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Reconstruction of the legal framework for the utilization of Blockchain technology in preventing land mafia practices in Indonesia

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Abstract---Land mafia practices constitute a legal problem that threatens legal certainty, land rights protection, and public trust in Indonesia's land administration system. Various methods involving document manipulation, falsification of land ownership documents, abuse of authority, and alteration of ownership records demonstrate that preventing land mafia practices requires more than criminal law enforcement. It also requires improvements in land administration governance. The development of digital technology, particularly blockchain, offers opportunities to strengthen transparency, record integrity, and traceability of changes in land registration data. Nevertheless, its implementation raises legal issues concerning regulatory foundations, the legal status of electronic records, evidentiary value, validation authority, and personal data protection. This study aims to examine weaknesses in Indonesia's land administration legal framework and formulate a reconstruction of the legal framework for utilizing blockchain to prevent land mafia practices. This research employs normative legal methods through statutory, conceptual, and case approaches. The proposed framework emphasizes institutional data verification, auditable digital records, institutional supervision, and legal remedies for land rights holders. This study argues that blockchain should function as a supporting instrument for land administration rather than replacing the state's authority to determine the legal validity of land rights.
Keywords--- Blockchain; Land Mafia; Agrarian Law; Land Administration; Legal Certainty.

Introduction

In Indonesia's legal system, the regulation of land rights is fundamentally based on Law No. 5 of 1960 on Basic Agrarian Principles. This law provides the foundation for the implementation of national agrarian law, including the regulation of land registration as a means of ensuring legal certainty over land rights. Government Regulation No. 24 of 1997 on Land Registration, in conjunction with the regulatory developments introduced by Government Regulation No. 18 of 2021, is an important component of land administration in Indonesia. Although a legal framework for land registration has been established, land administration practices continue to face various challenges. One issue of concern is the activity of land mafias. This phenomenon may involve document forgery, manipulation of legal data, the use of false identities, abuse of authority, and actions leading to the unlawful transfer or control of land. These practices not only cause losses to rights holders but may also undermine public trust in the institutions responsible for land administration.

The problem of land mafias cannot be viewed solely as criminal activity carried out by particular individuals or groups. It is also linked to the quality of land administration governance, document verification systems, data maintenance, internal oversight, and interagency coordination. Weaknesses at any stage of administration can create opportunities for data manipulation and abuse of authority. Prevention efforts should

focus on strengthening the land administration system as a whole. Advances in information technology offer various opportunities to improve the quality of government administration. One technology with potential for further development is blockchain. This technology is known as a distributed digital record-keeping system that uses cryptographic mechanisms and consensus to record and verify changes to information across a network. These characteristics enable the creation of traceable digital records and help identify changes made to data.

Blockchain has the potential to serve as a supporting tool for recording changes to ownership data, document verification processes, and administrative activities carried out by authorized officials. Such records can enhance transparency and accountability, as every recorded activity can be traced by access identity, time, and change history. The use of blockchain may offer an alternative means of strengthening efforts to prevent manipulation in land administration.

The use of blockchain cannot automatically guarantee the accuracy of land data. While the technology can help maintain the consistency and integrity of records entered into the system, it does not guarantee that the underlying data is materially accurate. If the source documents are forged or obtained through unlawful procedures, recording them on a blockchain may still preserve inaccurate information. Therefore, verification of physical and legal data by the competent authorities remains essential. Another issue concerns the legal status of blockchain-based records within Indonesia's land registration system. The Electronic Information and Transactions Law recognizes electronic information and electronic documents as valid legal evidence. However, recognition of electronic evidence does not automatically make every blockchain record standalone proof of land ownership. Its legal status and evidentiary weight must still be assessed in light of applicable laws and regulations, the authenticity of the data source, the integrity of the system, and its relevance to the land registration process

Regulations on the digitalization of land administration have also developed through Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency Regulation No. 3 of 2023 on the Issuance of Electronic Documents in Land Registration Activities. This regulation establishes a basis for the use of electronic systems in the conduct of land registration. However, the development of blockchain technology requires further study into the compatibility of distributed ledger mechanisms with the existing electronic land systems, including access controls, the responsibilities of system operators, data security, and correction mechanisms.

