

LEGAL LAND CONFLICT IN THE IMPLEMENTATION OF DIGITAL LAND CERTIFICATES: LEGAL CERTAINTY IN THE ERA OF ONLINE

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ABSTRACT

The digital transformation within Indonesia's land administration sector through the implementation of electronic land certificates represents a strategic effort to modernize public administrative services. This initiative aims to enhance service efficiency, strengthen transparency, and provide greater legal certainty for the public. However, the adoption of digital land certificates also raises a number of significant challenges that may hinder its effectiveness. One of the central issues concerns legal uncertainty regarding the validity, authenticity, and protection of digitized land data. In addition, technology-based threats—such as hacking, data manipulation, and electronic identity theft—pose substantial risks that could compromise the integrity of the national land administration system. This study employs a normative juridical approach supported by descriptive-qualitative analysis to examine the legal foundation of electronic land certificates, the practical obstacles encountered during implementation, and the forms of legal protection available against potential digital attacks. The findings indicate that although electronic certificates have been formally recognized as authentic documents with evidentiary power, their effectiveness remains limited by inadequate digital infrastructure, disparities in technological literacy, and vulnerabilities in cybersecurity systems. Therefore, strengthening regulatory frameworks, improving digital security mechanisms, and increasing public awareness emerge as urgent measures to ensure the secure and equitable implementation of electronic land certificates. Through these efforts, Indonesia's digital land administration system is expected to provide services that are more adaptive, reliable, and sustainable in the era of ongoing digital transformation.

Keywords: Electronic Land Certificates, Legal Certainty, Digital Security, Land Administration Reform, Cybercrime Risks

I. INTRODUCTION

The rapid development of information and communication technology over the past two decades has brought fundamental changes to various aspects of modern life. These advancements have not only influenced how society interacts and accesses information, but have also generated significant transformations within governmental administrative systems across many countries. The accelerating wave of digitalization has encouraged governments to adapt to contemporary demands by utilizing digital innovations as instruments to improve the quality of public services. In the Indonesian context, the adoption of digital technology within the bureaucracy has become an essential component of national administrative reform, emphasizing the principles of effectiveness, efficiency, transparency, and accountability. Digitalization is regarded as a strategic response to the public's need for services that are fast, easily accessible, and free from maladministration. Moreover, the integration of technology into governmental systems is expected to optimize institutional performance, minimize potential irregularities, and support more accurate data-driven decision-making.

This modernization movement is not merely a response to global developments, but a necessity in addressing the increasingly complex dynamics of society. Public demand for adaptive and responsive services requires the government to continually strengthen digital infrastructure, enhance human resource competencies, and ensure the sustainable integration of technological systems. Thus, the digitalization of public administration should not be viewed simply as a trend,

but as a strategic step toward establishing a more modern, trustworthy, and citizen-oriented system of governance.

Land is a vital asset for society, carrying significant economic, social, and legal value. Therefore, its management must be orderly and supported by a modern system. Every landowner is required to register their land so that ownership can receive formal recognition and legal protection from the state.¹ The land registration process serves to legally validate land ownership and ensure state protection over the rights attached to it. This procedure reflects the government's commitment to providing legal certainty for land rights holders. Land registration includes the initial recording of ownership rights as well as the continuous updating of data related to the land's status and relevant information.²

To ensure legal certainty for land rights holders, the land registration process requires active participation from various parties, including the government, the community, and the landowners themselves. The primary objective of this registration is to provide legal protection through the issuance of an official land certificate. This certificate serves as an authentic legal document that safeguards the rights of the landowner and reinforces the legitimacy of their ownership under the law.³ The digital era refers to a period in which various aspects of life are encouraged to become more efficient and modern through the use of technology. The shift toward digitalization has become unavoidable. In the land administration sector, efforts to modernize services have begun with the implementation of electronic-based systems, which ultimately produce documents in digital formats.⁴

At present, the land registration process, including the issuance of certificates, has transitioned to an electronic system. Through this system, proof of land ownership is now issued in digital form.⁵ The provisions for implementing electronic land registration are regulated under the Regulation of the Minister of Agrarian and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia Number 3 of 2023 concerning the Issuance of Electronic Documents in Land Registration Activities. The system is implemented gradually, adjusted to the readiness of each Land Office at the Regency/City level as determined by the Minister. The implementation of electronic land certificates aims to modernize land administration by enhancing operational efficiency. This system allows land registration, mapping, and measurement processes to be conducted more quickly and efficiently. In addition to speeding up procedures, the digital system also improves transparency, enabling landowners and other relevant parties to access ownership information more easily and openly.⁶

Although digitalization brings numerous benefits, its implementation is not without significant challenges. One major concern is ensuring legal certainty regarding land ownership recorded electronically. The transition from physical certificates to electronic ones requires substantial changes in policies, administrative procedures, and stricter oversight of registered data. Additionally, electronic systems introduce new risks, such as cybercrime, including

¹ Noor Atikah (2022), "The Legal Position of Land Certificates as Proof of Land Ownership Rights in the Indonesian Land Law System," *Notary Law Journal*, Vol. 1, No. 2, p. 217.

