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Application of Blockchain Technology for Strengthening The Integrity of The Electronic Investigation Management System (E-Mp) in The Indonesian National Police

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Abstract: This study discusses the application of blockchain technology in strengthening the integrity of the electronic investigation management system (e-MP) within the Indonesian National Police (Polri). As demands for transparency, accountability, and data security in the investigation process increase, the e-MP system faces serious challenges related to potential data manipulation, weak internal controls, and limited objectively verifiable digital footprints. Blockchain technology offers a solution with its decentralized, transparent, and immutable characteristics, thus enhancing the validity of digital evidence and preventing illegal intervention in legal processes. This study uses a normative juridical approach by analyzing recent regulations such as Law No. 4 of 2023 on the Development and Strengthening of the Financial Sector (P2SK), Law No. 27 of 2022 on Personal Data Protection (UU PDP), as well as technical provisions from the Financial Services Authority (OJK) and Commodity Futures Trading Regulatory Agency (Bappebti) regarding digital assets. The analysis results show that the implementation of blockchain in e-MP requires regulatory readiness, institutional capacity strengthening, and the development of integrated digital infrastructure. The legal implications include the need for adjustments in criminal procedural law, personal data protection, and national policy strategies in the digital law sector. This study recommends the formulation of cross-sector policies, training for law enforcement officers, and institutional cooperation to ensure the technology's implementation aligns with legal and human rights principles. With the right approach, blockchain has the potential to become a main pillar in the reform of a modern and trustworthy investigation system.

Keywords: Blockchain, e-MP, Police, Integrity, Investigation, Personal Data, Legal Reform.

INTRODUCTION

Integrity in the electronic investigation management system (e-MP) serves as a fundamental pillar for achieving fair, transparent, and trustworthy law enforcement (Herdiyathi, 2022). In the context of the Indonesian National Police (Polri), the e-MP system

is expected to digitally record the entire investigative process so that it can be easily traced and verified (Raslin, 2021). However, facts on the ground show that digitalization does not automatically guarantee transparency and accountability. There is still room for data manipulation, digital trail removal, and gaps in the auditability of the electronic systems used. This raises significant questions about how effectively digital systems can maintain the integrity and authenticity of information in legal processes (Yunaningsih, 2021).

The challenges Polri faces in maintaining the accountability of the e-MP system involve not only technical issues but also institutional culture and human resource capacity. When digital systems are built without strong control over data access and processing, their integrity can easily be questioned (Wibowo, 2023). Investigators may unlawfully alter records or delete data that could hinder the legal process, especially in sensitive cases. The reliance on closed systems accessible only to a limited few also makes public oversight and accountability difficult. In such an environment, solutions must not only refine the technology but also transform the trust structure.

Blockchain technology emerges as a promising alternative to address these issues (Wulan, 2024). The decentralized and tamper-resistant nature of blockchain offers advantages in preserving data integrity (Wahana, 2025). All transactions or data changes are recorded in interconnected, encrypted blocks, making every action within the system permanently traceable (Astuti, 2025). This mechanism enables any manipulation to be easily detected, as blockchain does not allow deletion of information without consensus. The transparency and trust produced by this mechanism are highly suitable for investigation systems that require a clear audit trail for every legal step taken (Ayuni, 2024).

The core principles of blockchain technology, such as immutability, transparency, and security through encryption, can be applied to the e-MP to ensure that no investigation can be concealed or forged (Wattimena, 2024). The technology also enables monitoring by multiple parties, including internal institutions and independent oversight bodies. With such a structure, blockchain is not just a matter of technical sophistication but builds a system of trust based on evidence, not claims. The involvement of multiple nodes in the system ensures that the recorded data cannot be altered without collective approval. This is highly relevant for investigative systems that have long been vulnerable to power influence (Tripathi, 2023).

Consensus mechanisms in blockchain, such as Proof of Work, Proof of Stake, or other hybrid models, also offer assurance that decisions or records in the system are made collectively, not based on a single authority (Irawan, 2023). In the context of investigations, this can be adapted as a form of joint verification of legal documents and actions before being permanently recorded in the system (Prawoko, 2024). Such consensus could be conducted internally within Polri's structure or even involve specific external institutions as part of a checks and balances mechanism. When investigations involve crucial cases such as corruption or human rights violations, this system ensures that no party can unilaterally control the information.

The legal foundation for the application of blockchain technology in Indonesia has undergone significant development. Law No. 4 of 2023 on the Development and Strengthening of the Financial Sector (UU P2SK) recognizes digital assets and their supporting technologies as legitimate parts of the ecosystem that must be regulated (Santiago, 2023). Under this regulatory umbrella, blockchain is no longer seen as an experimental technology but as part of a recognized legal architecture that can be used within formal institutions, including law enforcement agencies (Andriyani, 2023). This opens the door for integrating the technology into investigative systems, provided it aligns with prevailing legal norms and principles. In other words, there is legal legitimacy for adopting this new technology.