Previous research on blockchain in the legal sector has laid the conceptual foundation for the development of this technology. In their 2024 article, "Regulating Blockchain Technology as an Instrument for Developing Digital-Based Law Enforcement and

Realizing a Just Society in the Society 5.0 Era," Sinaga and Azzura examine the importance of establishing a regulatory framework to support the use of blockchain in law enforcement. Their study highlights blockchain's potential to enhance the transparency, efficiency, auditability, and accountability of the legal system. In addition, Lase, Adinda, and Yuliantika (2021) examine the legal framework for blockchain technology under Indonesian cyber law.

Both studies contribute to an understanding of the relationship between blockchain technology and the development of national law. This study, however, has a more specific focus: reconstructing the legal framework for using blockchain in land administration to prevent land-mafia practices. The discussion addresses not only the benefits of the technology but also the relationship among land-data validation, the authority of officials, the evidentiary value of digital records, legal accountability, and the protection of land rights holders.

This study examines three main issues: weaknesses in the regulation and governance of land administration that may create opportunities for land-mafia practices; the legal status of blockchain-based recordkeeping within Indonesia's land administration system; and the reconstruction of the legal framework for blockchain use to strengthen the prevention of land-mafia practices and the protection of land rights. It is expected to contribute to the development of agrarian law and information technology law by formulating a model for land-sector blockchain governance grounded in the principles of legal certainty, institutional accountability, data security, and community protection.

Methods

This study adopts a normative legal research methodology, examining positive legal norms, principles, doctrines, and legal concepts related to the use of blockchain technology in land administration. It aims to assess the adequacy of the applicable regulations and identify the need for legal reconstruction to prevent land-mafia practices in Indonesia. The study employs three approaches: a statute approach, involving a review of regulations on agrarian affairs, land registration, government administration, electronic transactions, and personal data protection; a conceptual approach, examining the concepts of blockchain, legal certainty, legal protection, administrative accountability, and digital data governance; and a case approach, analyzing court decisions concerning land disputes, document forgery, and abuse of authority.

Legal materials consist of primary, secondary, and tertiary sources. Primary legal materials include Law No. 5 of 1960, Government Regulation No. 24 of 1997, Government Regulation No. 18 of 2021, legislation on electronic information and transactions, including its amendments, Law No. 27 of 2022 on Personal Data

Protection, and ATR/BPN regulations concerning electronic documents in land registration. Secondary legal materials include books, scholarly journals, research findings, and expert opinions, while tertiary legal materials include legal dictionaries, encyclopedias, and other reference sources. Legal materials were collected through a literature review and analyzed qualitatively using legal interpretation, conceptual analysis, and prescriptive reasoning. The analysis focused on identifying relevant legal provisions and regulatory gaps, and assessing their consistency with the principles of legal certainty and legal protection, in order to reconstruct the legal framework for the use of blockchain in land administration.

Discussion

1. **The Problem of Land Mafias and Weaknesses in Land Administration Governance in Indonesia**
   a. Land Mafia Practices as a Threat to Legal
      Certainty Regarding Land Rights Land-mafia practices involve unlawful acts related to the control, ownership, use, and transfer of land rights. They may involve various parties employing a range of methods, from document forgery and manipulation of ownership data to the use of false identities and abuse of authority in land administration processes. From the perspective of agrarian law, legal certainty regarding land rights depends not only on the existence of a certificate but also on the accuracy of the physical and juridical data that form the basis for issuing certificates and maintaining land registration records. When data collection, examination, and recording are not carried out carefully, discrepancies may arise between the actual legal status and the information recorded in the land administration system. These problems show that preventing land mafia activity requires an administrative system capable of ensuring the authenticity of documents, the traceability of changes to data, and the accountability of those who carry out administrative actions. Without adequate oversight mechanisms, the land administration system can become a vehicle for manipulation that harms rights holders.
   b. Weaknesses in the Verification and Maintenance of Land Data
      Land registration requires careful collection and examination of both physical and legal data. Physical data concerns the location, boundaries, and area of land parcels, while legal data concerns their legal status, the holders of rights, and the basis on which those rights were acquired. The quality of land administration depends greatly on the verification of both types of data. Inconsistencies in source documents, errors in identifying land parcels, and inadequate examination of the history of rights transfers may give rise to legal disputes in the future. Disorderly data maintenance may cause stored information to fail to reflect the actual legal status. The land administration system needs mechanisms to identify every change to information. A record of these changes is important for determining who made each change, when it