² Isdiyana Kusuma Ayu. (2019). "Legal Certainty in Land Registration Through Complete Systematic Land Registration in Batu City." *Mimbar Hukum: Faculty of Law, Universitas Gadjah Mada*, Vol. 31, No. 3, p. 339.

³ Christiana Sri Murni and Sumirahayu Sulaiman (2022), "Certificate of Ownership (Sertifikat Hak Milik) as Proof of Land Ownership Rights," *Lex Librum: Journal of Legal Studies*, Vol. 8, No. 2, p. 184.

⁴ Ana Silviana (2021), "The Urgency of Electronic Land Certificates in Indonesia's Land Registration Legal System," *Administrative Law & Governance Journal*, Vol. 4, No. 1, p. 53.

⁵ Fikahati Prasetya and Muh. Afif Mahfud (2023), "First-Time Land Registration Electronically in National Land Law," *Jurnal Hukum*, Vol. 39, No. 1, p. 81.

⁶ Ni Kadek Wina and Ida Bagus Anggapurana (2024), "The Role of Land Deed Officials in the Issuance of Electronic Certificates," *Student Research Journal*, Vol. 2, No. 4, p. 385.

hacking, data manipulation, or identity theft, which may result in misuse or even illegal transfer of land rights.

This situation has the potential to undermine the integrity of land data and harm landowners. Information security is a critical concern, as digital land documents are sensitive and must be properly safeguarded. If BPN's digital security system is not rigorously designed and supported by strong legal regulations, digitalization could instead create vulnerabilities for land rights violations. Moreover, Indonesian positive law is not yet fully equipped to address the challenges posed by information technology in the context of land law. Not all regions have sufficient digital infrastructure or public literacy to understand electronic systems, potentially leading to unequal access to legal protection, particularly in rural or underdeveloped areas that still rely on manual systems. This lack of readiness also increases the risk of administrative errors and misuse by irresponsible parties.

With the advancement of digital technology, another challenge is ensuring that electronic land certificates hold the same legal validity as physical certificates. The legal authenticity and protection of electronic certificates must be guaranteed, as land certificates serve not only as proof of ownership but also as evidence in legal proceedings, particularly in resolving land disputes. Therefore, although digitalization of land certificates offers numerous benefits, its implementation must be carried out carefully to preserve legal principles.

Based on this background, several key questions arise regarding the implementation of digital land certificates in Indonesia, namely: (1) What is the legal status of digital land certificates within the framework of Indonesia's land law system? (2) What obstacles need to be addressed to ensure legal certainty for digital land certificates? (3) What are the potential cyber threats to the security of land data?

In light of this, a comprehensive study is needed to examine the legal issues arising from the implementation of digital land certificates, including regulatory, operational, and oversight aspects. This research aims to address these questions by analyzing the legal challenges involved and providing recommendations on how to manage potential security and legal certainty issues. It is expected that this study will contribute to clarifying how digital land certificates can be implemented safely and efficiently while ensuring adequate legal protection for landowners. Thus, the digital transformation in the land sector is not merely an administrative measure but a well-planned, inclusive, and sustainable legal process.

II. RESEARCH METHOD

This study employs a normative juridical approach, which emphasizes the analysis of the legal system and applicable legislation. Accordingly, the research focuses on examining existing legal norms and their implementation⁷. This approach is employed to examine the legislation related to the digitalization of land certificates, the assurance of legal certainty, and the protection against cyber threats within Indonesia's land administration system.

This study adopts a qualitative approach, aiming to gain an in-depth understanding and analysis of legal issues arising from the implementation of electronic land certificates, rather than measuring them quantitatively or statistically. The qualitative approach emphasizes the interpretation of legal materials and legal phenomena relevant to the research problem. The data sources employed are secondary, consisting of:

1. Primary Legal Materials

⁷ Zainuddin, Muhammad, and Aisyah Dinda Karina. "The Use of Normative Juridical Methods in Establishing Truth in Legal Research." *Smart Law Journal* 2, no. 2 (2023): 114–23.

Primary legal materials refer to the main sources of law that possess legitimacy and carry binding legal authority for the parties involved.⁸ In this study, the primary legal sources utilized include, among others:

- a. Law Number 5 of 1960 concerning Basic Agrarian Principles;
- b. Law Number 1 of 2024 regarding the Second Amendment to Law Number 11
- c. of 2008 on Electronic Information and Transactions;
- d. Government Regulation Number 24 of 1997 on Land Registration;
- e. Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of BPN Number 5 of 2020 on Electronically Integrated Collateral Rights Services;
- f. Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of BPN Number 3 of 2023 on the Issuance of Electronic Documents in Land Registration Activities.