Further regulations such as OJK Regulation No. 27 of 2024 and OJK Circular Letter No. 20/SEOJK.07/2024 strengthen rules on blockchain-based transactions, including data

security, user protection, and compliance with digital audit standards (Lase, 2021). Although the main focus of these regulations is the financial sector, the principles they establish—such as system transparency, openness of information access, and decentralized verification—are highly relevant for application in legal and investigative systems. If Polri intends to adopt blockchain, the legal footing already exists, though operational and technical adjustments would be needed. These explicit regulations reflect the state's readiness to embrace technological adoption in legal systems and public governance (Putra, 2024).

The electronic investigation management system (e-MP) currently implemented by Polri is fundamentally aimed at enhancing efficiency and accuracy in the investigation process. This system records reports, evidence collection, investigation reports, and coordination among investigation units (Hanafi, 2024). However, in practice, the system still has many weak points, particularly in terms of internal transparency and traceability of investigators' actions. Cases of stagnant or missing investigations due to weak digital documentation or information security loopholes are not uncommon (Azim, 2021). This highlights the importance of system updates using technology that can minimize the risk of abuse.

Another weakness of the current e-MP lies in the lack of system integration between institutions. Many investigations require coordination with prosecutors, courts, or other agencies, but data cannot be easily shared due to incompatible formats or concerns about security (Na'im, 2023). Blockchain could serve as a solution for interoperability, allowing different institutions to access information with balanced control without compromising data confidentiality (Andriyani W. W., 2025). Each party would only see data relevant to their authority, but still within a single, unalterable information chain. This would accelerate processes and reduce potential inter-institutional conflicts.

Implementing blockchain technology in the e-MP system also presents an opportunity to restore public trust in the police institution. Thus far, negative public perceptions of Polri often stem from suspicion that legal processes are not conducted fairly or transparently. When the investigation system uses technology that ensures real-time transparency and accountability, the public can see that there is no hidden interference or secretly deleted data. Even if full disclosure is not possible for legal reasons, a transparent internal process would at least facilitate oversight and accountability. Ultimately, applying this technology is not just about the system itself but about rebuilding trust in the rule of law.

METHOD

The research method used in writing this journal is a normative juridical method, which focuses on the study of existing legal norms as the basis of analysis. This approach is used to examine various laws and policies relevant to the application of blockchain technology in the electronic investigation management system (e-MP) within the Indonesian National Police institution. The research was conducted through library research, analyzing primary legal sources such as Law No. 4 of 2023 on the Development and Strengthening of the Financial Sector (UU P2SK), Law No. 27 of 2022 on Personal Data Protection (UU PDP), as well as the latest provisions from the Financial Services Authority (OJK) and the Commodity Futures Trading Regulatory Agency (Bappebti) regulating digital asset trading, including crypto assets. Secondary literature was also analyzed, including legal books, academic journals, scholarly articles, and official publications from state institutions discussing blockchain technology, the criminal justice system, and digitalization of the investigation process. This normative approach was chosen because it can systematically and conceptually describe how the existing legal structure can accommodate technological innovations in the context of law enforcement. The analysis was conducted qualitatively, assessing the appropriateness, gaps, and the need for legal norm development to support the implementation of blockchain within Polri. This method

allows the author to formulate policy recommendations based on positive law and address current challenges faced in the electronic investigation system in the digital era.

RESULT AND DISCUSSION

Analysis of Blockchain Technology Implementation in the e-MP System

The implementation of blockchain technology in the electronic investigation management system (e-MP) holds great potential to revolutionize how the police handle investigative processes. Transparency is the primary value offered by blockchain, where every recorded data or action carries a digital footprint that cannot be altered without detection. Any change to the investigation file would be logged into a data block that can only be modified through consensus, thereby closing opportunities for manipulation by individuals. This system not only strengthens internal control but also provides opportunities for independent oversight bodies to assess the validity of the investigation process without accessing physical data. It creates stronger systemic procedural justice guarantees.

Accountability can also be enhanced through a permanent logging system, where the time, identity, and actions of each officer are automatically recorded. Investigators can no longer arbitrarily delete or alter reports without leaving digital traces. This places personal responsibility on every legal action taken—something that has been difficult to prove within closed systems. When the public or oversight agencies require an audit of an investigation, blockchain provides chronological evidence that cannot be contested. This strengthens the legal position of victims and parties harmed by procedural deviations.

