

BLOCKCHAIN SYSTEM APPLICATION IN INSURANCE FOR MAPPING HEALTH INFORMATION SYSTEM

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ABSTRACT

Indonesia's population density is an issue, one of which is the significance of a health system that can assure the sustainability of people's lives in Indonesia. The value of insurance is an important asset that every Indonesian citizen must have in this study utilizing the SLR (systematic literature review) approach with descriptive analysis based on research data. The search parameters include articles from 2010 to 2021, and the articles are sorted based on those that satisfy the requirements. The primary material of each article is summarized using a descriptive analysis model and paragraphs. This study found 31 papers that met the requirements. Blockchain is a decentralized system with no centralization that uses connections to provide transparency and real-time. This technology allows apps to keep and share a safe, transparent, and immutable audit trail while minimizing red tape. However, this approach has significant limits and obstacles that must be addressed in future studies.

Keywords: *Blockchain, Health Insurance, Health Information System, Insurance Management, Indonesia's National Health Insurance*

1. INTRODUCTION

Indonesia is an archipelagic country with a dense population in each region. Indonesia's population density is a problem, one of which is the importance of a health system that can ensure the sustainability of people's lives in Indonesia [1]. The importance of insurance is an important asset that every Indonesian citizen must-have. Currently, BPJS is a state institution that guarantees the health of the Indonesian people through the JKN (National Health Insurance) Program, but BPJS has unresolved problems from year to year [2]. Some of the problems that occur are caused by a slow bureaucracy and inadequate information system, which causes the gap between regions and the inadequate health system in each region [3]. Besides that, the demands of public insurance providers who increase the number of contributions to the community are not proportional to the satisfaction of the services provided, the need for the latest breakthroughs to form a health system that is fast and

easy to access to create health welfare for the people of Indonesia [4]. Health services and policies are currently a problem that often occurs in every region and continues to be a problem that will never end. The Government has always done various ways by implementing and formulating a regulation made to save various vital sectors, including the health sector, using a decentralized approach to help shorten the bureaucratic flow.

Decentralization is the transfer of government authority by the Government to autonomous regions to regulate and manage government affairs within the system of the Unitary State of the Republic of Indonesia. The law states that one of the mandatory affairs carried out by local governments is to provide health services and handlers [5]. Several developed countries such as Germany and the United States use a decentralized approach in the health sector [6]. This decentralization approach aims to provide freedom for a region to enforce a policy that is appropriate to its region while still carrying out

measurable coordination, but the follow-up is returned to the relevant region. Indonesia has a National Health System, a proposal for health development [7]. This decentralized system has not yet achieved success in its implementation; there are still many obstacles and challenges that must be resolved. Several other health problems are that most Indonesians still find it challenging to get health services caused by various factors such as geographical, social, and economic conditions [8]. It gives an essential role in all aspects, according to the practice applied in health decentralization only in the deconcentration function where this function places more emphasis on transferring the administrative role from the Ministry of Health to the Regional Government [9].

Current technological advances provide convenience for humans; with technology, information is easy to access and can form transparent and fast information systems, one system that has developed from the presence of technology is blockchain [10]. This system is more often heard and used in the financial sector, but this system can enter other fields, including the health sector. This system can provide essential benefits utilized through a blockchain to form sustainable health data. The information system formed through the blockchain will impact the community as its users and the Government through BPJS as a regulator and operator to create an efficient health system [11].

2. METHODOLOGY

Based on the level of investigation, this research is literary or uses a systematic literature review or also known as descriptive analysis based on research data on the Blockchain system model: Application of Insurance Management in Mapping Health Information Systems through a literature search from google scholar. The search criteria used are documents in the form of articles during the 2010-2021 period. 2010 is used as the initial reference as the minimum year in writing this journal. All selected articles contain research on the theme of technology-based health system management. While the particular keyword used is Blockchain, BPJS; Health Insurance; Health Information Systems; Insurance Management; Indonesia's National Health Insurance. Based on the contents of the articles known through abstract searches and discussions, the distribution of research is grouped according to predetermined criteria. The main content of each article is explained at a glance with a descriptive analysis model using paragraphs.

The following is the flow of the systematic literature review used in this research:



Figure 1: Systematic literature review flow

Several stages are starting from planning, then proceeding with looking for articles and then filtering articles that meet the criteria, after that the review and analysis process, and the last is reporting or writing the research results obtained. So, this study tries to map the distribution of research on the use of Management in Mapping Health Information Systems technology in the development of the Blockchain system model and then offers several future frameworks.

