The Role of Blockchain Technology in Improving Data Security and Integrity in the Law Enforcement Process of Corruption Crimes

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Abstract. Corruption is a major problem affecting social, economic, and political stability in many countries. Ensuring the security and integrity of evidence in corruption cases is a key challenge in law enforcement. Blockchain technology can help by providing a transparent and publicly verifiable way to record transactions to increase transparency in law enforcement. This research examines how blockchain can improve data security in corruption cases and boost public trust in the legal process. The research used a qualitative approach with normative-descriptive analysis. It found that blockchain technology can improve data security in corruption law enforcement. Blockchain provides a secure, decentralized way to store transaction data, making it hard to manipulate without authority to help reduce power abuse and hidden corruption. Implementing blockchain technology can boost public trust in the legal process by ensuring the integrity of evidence in corruption cases. Using blockchain to record digital evidence, such as documents and financial transactions, ensures that the data cannot be manipulated or altered. It gives the public confidence that the evidence in corruption cases is valid and trustworthy.

Keywords: Role, Blockchain Technology, Security, Data Integrity, Law Enforcement.

1 Introduction

Corruption is one of the most serious challenges faced by many countries around the world. Corruption not only harms state finances and public institutions, but also undermines public trust in government and legal institutions. Law enforcement processes against corruption are often faced with various challenges, including issues of security and integrity of data used as evidence in court.

Technological development has experienced significant growth that affects various aspects of human life. Innovations such as the Internet of Things (IoT), blockchain, and cloud computing have become new solutions in various sectors. One of the sectors that has been affected by technological developments is the legal sector. The existence of technology is important for law enforcement, especially in an era where information moves quickly and crime becomes complex so that an effective, transparent, fair and efficient legal system is needed[1].

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In recent years, blockchain technology has emerged as a potential solution to improve data security and integrity in law enforcement processes. Public unrest and the level of public trust in government financial management are caused by many government elements who commit corruption. However, there are several things that need to be considered in an effort to optimize corruption cases against law enforcement in Indonesia, one of which is to take advantage of existing and rapidly developing technological developments today. The presence of technology really helps the government to reduce the number of corruption cases in Indonesia.

Bockchain is a technology that originated from an idea about digital data that can be safely stored and transmitted without the risk of hacking or manipulation due to its decentralized nature. Information data security is an effort to protect data and information from damage, loss, or access by unauthorized parties. In the digital era, information data security is becoming increasingly important as more and more data is stored. And exchanged through digital technology. One of the main focuses on technology. Blockchain technology is its data security. Data on the blockchain is protected by several layers of secondary technologies such as hashes, hashchains, private-public keys, and P2P data distribution. this makes blockchain ideal for public data storage that is vulnerable to manipulation.[2]

A paradigm shift in law enforcement through the utilization of technology is a must to improve effectiveness, transparency, and fairness in the law enforcement system. Previously, judicial processes tended to be manual, time-consuming, and prone to human error. However, with the inclusion of technologies such as artificial intelligence, data analytics, and e-court systems, the paradigm of law enforcement has fundamentally changed. According to Altayari, the integration of artificial intelligence technology and legal data analysis has helped speed up the identification of evidence and strengthen the basis of arguments in the judicial process.[3]

The implementation of one of the revolutionary innovations called blockchain is starting to be carried out by the Indonesian government, one of which is the creation of e-government. Blockchain is a decentralized data distribution system that provides security and transparency without involving a central authority. This system of blockchain can be utilized in creating a transparent, reliable, and equitable legal system. The decentralized nature of blockchain enables the creation of an immutable digital footprint for any transaction or legal evidence and can be used to store and manage digital evidence. Here are the aspects that differentiate blockchain from traditional methods.[4]

Blockchain technology is a shared, decentralized, immutable, and transparent database. Because of its characteristics, it is able to resolve confidentiality issues and store data over time and can ensure immutability. And it is ideal to be applied to financial and administrative systems that are outdated and have poor Information Technology security. Therefore, blockchain technology can prevent corruption by providing immutable digital records. As published by the World Compliance Association, Spain is a global benchmark in blockchain development, highlighting the link between crypto and the financial sector as well as its use by the university sector for validation of academic degrees. Countries such as Colombia and Peru have also seen positive results from how this technology can prevent corruption.[5]

Adaptation to social and technological developments is crucial in Indonesian law. Technology, particularly digitization, can improve the efficiency and effectiveness of the law. Indonesia's legal system must use digital technology to keep up with changes in legal substance and legal culture and meet public demand for faster, more transparent and accessible legal processes. Digitization changes

the way legal institutions work and how the public interacts with the legal system, enabling justice-oriented and efficient change.[6]

Indonesia is currently undergoing a major evolution in line with demographic growth and social change. One of the factors influencing this development is technology, especially information technology. Technological advances have affected human social life, especially in the field of communication which now uses sophisticated and automated devices.