Several countries have already utilized blockchain in their legal systems as a form of innovation to build public trust. Estonia, for example, has integrated blockchain technology into legal records and government documents since the early 2010s. In that country, blockchain is used to ensure the security of patient data, population records, and legal documents, including criminal justice processes. This success shows that blockchain technology can be adapted to complex governmental systems, provided there is a strong infrastructure and policy commitment. This could serve as a learning model for Polri and legal policymakers in Indonesia.

In the context of Indonesian law, the adoption of new technology in the investigation system faces significant juridical challenges. The criminal justice system is subject to strict legality principles, so any change in procedures or mechanisms must comply with the applicable criminal procedural law. Currently, the Criminal Procedure Code (KUHAP) has not provided explicit room for the use of blockchain-based digital technology. This demands regulatory adjustments, both in the form of technical regulations and legislative amendments, to ensure the legality of blockchain-based investigation data and actions so they can be recognized in court.

Technical issues are also an important consideration in the implementation of blockchain, particularly in terms of the security and privacy of investigation data. Blockchain is transparent, but not all information in the investigation process can be made public. Therefore, a private or hybrid blockchain system must be used, which allows access control without compromising the principle of data integrity. In addition, server capacity and network connectivity in various regions of Indonesia need to be strengthened so that this system can operate optimally and uniformly across all jurisdictions under the National Police. A half-baked implementation could instead open new risks in data management.

The privacy of victims, witnesses, and suspects in the investigation system must also be strictly maintained. Blockchain must be arranged in such a way that the identities of individuals involved in the legal process are not disclosed without permission. Encryption technology and information segmentation can be used to maintain access limitations in accordance with authority. This is where the involvement of information technology and

privacy law experts becomes important in designing a system that aligns with legal and ethical principles. A blockchain system must be designed not only to prevent deviations but also to protect human rights in their entirety.

The strategy for implementing blockchain in e-MP must begin with long-term planning involving all stakeholders, including the National Police, the Ministry of Communication and Information Technology, OJK, Bappebti, and external oversight institutions. A joint framework must be established to regulate technical standards, work mechanisms, as well as system oversight and audit procedures. The drafting of inter-agency work protocols using blockchain systems must also be regulated to avoid overlap or jurisdictional conflicts. This is a task that demands cross-sector collaboration and continuous supervision during the transition process.

Institutions such as OJK and Bappebti have important roles in overseeing and guaranteeing the standards of blockchain technology used, even though their domains are mostly in the financial sector. OJK can provide technical guidance on system security and digital data management, while Bappebti has experience in regulating digital assets and blockchain-based transaction systems. Collaboration with these institutions provides legitimacy and technical support for the National Police in building a system that complies with national norms. This approach strengthens the legal position of blockchain use in the Indonesian legal system and reduces internal resistance from law enforcement agencies.

The development of a pilot project integrating blockchain into e-MP can be a strategic initial step. This pilot project can be implemented in one police jurisdiction as a trial model under strict supervision. The results can then be evaluated technically and legally to serve as the basis for developing national policy. With this gradual approach, the National Police not only demonstrates a commitment to technology-based institutional reform but also opens space for continuous improvement based on empirical evidence. This transformation will mark a new chapter in Indonesia's digital criminal justice system based on trust and integrity.

Legal and Policy Implication Analysis

The regulation of blockchain technology implementation in the investigation system brings significant legal implications for all stages of the criminal process, particularly in the aspects of evidence and the digital chain of custody. When blockchain systems are used to record every stage of an investigation, each data point will have a clear timestamp and cannot be altered. This will influence how courts assess the authenticity and validity of a piece of evidence, as the digital forensic process will become more structured and open to verification. Judges and prosecutors will face a more technology-based evidence system, which demands adaptation to legal instruments that previously relied solely on manual documentation or easily manipulated digital files. This process will push a shift in criminal law approaches toward more forensic technology-based methods.

The integration of this technology can also shorten the investigation time as the processes of recording, archiving, and tracking data become automatic. This change requires revisions to several standard investigation procedures that were previously hierarchical and required manual authorization. The speed of the process may increase, but it must be ensured that such acceleration still aligns with the principle of legal prudence. A legal system accustomed to conventional evidence testing must adjust to the blockchain's working logic, which is based on data integrity from the moment of initial recording. This transformation will create new challenges in harmonizing digital processes with the normative system of criminal procedural law.

The use of blockchain in e-MP will also encourage an evaluation of the authority of law enforcement officers, particularly in accessing and managing investigation data. Every change or data processing in the blockchain system must go through validation and be recorded

permanently, which automatically limits investigators' discretionary space. This can increase institutional accountability but also raises questions about flexibility in handling sensitive or emergency cases. In such situations, the legal system needs to prepare provisions that facilitate limited discretion without compromising the principle of transparency. New regulations may be needed to balance between technology and the realities of field dynamics.