2. Secondary Legal Materials

Secondary legal materials serve as supplementary references derived from various literature, including previous studies, legal books, scholarly articles, and other academic writings.⁹ In this study, secondary legal materials are utilized to reinforce the analysis of applicable regulations while exploring academic perspectives on legal certainty and the potential cyber threats to the security of land data.

3. Tertiary Legal Materials

Tertiary legal materials serve as supporting sources that provide explanatory or supplementary information to enhance the understanding of primary and secondary legal materials. Examples of such materials include legal dictionaries, encyclopedias, and other reference sources¹⁰. In this study, tertiary legal materials play a crucial role as supplementary references, employed to clarify and provide context for technical terms and specialized concepts that arise within the study of land law, document digitalization, and aspects of cybersecurity. The use of these tertiary sources enables the researcher to bridge the understanding between primary and secondary legal norms and technical terminology, thereby allowing for a more comprehensive and precise legal analysis.

Data collection in this study was conducted through a library research method, involving the collection, identification, and analysis of various legal documents and relevant literature pertaining to the research topic. The collected data were subsequently analyzed using a descriptive-qualitative approach, aimed at providing a systematic depiction of the applicable legal norms, assessing their alignment with practical implementation in the field, and evaluating the adequacy of these norms in addressing the legal challenges arising from the digitalization of land administration. This approach enables the researcher to conduct an in-depth interpretation of legal materials and relevant phenomena, thereby offering a comprehensive understanding of the legal dynamics surrounding digital land certificates and issues of land data security.

III. RESULT AND DISCUSSION

A. Legal Status of Digital Land Certificates within the Framework of Indonesia's Land Administration System

1. Land Certificate as Evidence of Ownership Rights

⁸ Ahmad, et al. *Textbook on Legal Research Methods and Legal Writing*, 1st ed. (Jambi: PT. Sonpedia Publishing Indonesia, 2024), 79.

⁹ *Ibid.*

¹⁰ Kornelius Benuf and Muhammad Azhar. "Legal Research Methodology as an Instrument to Analyze Contemporary Legal Issues." *Jurnal Gema Keadilan* 7, no. 1 (2020): 26.

Land constitutes a fundamental and strategic natural resource, serving as the foundation for multiple dimensions of human life. With the growth of population and the intensification of development activities, the demand for land continues to rise, while its availability remains limited and non-renewable. The role of land extends beyond mere habitation; it is instrumental in supporting economic activities, social interactions, and technological advancement and innovation.¹¹ Consequently, the legal management and protection of land become critical, as they are directly linked to the certainty of rights, societal welfare, and the sustainable development of the nation. Law Number 5 of 1960 concerning Basic Agrarian Principles (UUPA) serves as the foundational framework of Indonesia's land administration system, designed to ensure social justice in the control, utilization, and use of land by the community.¹²

The Basic Agrarian Law (UUPA) grants landowners the authority to manage and utilize their land in an optimal manner, including undertaking legal actions related to the transfer of land rights. The issuance of land rights, whether to individuals or legal entities, establishes a legitimate legal relationship between the landowner and other involved parties.¹³

A fundamental principle of the Basic Agrarian Law (UUPA) is to guarantee legal certainty over land ownership for the community. To achieve this objective, Indonesia's agrarian legal system establishes land registration as the primary mechanism to ensure land ownership rights are legally recognized and enforceable.¹⁴

Land ownership is an inherent right that cannot be unilaterally revoked. This right can be acquired through legal actions, such as sales transactions, gifts, exchanges, or contributing land as capital in a company (inbreng). However, even if a sale has occurred, ownership of the land does not automatically transfer to the buyer. The transfer of rights must go through specific administrative procedures to be legally recognized.¹⁵ Article 19 paragraph (1) of the Basic Agrarian Law (UUPA) stipulates that the Indonesian government has the duty to conduct national land registration. This registration system follows the *recht kadaster* approach, aiming to ensure legal certainty for land rights holders.¹⁶ To ensure legal certainty for land rights holders, the government stipulates that any registered land rights will be issued a certificate as valid and strong evidence. This provision aligns with Article 4 of Government Regulation No. 24 of 1997 concerning Land Registration, which states that to guarantee legal certainty and protection as outlined in Article 3(a), rights holders are provided with a land certificate as proof of legal ownership.

Land registration in Indonesia follows a negative system designed to protect the legal rights of legitimate landowners. This system is based on the *nemo plus iuris* principle. Registration provides legal certainty by recording verified data, with registration officers actively checking the validity of submitted information before issuing a land certificate to the applicant. However, even if the certificate is issued in the applicant's name as the recorded owner, this ownership is not final. Legitimate landowners still have the right to assert their claims in general courts.¹⁷

¹¹ Eni Suarti. "The Principle of Balance Between Parties in Land Sale and Purchase Contracts." *Doctrinal* 4, no. 1 (2019): 976.