3. RESULT AND DISCUSSIONS

3.1 IMPACT OF BLOCKCHAIN SYSTEM IN HEALTH SYSTEM IN INDONESIA

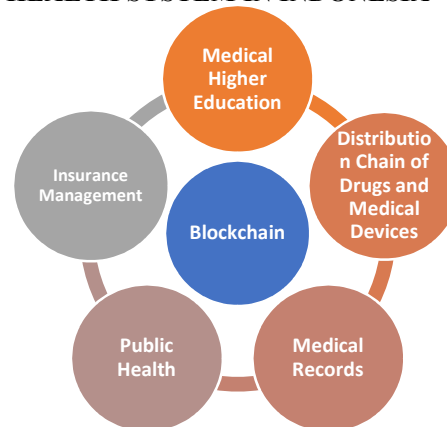


Figure 2: Effects of selecting different switching under dynamic condition

Figure 2. The blockchain system has a significant impact, including having an essential impact on medical colleges, whereas long as doctors start from their studies to become doctors or specialists, they can be tracked and appropriately archived and can continue to grow [12]. By

recording every track record in conference participation, scientific publications, doctor's diaries, the level of patient satisfaction will be appropriately archived with the blockchain system; this can make it easier for institutions that are responsible for medical professional institutions in

particular to process certification or issuance of diplomas by paying attention to records. Generated in the blockchain system, which makes the system transparent, cost-effective, and anti-counterfeiting [13], [14].

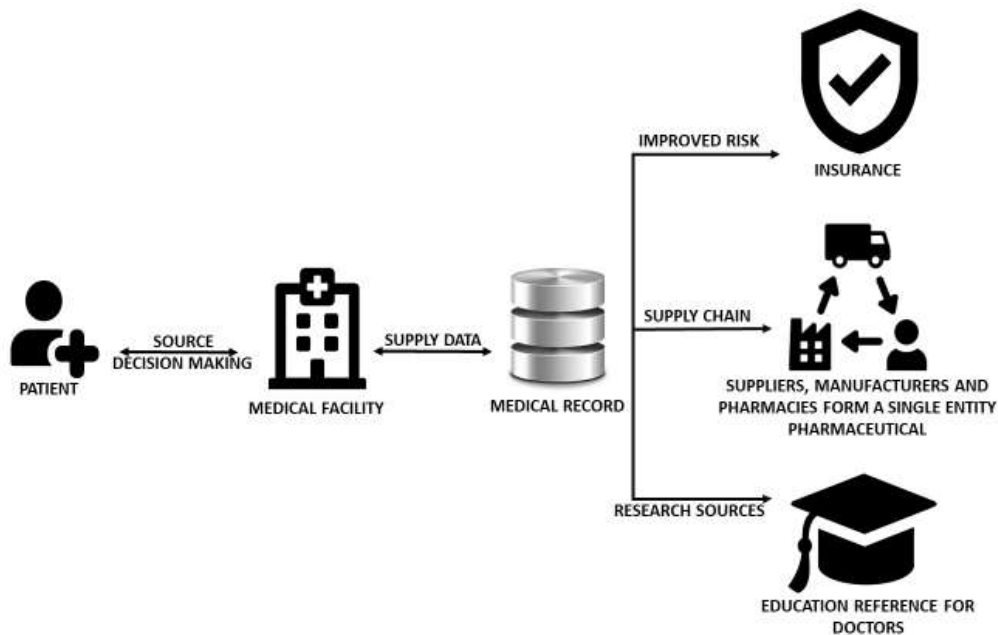


Figure 2: Scenarios for implementing blockchain systems in health information systems at the district level

Other benefits are also obtained from medical records, where patient medical records are archived safely but stored in different places (Puskesmas, Clinics, and Hospitals), and also Medical Records can help determine the basis for payment of health services costs such as Figure 2. which is described. The need for a blockchain system makes it easier for health systems and health care facilities to create single data or archive medical record data in one place [15]. This blockchain system has a free, decentralized system with agreements that can be arranged together, such as medical record data accessed by health workers, clinics, hospitals, BPJS, or health research institutions. In this case, they are an essential part of the blockchain system, furthermore, in the other health sector, namely the distribution chain of drugs and medical devices, where this blockchain system provides a network system that can help the government and health service facilities to overcome shortages in the supply of medical equipment and drug availability throughout Indonesia. Finally, the blockchain system's role also applies to Public Health, where this system records the type of disease according to the geographical location, which can

help epidemiologists predict disease trends in the related area [16].