Corruption is one of the biggest problems faced by the Indonesian nation to date. Efforts to eradicate corruption that have been made in Indonesia tend to be partial and are not supported by a comprehensive strategy design to eradicate corruption significantly. According to Waterbury, corruption is "the abuse of public power and influence for private ends."[7]

The high level of corruption in Indonesia indicates that corruption in Indonesia has been widespread in various fields of public life and has been going on for a long time, resulting in the cumulation of large amounts of state financial losses and losses to the state economy. Corruption does not only result in losses to state finances and the state economy, but also affects the level of public welfare and hampers national development.

In Indonesia, many efforts to eradicate corruption have been made, such as the provision of paying laws related to corruption, the establishment of the KPK which focuses on preventing and prosecuting corruption. However, not much technology has been utilized in efforts to eradicate corruption, so this blockchain technology will be a breakthrough in efforts to eradicate corruption so as to create an anti-corruption budgeting system in Indonesia. Indonesia, which has a high corruption index, is an ideal laboratory to see the prospects for adopting blockchain technology in forming an anti-corruption system in the era of the industrial revolution 4.0 and society 5.0.

Based on the explanation above, the research problem formulation can be stated: How can blockchain technology be used to improve data security in the law enforcement process against corruption crimes, and how can implementation increase public confidence in the legal process?

2 Methodology

The research method used in writing is a normative juridical approach. The sources of legal materials used in this research are primary legal materials and secondary legal materials. Primary materials used are legal science books. The types of approaches used in this research are legislative approaches, comparative legal research approaches, cases and legal analysis approaches. The data processing method used is the analysis method which is then outlined in descriptive analysis writing.

3 Result and Discussion

In the era of industry 4.0 and society 5.0, the fast-paced digital world, innovation and technology are essential in every sector, including law enforcement. The legal system has benefited greatly from digital transformation, which allows for much better access, analysis and processing of related data. A number of aspects of human life, including the justice system, have been greatly

impacted by the exponential growth of technological innovation. Technology is already a very important component of law enforcement in this digital age. Positive lawmaking, or rules and regulations for the legal use of technology, often lags behind technical advancements.[8]

Rapid technological change has led to a global flood of data. Certain aspects of shared information-authenticity, verification, speed, and integrity-are key to good governance and helping democracies realize the well-being of their citizens. [9] Technological developments in finance and communications not only open the door to innovation and convenience, but also pose new risks related to the security and integrity of financial transactions. Therefore, the role of law in addressing these challenges has become increasingly important. Advances in information technology have profound implications for social and legal challenges. The phenomenon of digital footprints provides another new dynamic for law enforcement.

Blockchain is the latest information technology, and is currently being widely applied in daily needs in various applied fields. This technology was developed in order to support the era of information disruption that provides alternative solutions from centralized technology architecture. Blockchain technology is realized with the concept of decentralization of information in data management. Data in Blockchain is stored permanently in data records that will be communicated peer-to-peer in an internal network and actively collaborate. This is very different from the internet-based concept that developed in previous information technology.

Corruption is an extraordinary crime that can erode trust, weaken democracy, hamper economic development, and further exacerbate inequality, poverty, and environmental crises. The problem of corruption cases in Indonesia is not getting better every year. In the Rule of Law Index Indonesia, a number of findings illustrate that there are still many countries that make little effort to eradicate corruption in the public sector. This is confirmed by the global Corruption Perception Index which is unchanged from last year, with a score of 43 with more than 2/3 of the countries surveyed falling below a score of 50, a sign that corruption is a very serious problem for most countries in the world.[10] The above report shows that corruption cases in Indonesia are still not well resolved by the government.

Corruption will continue to grow until the justice system can punish criminals and keep government authority in check. When justice is “bought” or politically intervened, it is the people who suffer. Leaders must take a serious interest and ensure the independence of the institutions that enforce the law to combat corruption.

An independent, transparent and adequately resourced judiciary and law enforcement agencies are essential prerequisites in combating corruption. In turn, preventing the abuse of political power, bribery and other forms of corruption affecting the judicial system is key to ensuring the effectiveness of corruption eradication performance.