¹² Sasikirana Anastasia et al. "The Legal Implications of Agrarian Law on Land Conflicts in Indonesia." *Arus Jurnal Sosial dan Humaniora* 4, no. 2 (2024): 546.

¹³ Rusmadi Murad. *Land Administration: Its Implementation in Practice*. Bandung: CV Mandar Maju, 1997, 46.

¹⁴ Desi Apriania and Arifin Bur, (2021), "Legal Certainty and Legal Protection in the Land Registration Publication System in Indonesia," *Jurnal Bina Mulia Hukum*, Vol. 5, No. 2, p. 222.

¹⁵ Sulaeman Sagon, et al., (2023), "A Legal Review on the Position of Land Certificates in the Coastal Area of Lake Tempe," *Legal: Journal of Law*, Vol. 2, No. 2, p. 114.

¹⁶ Wulamas Anna P. G. Frederik, Deine R. Ringkuangan, and Herry F. D. Tuwaidan, (2024), "Land Rights Registration from the Perspective of Legal Certainty," *Amanna Gappa*, Vol. 32, No. 1, p. 20.

¹⁷ Abdul Muthalib, (2020), "The Influence of Land Rights Certificates as Evidence in Achieving Legal Certainty," *Jurisprudensi: Journal of Sharia Studies*, Vol. 12, No. 1, p. 37.

The issuance of a certificate in the land registration process aims to facilitate the rights holder in proving ownership of a piece of land. The certificate serves as valid legal evidence, providing legal certainty and protection for its owner. Having a land rights certificate also helps reduce the risk of future disputes or legal claims from parties who may feel aggrieved.¹⁸

A land certificate facilitates an individual's ability to acquire and control land, legally evidenced by a deed of ownership. The process of issuing a land certificate often involves agreements arising from buying and selling transactions, conducted before a notary or authorized official. This certificate serves as a legitimate proof with legal force and plays a crucial role in addressing the evolving legal needs of society.¹⁹ A certificate is issued to safeguard the interests of the rights holder based on the physical and legal data recorded in the land book. It may only be granted to parties registered as rights holders or to those authorized by the rights holder. If the rights holder passes away, the certificate will be transferred to their heirs, or to one of the heirs with the consent of the other heirs.²⁰

Based on this, the author believes that land certificates hold a crucial role in Indonesia's agrarian legal system, as they are officially recognized by the state. As government-registered documents, land certificates provide strong legal certainty for the rights holders. Thus, they serve not only as legitimate proof of ownership but also as protection of the owner's rights against claims or disputes from other parties. As legally binding evidence, land certificates also facilitate the resolution of land-related disputes through legal mechanisms established by legislation.

2. The Role of Electronic Certificates in Providing Legal Certainty of Evidence

A land certificate is an official legal document that demonstrates an individual's ownership or control over a plot of land. Within the framework of Indonesian land law, this certificate plays a vital role as valid evidence of land rights, as regulated under Law No. 5 of 1960 concerning the Basic Agrarian Principles (UUPA). With advances in information technology, the government, through the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN), has digitalized land services, including the issuance of land certificates in electronic form (electronic certificates).

On June 20, 2023, the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency issued Regulation No. 3 of 2023 on the Issuance of Electronic Documents in Land Registration Activities, which governs the use of electronic documents in the land registration process. This policy represents an adaptation to the evolving legal needs of society and an effort to accelerate digitalization in the land sector. Through this shift to electronic-based services, the government aims to establish a more efficient public service system and foster a favorable investment climate by leveraging advancements in information and communication technology.²¹

Article 1, Number 9 of the Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 3 of 2023 states that "an Electronic Certificate, hereinafter referred to as an E-Certificate, is a certificate issued through an Electronic System in the form of an electronic document, whose physical and legal data have

¹⁸ Yulies Tiena Masriani, (2022), "The Importance of Land Ownership Certificates Through Land Registration as Evidence of Rights," *Jurnal USM Law Review*, Vol. 5, No. 2, p. 550.

¹⁹ Marcho G. V. Ngongoloy, Dani Robert Pinasang, and Nixon S. Lowing, (2022), "The Legal Force of Land Certificates as Proof of Ownership Based on Government Regulation No. 18 of 2021," *Lex Privatum*, Vol. 10, No. 5, pp. 1.

²⁰ Sulaeman Sagon, et al., (2023), *Op. Cit.*, p. 114.

²¹ Sy. Arifin Habibi, et al., (2025), "Digital Transformation of Land Administration: Implementation and Challenges of Electronic Certificates in Indonesia," *Rio Law Journal*, Vol. 1, No. 2, p. 500.

been stored in the BT-el.”²² Electronic certificates represent a transformation of conventional physical land certificates into digital documents that are stored and managed electronically. From a legal perspective, it is important to assess the evidential strength of electronic certificates compared to physical certificates, particularly in proving land rights in court. Normatively, both physical and electronic certificates are recognized as authentic evidence with strong legal force, as stipulated in Law No. 5 of 1960 concerning the Basic Agrarian Principles (UUPA) and reinforced by the Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 3 of 2023 on the Issuance of Electronic Documents in Land Registration Activities.