3.2 MODEL DESIGN IN UTILIZING BLOCJCHAIN SYSTEM IN HEALTH INFORMATION SYSTEMS

In this discussion, an overview is made by researchers to design a blockchain-based health information system by combining the five elements in the health sector (medical higher education, medical records, insurance management, distribution chain of drugs and medical devices, and public health) in taking a case study design in an area at the district level which can be presented simply through Figure 2. In the figure, the overall involvement of the four aspects in health includes the five aspects where the various fields are interconnected in a decentralized manner, where the benefits of its functions include, Sources of data obtained from patients, then processed and stored by health facilities (hospitals). Clinics and Health Centers) as well as insurance. Then, the role of Public Health can help the health system, which functions as a forum for education and evaluation of disease control based on where the patient lives and also the insurance function is involved in it where

the insurer can take policies in determining the price value of an insurance based on the type of disease, the quantity of the number of sufferers of the disease in an area. The region, which can also affect suppliers of medical equipment and drugs in the area, can provide a value for efficiency in the use of the budget in the health sector. Finally, the involvement of health universities where a health worker needs a source of reference and reference materials for interests in the health sector includes elements of universities and research groups that refer to disease phenomena in the related regional environment [17], [18].

Blockchain consists of blocks, where each block has a set of transactions as a data structure. Blockchain has several exciting properties [19]. Blockchain technology also provides a level of security such as data integrity. Blockchain technology can be described as a distributed ledger that records all transactions stored in blocks [20]. In addition, the use of Blockchain technology in the transaction process can also ensure security in the Transaction Process. The distribution of Transaction data between sellers and buyers is then stored in blocks that have their codes [7] All user information is recorded as account addresses and is not linked to personal information. The features of decentralized transaction validation, data source insurance, data sharing, and data integration are suitable for the needs [22].

Other prominent applications using blockchain include pharmaceutical research [8]. In one study, it was found that the results showed that the blockchain technology built-in Hyperledger Composer with a total number of 100 transactions, of which 100 transactions were successful, was stored on the blockchain for a total of 159 ms and an average transaction time of 1.59 ms per year. Transaction. This means that all transactions in the Hyperledger system are recorded in a relatively fast time. Generally, the recording time of medical record transactions by an admin takes several minutes [24]. A standard fact to know is to develop healthcare applications based on blockchain technology. Thus, applications developed differently may not be able to work together. In addition, scalability is a significant issue in blockchain-based healthcare systems, particularly the volume of medical data involved. Due to the high volume of healthcare data, storing it on the chain, i.e., on the blockchain, as this can lead to severe performance degradation [10].

3.3 MODEL DESIGN IN UTILIZING BLOCJCHAIN SYSTEM IN HEALTH INFORMATION SYSTEMS

This section may be divided by subheadings. It should provide a concise and precise description of

the experimental results, their interpretation, as well as the experimental conclusions that can be drawn. Blockchain has a million benefits in it, especially in the health sector. In its use, this system has its shortcomings and challenges to reach the stage of use for the public. The drawbacks of this blockchain are that it is not tied to a centralized server, so storage or recording in a system that keeps recording all the time requires a large storage capacity [19]. In addition, there are still few enthusiasts to be involved in the system's work, supported by other factors that support equipment in running the blockchain system is still not fulfilled, including the electronics industry, telecommunications, and inadequate industrial technicians. Besides that, there is still no regulation that regulates this, so there is still no protection and security in running this system [26].

Besides that, the importance of collaboration between sciences owned by each University to create pilots and trials that focus on the development of the health system in Indonesia, which will later be able to contribute to the University's contribution to the Government in influencing a policy made primarily in the affairs of the health system in Indonesia [27]. Not only that, but blockchain also allows transactions that are secure, immutable, transparent, and often cheaper, making many businesses and platforms adopt it, including supply chain and logistics [28]. Blockchain can help reduce the bullwhip effect even more, thanks to its transparency and information integrity [13]. In blockchain technology, all recorded transactions or records are known as distributed ledgers, decentralized, and anyone can view and verify them [29]. By many circles, blockchain is considered a system that is anti-tampered with and cannot be hacked because, naturally, the entities are distributed, so if anyone wants to change, they have to change everything in all systems. So that if something is changed without knowledge or verification, it will automatically be rejected by the system as a whole. So with these characteristics, blockchain is considered a problem solver [14]. Furthermore, by convention, the first transaction on a block is a unique transaction that initiates a new coin owned by the creator of the block as an incentive or compensation. So it can be said that nodes function the same as banks in recording and verifying transactions between buyers and sellers [15].

4. CONCLUSION

Blockchain is a decentralized system that implements transparency and real-time by being connected, and there is no centralization in the

system. The importance of using this system is to facilitate all integrated access to single data, blockchain technology, all transaction records or recordings are known as distributed ledgers, decentralized and anyone can view and verify them. Using this technology, applications can be built to manage and share a secure, transparent, and immutable audit trail with reduced red tape. However, this technology has several challenges and limitations that need to be focused on in future research.

DECLARATION OF COMPETING INTEREST

The authors claim that they do not know of any conflicting financial interests or personal relationships that could affect the paper's research.

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