was made, its legal basis, and which official approved it. Land administration issues concern not only the storage of documents but also the integrity of the information management process. This need is one of the key reasons for examining the use of digital record-keeping technologies such as blockchain.

c. Institutional Oversight and Administrative Accountability
Land administration involves institutions and officials exercising authority over the registration, maintenance, and recording of changes to land data. The effectiveness of oversight depends heavily on a clear allocation of authority, inspection mechanisms, and accountability systems. Weak oversight can create opportunities for the abuse of access and authority. Every administrative action affecting the legal status of land should have an auditable record.This audit trail helps ensure that data changes are made in accordance with proper procedures. The use of blockchain technology could be considered to support this need. By recording activities in sequence and using network verification mechanisms, blockchain could help improve the traceability of administrative activities. However, its implementation must still be accompanied by institutional oversight and clear accountability mechanisms.

2. Legal Status and Potential Applications of Blockchain in Land Administration

a. Blockchain's Characteristics as a Digital Record-Keeping Instrument
Blockchain is a distributed digital record-keeping technology that stores information in interconnected blocks using cryptographic mechanisms. Each block contains specific information and is linked to the preceding block, allowing changes to validated records to be detected through network verification. These characteristics offer several potential applications in land administration: greater transparency in record-keeping, traceability of data changes, improved integrity of digital records, and enhanced auditability of administrative activities. Blockchain technology can be used to record a land parcel's administrative identifiers, the history of changes to its data, the time each entry was recorded, the identities of officials who carry out administrative actions, and references to the documents on which changes are based. This mechanism makes administrative activities traceable in the event of data discrepancies or suspected manipulation. The fact that blockchain records are relatively difficult to alter should not be taken as a guarantee that all stored information is accurate. Blockchain can only help preserve the integrity of records based on the information entered into the system. The substantive accuracy of those records still depends on the examination of documents and validation by duly authorized officials.

b. Blockchain's Characteristics as a Digital Record-Keeping Instrument
An important issue in the use of blockchain is the legal status of the records it produces. Under Indonesian law, the Electronic Information and Transactions Law recognizes electronic information and electronic documents

as legally valid evidence. This recognition provides a basis for considering blockchain records as electronic information that may be used as evidence, provided they satisfy the applicable legal requirements. However, recognition of electronic information as evidence must be distinguished from recognition of a record as a basis for determining land ownership. Blockchain records cannot automatically replace land registers, certificates, or other official documents recognized under the land registration system. The evidentiary value of such records must be assessed in light of their authenticity and integrity, the reliability of the system, the sources of the information, and their conformity with applicable land law. Blockchain should be treated as a supporting tool for strengthening the administrative audit trail, not as a mechanism that independently determines the creation, transfer, or extinguishment of land rights.

c. The Relationship Between Blockchain and the Digitalization of Land Registration

   The digital transformation of land administration in Indonesia is grounded in Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency Regulation No. 3 of 2023 on the Issuance of Electronic Documents in Land Registration Activities. This regulation provides the basis for implementing electronic systems in land registration, including initial land registration, maintenance of land registration data, recording changes to data and information, and media conversion. The existence of these provisions demonstrates that the use of digital technology in land administration is no longer merely a conceptual idea. Nevertheless, the use of blockchain requires further regulation governing its integration with the electronic systems operated by the Ministry of ATR/BPN. Such integration must adhere to the principle that blockchain systems must not create independent ownership records that conflict with the national land registration system. All record-keeping must remain within the scope of the authority and procedures prescribed by applicable land law.

d. Legal Risks and Limitations of Implementing Blockchain

   Implementing blockchain in land administration also entails several risks.