Referring to Article 6 paragraph (2) of the Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 3 of 2023, electronic documents, including their printed versions, are recognized as valid legal evidence. This represents an expansion of the types of evidence acknowledged within Indonesia’s procedural law. For evidential purposes, such electronic documents can be accessed through the provided electronic system. Therefore, electronic land certificates hold the same legal force as conventional certificates, both as proof of ownership and as evidence in judicial proceedings.

The recognition of electronic certificates demonstrates that Indonesia’s legal system is beginning to adapt to digitalization, particularly in land administration services. These certificates not only provide legal certainty for digitally registered land ownership but also reflect the national legal system’s effort to meet the demands of modern society, emphasizing speed, accuracy, and transparency.

This transition marks a step toward more efficient land governance without diminishing the legal validity of documents issued digitally. Furthermore, the implementation of electronic certificates enables comprehensive integration of land data, reduces the potential for fraud, and strengthens the legal position of rights holders in case of disputes or conflicts in court. Thus, electronic certificates constitute a crucial element in agrarian reform, grounded in legal certainty and protection of public rights.

B. Legal Certainty of Digital Land Certificates

The transition from physical certificates to electronic form represents an adaptive response to the rapid advancement of information technology, while also addressing the need for a more efficient, secure, and environmentally friendly administrative system. Traditionally, paper-based certificates have been widely used as proof of ownership or recognition of certain competencies. However, physical certificates often pose challenges, particularly in terms of management, data protection, and cost efficiency. In the digital era, both the general public and educational institutions are required to adapt to more dynamic and integrated systems. Electronic certificates provide a modern solution by reducing reliance on printed documents and facilitating easier access, storage, and distribution of information in a practical and flexible manner.²³

The implementation of electronic certificates supports the government’s efforts to enhance public service efficiency, in line with the national vision toward digitalization. This digital transformation is expected to accelerate the readiness of public institutions, strengthen public trust in systems that ensure data security, and contribute to environmental preservation by reducing paper consumption.²⁴

²² Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency of the Republic of Indonesia No. 3 of 2023 concerning the Issuance of Electronic Documents in Land Registration Activities, State Gazette of the Republic of Indonesia, 2023, Article 1.

²³ Nabila Arzeti Maharani, Ety Tri Rahayu, and Siti Rukmana, (2024), “The Positive and Negative Impacts of the Transition from Analog to Electronic Certificates,” *Jurnal Prisma Hukum*, Vol. 8, No. 11, p. 146.

²⁴ *Ibid.*

The digitization of land services through the issuance of electronic land certificates represents a significant step in the modernization of agrarian administration in Indonesia. However, amid this digitalization effort, various legal challenges have arisen, including evolving regulations, technological infrastructure readiness, and the protection of certificate holders' rights. This situation raises questions about the extent to which Indonesia's legal system can ensure the legality and legal security of digital certificates in national land administration practices. The use of electronic evidence in civil cases still faces several challenges, particularly in guaranteeing the authenticity and validity of evidence presented in court.²⁵ Based on this, a system is required that not only stores and presents data digitally but also carries legal authority to ensure the authenticity of documents, making them valid for use as evidence in court proceedings.

Within the applicable legal framework, the implementation of the Land Information and Exploration System (STE) is considered a significant innovation to enhance legal certainty and minimize the risk of document forgery. STE enables landowners to access their ownership data quickly and accurately. Additionally, the system streamlines land sale and purchase transactions, provides legally recognized proof of ownership, and facilitates the recognition of land rights in court. The use of STE in judicial practice strengthens the evidentiary process, as information stored in the Electronic Sign System is considered valid unless proven otherwise. This digital approach not only accelerates legal procedures but also reduces the risk of errors or overlapping data that commonly occur with physical documents.²⁶

Like other innovations, the implementation of the STE faces various challenges and uncertainties within society. Many people are still reluctant to switch to electronic certificates, preferring conventional ones instead. This hesitation arises from concerns that storing important documents digitally may not yet be fully secure, given the high risk of cyberattacks.²⁷ Cybersecurity threats are a major issue that must be addressed in the implementation of electronic certificates.

Additionally, limitations in technological infrastructure pose another challenge. Not all regions in Indonesia have adequate technological facilities, such as stable internet connections, making it difficult to access and utilize electronic certificates, particularly in remote areas. Older users or those less familiar with technology often struggle to use electronic certificates, presenting a challenge in promoting the adoption of this technology across all segments of society.