The implications for personal data protection become one of the main concerns in implementing blockchain in the legal system. Law No. 27 of 2022 on Personal Data Protection (PDP Law) stipulates that all data processing must be based on the principles of legality, transparency, and accountability. In the context of the e-MP system, data of victims, witnesses, suspects, and other involved parties are highly sensitive, so each access must be strictly protected. Blockchain that is not designed with appropriate encryption and access control approaches risks violating the provisions of the PDP Law. Such non-compliance can lead to new legal disputes, especially if personal data leaks or is used outside of the legal context.

The blockchain system design in the e-MP context must adopt the principles of data minimization and privacy by design. These two principles emphasize that only relevant and essential data may be processed, and the system must be designed from the outset to protect user privacy. These technical adjustments must be accompanied by regulations that explicitly ensure that blockchain in law enforcement does not violate citizens' data rights. Compliance with the PDP Law must be the main benchmark in every stage of planning and implementation. If not anticipated early on, normative conflicts between system transparency and data confidentiality may hinder the sustainability of the blockchain-based e-MP project.

A strong policy foundation is needed to ensure the successful integration of blockchain technology into the investigation system. The policy must be cross-sectoral and able to address the emerging regulatory, technical, and institutional challenges. Adjustments to Law No. 8 of 1981 on Criminal Procedure may be necessary, especially regarding the recognition of electronic evidence derived from blockchain systems as legitimate evidence. In addition, derivative regulations need to be formulated that detail technical standards and procedures for using blockchain systems in the investigation context. These steps must involve active participation from the legislative, executive, and law enforcement institutions.

Policy recommendations also include the need to establish a special unit under the National Police tasked with managing and supervising the blockchain technology infrastructure. This unit will not only function as a technical implementer but also as a guardian of system integrity and liaison with other regulatory bodies. In the long term, the existence of this unit can enhance the institutional capacity of the National Police in dealing with the dynamics of legal technology development. The performance of the blockchain system needs to be monitored periodically and reported in the form of open evaluations to maintain accountability. External oversight mechanisms from the National Police Commission (Kompolnas) or other independent institutions can also be expanded to include this digital system.

Blockchain implementation policies must also take into account the readiness of human resources within law enforcement institutions. Special training on understanding blockchain technology and its implications for criminal law needs to be provided systematically. Not all investigators or prosecutors have sufficient technical backgrounds to understand the complexity of digital systems, so training becomes the main key. The training materials must cover technical, ethical, and regulatory aspects so that law enforcement’s understanding is not partial. This process cannot take place just once, but must become part of the continuous education and training curriculum.

Strengthening institutional capacity must also involve legal and technology education institutions to create synergy in human resource development. Law faculties can play a role in examining the legal impact of integrating new technologies, while technology institutions can

support the development of systems that are adaptive to legal norms. This collaboration will create a stronger digital legal ecosystem based on scientific evidence. The blockchain-based e-MP system is not just a technology project but a legal reform project that requires strong intellectual and political commitment. Proper implementation can lead Indonesia's legal system into a new era of fair, transparent, and trustworthy digital justice.

CONCLUSION

The implementation of blockchain technology in the electronic investigation management system (e-MP) of the Indonesian National Police is a strategic step to strengthen transparency, accountability, and integrity in the law enforcement process. This study has explained that blockchain, with its decentralized and immutable nature, is capable of providing solutions to various issues inherent in both conventional and currently used digital investigation systems. Through this integration, each stage of the investigation can be recorded automatically and permanently, thereby minimizing the risks of data manipulation, loss of case files, or abuse of authority. The study also shows that the success of blockchain implementation in the e-MP system highly depends on the readiness of national law, including synchronization with recent regulations such as Law Number 4 of 2023 concerning the Development and Strengthening of the Financial Sector (P2SK) and Law Number 27 of 2022 concerning Personal Data Protection. In the long term, this technology-based approach not only reforms the technical procedures of investigation but also strengthens the legitimacy of law enforcement institutions in the eyes of the public.

However, for blockchain technology integration to run effectively and sustainably, a comprehensive and inclusive implementation strategy is required. The government needs to encourage the formation of technical regulations and operational policies that support the adaptation of the law to developments in information technology. Law enforcement officers must be prepared through education and training that not only focus on technical mastery but also on normative understanding of human rights, particularly concerning data protection and the right to fair justice. It is recommended that the Indonesian National Police collaborate with the Financial Services Authority (OJK), the Commodity Futures Trading Regulatory Agency (Bappebti), the Ministry of Communication and Informatics (Kominfo), as well as academic and technological institutions to develop a credible digital legal infrastructure. The final recommendation of this study emphasizes that blockchain is not merely an advanced technology, but a structural reform instrument with great potential to build a cleaner, more efficient, and trustworthy investigation system in Indonesia.

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