The blockchain technology system is a technological concept where transactions are recorded reliably without a third party to guarantee it, so that it is replaced by each user being able to verify and know related transaction information together. Blockchain was originally created and used in the development of Cryptocurrency, but over time more and more people are interested and also research the benefits of this technology system in various industrial sectors, especially the financial industry sector. In its application, the blockchain system is a block of data that is interconnected so that it forms like a chain. Simply put, this system model connects users without going through intermediaries or third parties and makes each user will be able to copy and know each other's data blocks. In blockchain this system can only add data so that it allows no data changes because each

transaction will only add a new block to each user device in the form of different encryptions so that security in this system is guaranteed.

Indonesia is currently faced with the rise of corruption as a major issue, especially political corruption. Corruption is considered to hamper aspects of national development which include economic, socio-political and cultural aspects of the nation. The occurrence of corruption in Indonesia is partly due to the current state financial management system which is still conventional. In practice, the current state financial management system still has many weaknesses so that it can open up loopholes for corruption cases. The weaknesses of the current state financial management system inherited from the New Order financial management system are fundamental. These weaknesses include the design and implementation of internal system controls, non-compliance with laws and regulations, chaotic state financial irregularities, and the absence of information about state assets and debts. Internal control systems prevent the people from knowing the exact amount of the state budget and the details of its use. Current financial management allows for the manipulation of financial report data from the regions to the center. The lack of public role in the process of monitoring the state's financial turnover is also a serious problem.

The government's efforts in handling corruption problems in Indonesia can be said to be still very lacking. In handling the problem of corruption cases, the government uses two strategies, namely preventive or prevention strategies, and repressive or prosecution. However, until now these two strategies have not been able to deal with the problem of corruption in Indonesia. Especially in the preventive strategy in the form of prevention efforts, there is no form of effort that can truly prevent acts of corruption as evidenced by the many acts of corruption that occur in Indonesia.

In the process of preventing corruption cases, supervision by the public is an important key to carrying out the checks and balances mechanism to prevent abuse of power by law enforcers. Moreover, in the context of a democratic country, public participation should be a vital component in the implementation of the state, including financial management. The public or society certainly has the right to know and participate in overseeing the course of financial turnover in the government so that control of trust between the public and the government is always maintained.

The need for an active role of the community in monitoring state finances is also a major factor in efforts to prevent corruption cases in Indonesia. So, there is a need for a state financial management system where the community can take an active role in the financial supervision process. Blockchain *Open Ladger System* can be a solution to these problems by making it a corruption-free state financial governance system. Blockchain is a technology that was first successfully used in the development of cryptocurrency. Until now, Blockchain technology continues to be developed so that it can be applied to various sectors ranging from the financial industry to the government system.

In the application of this Blockchain system, the public or people who are in the system network can take an active role in overseeing the course of the country's financial turnover through a digital platform network. In this system, the public can clearly know the direction in which the state financial budget is running so that if there is fraud or discrepancies, the perpetrators or problems can be detected immediately. In other words, the application of this Blockchain system is open or transparent to the course of state finances. In addition, transaction activities with this Blockchain system will be able to take place quickly because it uses a digital platform-based system and also the costs used will be cheaper because this system does not require intermediaries or third parties such as banks or other financial institutions so that the transaction process becomes faster and more

effective. With the advantages of the Blockchain system, it is not impossible that corruption crimes in Indonesia will be resolved properly.

From the description of the Blockchain system above, its application to the state financial governance system will greatly affect the behavior of officials or state officials in activities using state finances. In other words, the potential for corruption cases will be minimal, even if there are indications of corruption cases, it will be immediately detected and seen where the direction of the financial fraud occurred. In addition, it is not only the government or the Financial Supervisory Board that can monitor the state's financial turnover, but the public from all levels of society can also participate in monitoring and supervising the course of transactions or the process of the state's financial turnover.

In the process of preventing or handling corruption cases, public supervision is important. Especially in the context of a democratic country, community participation is certainly a vital aspect in the ongoing process of a state, including in the process of managing state finances. The public also has the right to be able to know and oversee the course of state financial transactions, which is also an important factor in preventing criminal acts of corruption. In this case, it is necessary to have a state financial management system that can directly involve the community to take an active role in the implementation of financial supervision, Blockchain is the solution[11].

In state financial governance, Blockchain is run as a system that regulates the course of the state's financial turnover itself based on a digital technology system. In every transaction or state financial activity that takes place will always be recorded in a system block, where all people in this system network can also monitor it. The Blockchain system works efficiently without intermediaries or third parties so that transaction activities can run more quickly and effectively. With the efficiency and direct supervision of the community in this Blockchain network, it will directly make there is no gap for officials or state officials to commit acts of corruption.

In line with one of the 4 pillars of Indonesia's vision 2045, namely strengthening national resilience and governance which also includes the goal of making Indonesia free from corruption. With the application of the Blockchain system in the state financial governance system, one of the goals of the 4 pillars of Indonesia's vision 2045 to become a corruption-free Indonesia can be realized which indirectly also leads to efforts to strengthen national resilience and better governance.