C. Legal Protection Against Cyber Threats in Land Digitization Processes

The utilization of technology in land data management offers numerous advantages, including easier access to information, administrative cost efficiency, and enhanced transparency. However, this digital transformation also introduces substantial risks in the form of cyber threats, which can compromise the integrity of both data and digital land systems.

Cyber threats are defined as risks of interference with the integrity of technological systems, regulations, or legal provisions by unauthorized parties, whether for individual, collective, or state interests. Perpetrators may originate from government institutions, non-

²⁵ Fauziah Lubis and Sofia Ramadhani Purba, "Critical Analysis of Electronic Evidence in Civil Procedure Law: Challenges and Prospects in the Digital Era," *Jurnal Hukum*, Vol. 5, No. 2, 2024, p. 39.

²⁶ Gandi Assidiqih, et al., (2024), "A Legal Review of Electronic Land Certificates as Proof of Land Ownership in Indonesia," *Novum: Jurnal Hukum*, Vol. 1, No. 1, p. 59.

²⁷ Muhammad Fachri Herawza, et al., (2023), "Efficiency of Electronic Land Certificates in the Land Registration Legal System," *Unes Law Review*, Vol. 6, No. 1, p. 2331.

governmental organizations, individuals, or foreign states. Broadly, cyberattacks can be categorized into three types: attacks targeting hardware, software systems, and stored data.²⁸

The rapid development of digital communication has facilitated instantaneous and cross-border information dissemination, thereby heightening the potential for violations of individual privacy.²⁹ In the digital era, privacy has become an integral component of cybersecurity and the protection of human rights.

A serious consequence of data breaches is the accumulation of personal data stored systematically by government or private entities, often without full awareness of the data owners regarding its collection and intended use. Unauthorized disclosure or dissemination of personal data poses risks to the validity of information and constitutes a violation of privacy rights, as individuals inherently possess the authority to control the use of their personal data.³⁰

Digital land administration systems that store critical information, including Land Ownership Certificates (SHM) and supporting data, are highly vulnerable to cybercrime, such as system hacking, data theft, document forgery, and information manipulation that threaten data accuracy and reliability. Manipulation of land ownership data may result in legal conflicts, the loss of legitimate land rights, and facilitate the legalization of falsified documents for administrative land acquisition.³¹

The economic impact of cyberattacks is also significant, including potential fraud in land transactions caused by manipulated digital documents. Individuals with limited cybersecurity awareness are particularly vulnerable, resulting in losses for legitimate landowners and transactional parties. Such cybercrimes can undermine public trust in digital land administration systems.

Therefore, safeguarding digital land systems requires measures such as data encryption, strict monitoring of system access, and continuous development of cybersecurity protocols. These measures are crucial to maintaining the integrity of land data, which constitutes a strategic asset for both society and the state.

The transition of land administration systems to a digital format represents a strategic step that offers numerous benefits for land management. However, this development also creates an urgent need for comprehensive legal protection to ensure that digital systems operate effectively and do not cause harm to either the public or the state. Effective legal safeguards are crucial to maintaining system integrity, preventing potential misuse, and ensuring legal certainty over digitized land data.

Enhancing legal protection for electronic certificate holders is particularly critical in terms of data security and cyber threat mitigation. While digitalization has the potential to reduce land ownership disputes, the validity and security of electronic certificates must be guaranteed through strict regulatory measures. The government plays a key role in safeguarding citizens' rights throughout the digitalization process. In the absence of robust legal frameworks, digital transformation in land administration could produce adverse consequences.

Legal protection in the context of land digitalization must address multiple dimensions. First, from a regulatory perspective, a responsive legal framework is required to accommodate technological advancements, including specific regulations regarding electronic land certificates, mechanisms for accessing land data, and procedures for resolving disputes digitally. Second,

²⁸ Makbull Rizki, (2022), "The Development of Indonesia's Cybersecurity System in Facing Technological and Information Advancement Challenges," *Politeia: Jurnal Ilmu Politik*, Vol. 14, No. 1, p. 57.

²⁹ Fanny Priscyllia, (2019), "Personal Data Privacy Protection from a Comparative Law Perspective," *Jatiswara*, Vol. 34, No. 3, p. 244.

³⁰ Upik Mutiara and Romi Maulana, (2020), "Personal Data Protection as Part of Human Rights to Personal Safeguarding," *Indonesian Journal of Law and Policy Studies*, Vol. 1, No. 1, p. 45.

³¹ Syarifatul Hidayah, et al., (2024), "Challenges and Opportunities of Electronic Certificates in Land Registration Reform in the Digital Era," *Jurnal Ilmiah Nusantara*, Vol. 1, No. 6, p. 191.

from a technical standpoint, a reliable security system is necessary to protect the Land Information System infrastructure while also ensuring the protection of personal data belonging to land rights holders.