   1. Risk of errors in source data. Incorrect information may remain on the network if the initial validation process is not performed properly.
   2. Risk of security breaches and access misuse. The use of digital identities and cryptographic keys requires strict controls to prevent unauthorized parties from accessing the system or performing administrative actions.
   3. Personal data protection risks. Information about holders of land rights may contain personal data that must be processed in accordance with applicable laws and regulations.
   4. Risk of legal liability. It must be clear who is responsible in the event of input errors, negligent verification, system failures, or abuse of authority.

5. The risk of incompatibility between technology and the legal system. If blockchain records are not properly integrated with the land registration system, discrepancies in information may arise, creating legal uncertainty. Blockchain implementation should be based on clear institutional design and legal frameworks, not solely on the technology's advantages.

3. Reconstruction of the Legal Framework for Using Blockchain to Prevent Land Mafia Practices

a. The Urgency of Establishing a Regulatory Framework for Land Blockchain
A reworking of the legal framework is necessary to ensure that blockchain use has a clear legal basis and purpose, and operates within clearly defined limits of authority. Such regulation need not be understood as establishing a new land registration system; rather, it can be directed toward developing rules governing the use of blockchain as a supporting tool for land administration. The regulatory framework should clarify the legal status of blockchain records, which parties are authorized to manage the system, validation procedures, security standards, and legal liability in the event of errors or misuse. It should also take into account the relationship between land regulations, regulations governing electronic systems, and personal data protection regulations. The use of technology must not give rise to conflicting provisions or uncertainty regarding the allocation of authority.

b. Strengthening the Verification of Physical and Juridical Data
The first aspect of the reconstruction is to strengthen the requirement to verify data before it is entered into the blockchain system. Physical and legal data must first be checked against the source documents and applicable land registration procedures. This verification must be carried out by officials or institutions duly authorized under applicable laws and regulations. Blockchain records information only after the validation process has been determined to meet the requirements. This mechanism is necessary to avoid the fundamental error of assuming that digital recording, by itself, makes information true. Thus, technology serves to preserve the integrity of the record, while the validity of the data continues to be determined through lawful procedures.

c. Affirming the Status and Evidentiary Weight of Blockchain Records
The next reform concerns clarifying the legal status of blockchain records. Regulations should distinguish between administrative records, official electronic documents, and evidence used in judicial proceedings. Blockchain records may be used to demonstrate the history of administrative activities, when records were made, and changes to information. However, they should not automatically be treated as proof of land ownership. A blockchain record must be assessed alongside other evidence, taking into account the authenticity of the source data, the authority of the party making the record, the integrity of the system, and the applicable rules of procedure.

d. Strengthening Accountability and Institutional Oversight
The use of blockchain needs to be accompanied by a clear division of responsibilities between system providers, land officials, technology infrastructure managers, and authorized parties conducting inspections. The land blockchain system should use permissioned blockchain mechanisms or licensed blockchains. This choice is based on the characteristics of land administration that require access control and authority by state institutions. The network can be managed by the Ministry of ATR/BPN with supervision and audit mechanisms involving related institutions according to their authority. The rights to read, validate, and record must be differentiated based on the functions and authorities of each party. These regulations are necessary so that the principle of transparency does not result in the disclosure of all personal information of land rights holders to the public.

e. Personal Data Protection and Correction Mechanisms
An important aspect to consider is the protection of personal data. Land information may include the name of the rights holder, identification details, address, and other information relating to an individual. Its storage and use must comply with Law No. 27 of 2022 on Personal Data Protection. One applicable model is to store complete documents in an official storage system with adequate access controls, while using blockchain technology to record document hash values, timestamps, the identities associated with administrative activities, and references to data changes. If an error occurs, there is no need to delete the existing record history. The correction is made through a new record that contains the legal basis, the reason for the change, the office that gave the approval, and the relationship to the previous record. This mechanism allows the entire administrative record to be traced and audited, while accommodating the need to correct inaccurate information.