Blockchain technology can make a major contribution to improving data security in the law enforcement process against corruption. Here are some ways in which that can be done:

1. High Data Integrity: Blockchain uses decentralized data structures and strong cryptographic systems to record transactions. Data that has been entered into the blockchain is difficult to manipulate or change without the consent of the majority of the network. This ensures high data integrity, so information related to corruption offenses cannot be modified or deleted.
2. Transaction Tracking: Blockchain allows transaction tracking in a transparent and open manner. Every transaction recorded in the blockchain can be accessed and verified by all parties involved in the network. This allows investigators to track the flow of funds and transactions related to criminal acts of corruption more efficiently.
3. Smart Contracts: Smart contracts can be programmed in the blockchain to execute automatically when certain conditions are met. For example, in the case of law enforcement against corruption, smart contracts can be used to automate processes such as incentive payments to informants or locking up assets suspected of being linked to criminal acts.

4. Identity Security: Blockchain can be used to digitally verify identity without the need for a central authority. This can help in ensuring that investigators, courts, and other interested parties in law enforcement proceedings are legitimate parties and have the necessary authority.
5. Data Security: Data stored in blockchain is encrypted and distributed across the network, reducing the risk of cyberattacks and data leaks. By using blockchain technology, sensitive information related to corruption investigations can be stored securely and can only be accessed by authorized parties.

By applying blockchain technology in the law enforcement process against criminal acts of corruption, transparency, security and accountability can be improved, which in turn can help reduce the level of corruption and strengthen law enforcement. Implementing blockchain technology in legal processes can increase public trust in several ways:

1. Transparency: Blockchain technology allows all legal-related transactions and activities to be recorded transparently in a ledger that is accessible to all interested parties. This creates a high level of transparency in the legal process, which can help the public to understand how decisions are taken and actions are carried out.
2. Data Integrity: With the immutability and decentralization nature of blockchain, data integrity in legal proceedings can be guaranteed. This means that information presented in legal proceedings, such as evidence and records, cannot be manipulated or changed without the consent of a majority of the network. This gives the public confidence that the data used in the legal process is valid and trustworthy.
3. Increased Efficiency: Implementation of blockchain technology can increase efficiency in legal processes by automating some administrative tasks and speeding up verification and validation processes. This can reduce the possibility of human error and ensure that the legal process runs more quickly and effectively.
4. Public Participation: Through an open blockchain platform, the public can more easily get involved in the legal process, for example by providing input or conveying relevant information. This creates a greater sense of community ownership and participation in the law enforcement process, which in turn can increase trust in the legal system as a whole.

Thus, the implementation of blockchain technology in legal processes can help create a more transparent, trustworthy and efficient system, which in turn can increase public trust in the legal process and the institutions involved. Information technology can encourage faster tracking of corruption, in which case more and more people find it difficult to carry out corruption because everything has been monitored and is easy to track. This can help the Indonesian people who are trying to build progress in carrying out more advanced and better development without any acts of corruption occurring in it.

4 Conclusions and Suggestions

4.1 Conclusions

In an effort to create an Indonesia that is free from corruption cases, there are several ways that the government can do by utilizing the role of technological and information developments, one of which is by utilizing the role of the Blockchain Open Ladger System, a system that operates in the process of transparency in financial management. In this system, the public can clearly know the direction in which the state's financial budget is running so that if fraud or discrepancies occur, the perpetrator or problem can be immediately detected. The implementation of blockchain technology has great potential in increasing security, integrity and transparency of data in the law enforcement process against criminal acts of corruption[12].

With good collaboration between law enforcement agencies, governments, and technology experts, as well as a careful approach to implementation and oversight, blockchain technology can become an effective tool in fighting corruption and ensuring fairness in the legal system. In other words, the implementation of the Blockchain system is open or transparent regarding the running of state finances. Apart from that, there are several ways that the government can do to overcome corruption cases in Indonesia, namely by providing training to the nation's next generation through three factors, namely education, technology and information, and family[13].

4.2 Suggestions

Cooperation between law enforcement agencies, governments, and blockchain technology experts is necessary to design and implement effective blockchain solutions. Intensive training for law enforcement personnel on blockchain technology and its implementation in legal processes needs to be organized to ensure maximum utilization of this technology. The development of a blockchain platform specifically for corruption law enforcement purposes, with features such as secure identification and a smart contracts-based reward system, could be an effective step. A regular monitoring and evaluation mechanism is needed for the implementation of blockchain technology in law enforcement processes to ensure optimal performance and identify areas for improvement.

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