The government bears significant responsibility for securing personal data contained in electronic certificates. Such protection forms an integral part of human rights, as fundamental rights inherently possessed by every individual. Accordingly, the government has established regulations on personal data protection to safeguard the rights of Indonesian citizens.

One of the main objectives of the Personal Data Protection Law is to ensure that the principles and provisions it contains can be effectively applied in practice, thereby achieving genuine protection of personal data. To accomplish this, the presence of an independent authority—whether in the form of an institution, agency, or commission—is required.

To ensure the security of data within the electronic land certificate system, the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN) has implemented a comprehensive set of digital security measures. A key mechanism employed in this system is the use of authentication technology and electronic signatures. The implementation of electronic signatures serves a dual purpose: to verify the authenticity of the issued electronic documents and to maintain the integrity of the information contained therein, ensuring that these documents are reliable and legally binding.

This provision is explicitly regulated under Article 16 of the Minister of ATR/Head of BPN Regulation No. 5 of 2020 concerning Integrated Electronic Fiduciary Rights Services, which stipulates that all outputs of electronic fiduciary rights services must be validated and authorized by the competent official through the electronic signature mechanism. Consequently, this system not only enhances the security and accuracy of digital documents but also strengthens legal certainty for parties holding electronically registered land rights. This approach reflects the government's efforts to leverage information technology to improve the efficiency of land administration while simultaneously safeguarding the legal rights of electronic certificate holders.

Efforts to safeguard the land digitalization process can also be realized through the implementation of security measures for electronic documents stored within dedicated databases, the protection of which is rigorously maintained by the National Cyber and Encryption Agency (BSSN). In this context, the presence of supervisory institutions plays a strategically critical role, as these bodies are responsible for ensuring that the entire digitalization process proceeds in accordance with established procedures and security standards. Such oversight is essential to close potential loopholes that could be exploited by individuals or groups seeking to use the system for personal or vested interests.

Consequently, systematic and stringent supervision of the information technology employed in land administration not only strengthens data security but also enhances public trust in the legitimacy and integrity of the digital system. Effective oversight can minimize the risk of misuse, whether originating from personnel within the relevant institutions or external actors with malicious intent, thereby creating a secure, transparent, and legally accountable digital environment. This approach underscores the importance of synergy between technology, regulation, and institutional supervision to ensure that land digitalization is not only efficient but also aligned with legal principles and the protection of citizens' rights.

IV. CONCLUSIONS

The advancement of information technology has driven digital transformation across various sectors, including land registration systems. A concrete manifestation of this innovation is the implementation of electronic certificates, which represent a significant step toward modernizing land administration in Indonesia. Electronic certificates function not only as an administrative

solution but also provide strategic benefits, such as expediting service delivery, enhancing transparency in registration procedures, and strengthening legal certainty for land rights holders. However, their implementation faces challenges, including uneven public readiness, limited infrastructure, and concerns over data protection and system security. Therefore, a coordinated effort from the government and relevant institutions is necessary, including effective outreach, regulatory reinforcement, public education, improved digital literacy, and robust cybersecurity standards, to build public trust. When properly managed, electronic certificates can serve as the foundation for a more transparent, efficient, and adaptive land administration system.

REFERENCES

- Adinegoro Kurnia Rheza Randy, (2023), "Challenges in the Implementation of Electronic Land Certificates at the Ministry of Agrarian Affairs and Spatial Planning / National Land Agency of the Republic of Indonesia," *Jurnal Ilmu Kenotariatan*, Vol. 4, No. 2.
- Ahmad, et al., (2024), *Textbook on Legal Research Methods and Writing*, 1st Edition, (Jambi: PT. Sonpedia Publishing Indonesia).
- Anastasia Sasikirana, et al., (2024), "Agrarian Law Implications on Land Conflicts in Indonesia," *Arus Jurnal Sosial dan Humaniora*, Vol. 4, No. 2.
- Apriana Desi and Arifin Bur, (2021), "Legal Certainty and Legal Protection in the Land Registration Publication System in Indonesia," *Jurnal Bina Mulia Hukum*, Vol. 5, No. 2.
- Assidiqih Gandi, et al., (2024), "A Legal Review of Electronic Land Certificates as Proof of Land Ownership in Indonesia," *Novum: Jurnal Hukum*, Vol. 1, No. 1.
- Atikah Noor, (2022), "The Legal Position of Land Certificates as Evidence of Land Ownership in the Indonesian Land Law System," *Notary Law Journal*, Vol. 1, No. 2.
- Ayu Isdiyana Kusuma, (2019), "Legal Certainty of Land Registration Through Complete Systematic Land Registration in Batu City," *Mimbar Hukum: Faculty of Law, Gadjah Mada University*, Vol. 31, No. 3.
- Benuf Kornelius and Muhammad Azhar, (2020), "Legal Research Methodology as an Instrument to Resolve Contemporary Legal Issues," *Jurnal Gema Keadilan*, Vol. 7, No. 1.
- Frederik Wulamas Anna P. G., Deine R. Ringkuangan, and Herry F. D. Tuwaidan, (2024), "Land Rights Registration from the Perspective of Legal Certainty," *Amanna Gappa*, Vol. 32, No. 1.
- Habibi Sy. Arifin, et al., (2025), "Digital Transformation of Land Administration: Implementation and Challenges of Electronic Certificates in Indonesia," *Rio Law Jurnal*, Vol. 1, No. 2.
- Herawza Muhammad Fachri, et al., (2023), "Efficiency of Electronic Land Certificates in the Land Registration Legal System," *Unes Law Review*, Vol. 6, No. 1.
- Hidayah Syarifaatul, et al., (2024), "Challenges and Opportunities of Electronic Certificates in Land Registration Reform in the Digital Era," *Jurnal Ilmiah Nusantara*, Vol. 1, No. 6.
- Lubis Fauziah and Sofia Ramadhani Purba, (2024), "Critical Analysis of Electronic Evidence in Civil Procedure Law: Challenges and Prospects in the Digital Era," *Jurnal Hukum*, Vol. 5, No. 2.
- Maharani Nabila Arzeti, Ety Tri Rahayu, and Siti Rukmana, (2024), "Positive and Negative Impacts of the Transition from Analog to Electronic Certificates," *Jurnal Prisma Hukum*, Vol. 8, No. 11.
- Masriani Yulies Tiena, (2022), "The Importance of Land Certificate Ownership as Proof of Rights Through Land Registration," *Jurnal USM Law Review*, Vol. 5, No. 2.
- Murad Rusmadi, (1997), *Land Administration: Its Implementation in Practice*, (Bandung: CV Mandar Maju).

