarantee that medications are uniformly distributed, many techniques are created and monitored to meet specifications in accordance with meeting the purpose and requirements stated in the distribution authorization, product information [12].

5. Methodology

This research methodology uses user-centered design methods and a qualitative approach. The model was created using literature reviews and focus groups with representatives from the pharmaceutical sector [13]. The logistics department, the finished drug warehouse, marketing and sales, Quality Control, and Quality Assurance were represented in this FGD with four domain experts from the division that oversees the drug distribution process. It was made sure that the model’s design complied with the requirements of the pharmaceutical business through discussions with experts at various points. The experts expressed their agreement with the model being built during this conversation session. It is conceivable to use this verified model in the pharmaceutical sector [14].

5.1 Context of Use

This phase looks for user issues pertaining to the pharmacy, pharmaceutical wholesaler, and pharmaceutical industry distribution processes [15]. With the help of a forum discussion group on the pharmaceutical sector, the issues were identified. The production planning and inventory management section, the completed medicine warehouse, and marketing and sales managers all participated in this discussion session [16]. The issue is that numerous drug distribution procedures don’t follow the rules set forth by the government. For instance, the number of pharmaceutical distributors who are still not properly registered, the poor recording of drug distribution data, and the lack of integration between the various actors, are all examples. Therefore, it needs technology that can deal with issues. The author suggests using blockchain technology, which enables each associated party to correctly integrate data and information and record information on the distribution of drugs in an irreversible manner [17].

6. Analysis and Discussion

A user-centered design method is used to construct effective drug distribution models, and it goes through numerous stages [18]. The model created using the literature and based on the standards for safe medicine distribution set by the Republic of Indonesia Food and Drug Administration is the subject of this study’s discussion [19]. The value chain (outbound logistics, distribution, marketing, sales, and service) and its associated stakeholders (warehouses, distributors, hospitals, clinics, pharmacies, drug stores, and end users/patients) are the starting point for this model. The data will be kept in the blockchain during the distribution process thanks to blockchain technology [20]. The pharmaceutical industry is the first to implement blockchain in this distribution process, receiving drug purchases from drug distributors and sending drugs back to distributors. Data will be stored on the blockchain database, and pharmacies, drug stores, and hospitals will also carry out the drug purchase process to distributors. The blockchain will be used to store the data [21]. Customers buy medications from pharmacies, drugstores, and medical facilities. The blockchain database will store the data. The GDP Aspect in the sector, which has nine components, is the final (quality management, management, personnel organizations, buildings and equipment, operations, self inspection, complaints of drugs or presumed counterfeit drugs and process recall, transportation, distribution facilities based on contracts, documentation) [22]. The two primary business processes in the pharmaceutical
sector are good manufacturing practice (GMP), also known as "cara pembuatan obat yang baik" (CPOB) in Indonesia, and good distribution practice (GDP), also known as "cara distribusi obat yang baik" (CODB) [23]. The industry that develops and conducts research on medications that are intended for production is where CPOB begins. After that, make a manufacturing after purchasing raw materials from suppliers. Results from the production process will be kept in the finished medicine warehouse. In the meanwhile, CODB begins with finished medications that are prepared for client distribution, moving from the pharmaceutical industry to pharmaceutical wholesalers, and then from those wholesalers to health services (pharmacies, drug stores, hospitals). The general population may receive additional health services [24] [25].

7. Conclusion
The distribution method of blockchain technology in the pharmaceutical business is examined in this paper. The method demonstrates how the use of blockchain technology aids the process of drug distribution from the pharmaceutical sector (drug warehouse), which is disseminated to distributors and retailers, and ultimately to consumers. Blockchain enables the recording of all related party transactions. The immutability, distribution, and protection of data security from careless attacks of the blockchain will assure the transactions that are recorded. Traceability of transactions is another assurance provided by blockchain technology. We'll create a working blockchain drug distribution model before creating a working prototype to demonstrate the viability of the proposed concept for the pharmaceutical sector.

References