f. Reconstruction of Legal Accountability
The adoption of blockchain must be accompanied by provisions governing legal liability. Errors in land administration systems may arise from various factors, including data-entry errors, negligence in verification, abuse of authority, system disruptions, and unauthorized access. The regulations must distinguish liability according to each party's actions and authority. Officials who conduct verification are liable in accordance with their authority and legal obligations. System operators are responsible for the security and reliability of the infrastructure in accordance with the obligations established. Meanwhile, parties that intentionally manipulate data or gain unauthorized access may be held liable under applicable laws. In addition to liability, mechanisms should be provided for lodging objections, conducting reviews, correcting data, resolving disputes, and restoring the rights of affected members of the public.

4. A Model for Reconstructing Blockchain Governance in Indonesian Land Administration

Based on an analysis of weaknesses in land administration, the legal status of electronic documents, and the need to protect land rights holders, this study proposes a layered blockchain-based land governance model. The model positions blockchain as a supporting tool integrated with the official land administration system. It comprises five main stages.

a. **The data verification and validation stage.**
   All physical and legal data must be examined by the competent authorities. The examination includes the underlying documents, the status of the rights, the identity of the rights holder, and the consistency of the information about the land parcel.
b. **The digital recording stage.**
   Once the verification process is complete, information about administrative actions is recorded on the blockchain. The record may include the document hash, transaction timestamp, official's identity, and references to supporting documents.
c. **The system integration stage.**
   Blockchain records are linked to the official land administration system and therefore do not constitute a separate ownership system. Decisions and legal actions continue to follow the applicable land registration procedures.
d. **The audit and supervision stage.**
   Any changes to information can be traced through digital audit trails. Audits are conducted to identify procedural violations, unauthorized changes, and suspected data manipulation.
e. **The legal protection and recovery stage.**
   The public is granted access to information in accordance with their respective rights and authority, mechanisms for lodging objections, opportunities to submit corrections, and channels for resolving disputes in the event of administrative errors. Under this model, blockchain is not intended to replace the role of land officials, but rather to strengthen oversight of administrative processes. The model's success nevertheless depends on the quality of verification, system security, institutional compliance, and the effectiveness of law enforcement.

Conclusion

Land mafia practices show that land administration issues concern not only law enforcement but also the quality of data management, verification, oversight, and institutional accountability. Weaknesses in verifying physical and legal data, as well as in tracing changes to information, can create opportunities for document manipulation and abuse of authority. Preventing such practices requires a comprehensive strengthening of the land administration system. Blockchain has the potential to

enhance transparency, the integrity of records, and the traceability of data changes. However, this technology does not automatically establish the validity of land ownership. Blockchain records constitute electronic information that may be used as evidence in accordance with the law, but they do not replace certificates, land books, or the authority of competent officials. A reconstruction of the legal framework governing the use of blockchain should address source-data verification, the legal status of digital records, the allocation of authority, system security, independent audits, personal data protection, legal accountability, and mechanisms for correction. Implementing a permissioned blockchain integrated with official land administration systems could help strengthen oversight and prevent data manipulation. With appropriate governance, blockchain can support transparent and accountable land administration while providing legal protection for the public.

Suggestion

The government, through the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency, should consider establishing a specific regulatory framework governing the use of blockchain in land administration. This framework should clarify the legal status of digital records, verification mechanisms, the authority of system administrators, security standards, and legal accountability. A permissioned blockchain system integrated with the national land registration system should be developed. Its development should proceed gradually through technical and legal testing, with verification of data by authorized officials remaining a primary requirement. The government also needs to strengthen audit and oversight mechanisms, protect personal data, and ensure the restoration of people's rights. These measures are expected to enable the use of blockchain technology to help prevent land-mafia practices without undermining legal certainty or the protection of land rights.

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