- Murni Christiana Sri and Sumirahayu Sulaiman, (2022), "Land Ownership Certificates as Evidence of Land Ownership Rights," *Lex Librum: Jurnal Ilmu Hukum*, Vol. 8, No. 2.
- Muthalib Abdul, (2020), "The Role of Land Ownership Certificates as Evidence in Achieving Legal Certainty," *Jurisprudensi: Jurnal Ilmu Syariah*, Vol. 12, No. 1.
- Mutiara Upik and Romi Maulana, (2020), "Personal Data Protection as Part of Human Rights to Personal Safeguarding," *Indonesian Journal of Law and Policy Studies*, Vol. 1, No. 1.
- Ngongoloy Marcho G. V., Dani Robert Pinasang, and Nixon S. Lowing, (2022), "Legal Force of Land Certificates as Proof of Ownership Based on Government Regulation No. 18 of 2021," *Lex Privatum*, Vol. 10, No. 5.
- Ministry of Agrarian Affairs and Spatial Planning / National Land Agency of the Republic of Indonesia Regulation No. 3 of 2023 concerning the Issuance of Electronic Documents in Land Registration Activities, *State Gazette of the Republic of Indonesia*, 2023.
- Prasetya Fikahati and Muh. Afif Mahfud, (2023), "First-Time Electronic Land Registration in National Land Law," *Jurnal Hukum*, Vol. 39, No. 1.
- Priscyllia Fanny, (2019), "Personal Data Privacy Protection from a Comparative Law Perspective," *Jatiswara*, Vol. 34, No. 3.
- Rizki Makbull, (2022), "Development of Indonesia's Cybersecurity System in Facing Technological and Information Advancement Challenges," *Politeia: Jurnal Ilmu Politik*, Vol. 14, No. 1.
- Rosadi Sinta Dewi, (2022), *Cyber Law*, (Bandung: Refika).
- Sagon Sulaeman, et al., (2023), "A Legal Review of the Position of Land Certificates in the Coastal Area of Lake Tempe," *Legal: Journal of Law*, Vol. 2, No. 2.
- Shabranah Andi Nur, Maskun, and Muhammad Aswan, (2023), "Electronic Certificates in the Perspective of Personal Data Protection," *Unes Law Review*, Vol. 5, No. 4.
- Silviana Ana, (2021), "The Urgency of Electronic Land Certificates in the Land Registration Legal System in Indonesia," *Administrative Law & Governance Journal*, Vol. 4, No. 1.
- Suarti Ani, (2019), "The Principle of Balance Between Parties in Land Sale and Purchase Contracts," *Doctrinal*, Vol. 4, No. 1.
- Supartini Tri and Meysita Arum Nugroho, (2025), "Legal Review of the Legal Force of Electronic Land Certificates Based on Ministry of Agrarian Affairs and Spatial Planning / National Land Agency Regulation No. 1 of 2021," *Iblam Law Review*, Vol. 5, No. 1.
- Law of the Republic of Indonesia No. 1 of 2024 concerning the Second Amendment to Law No. 11 of 2008 on Information and Electronic Transactions.
- Wina Ni Kadek and Ida Bagus Anggapurana, (2024), "The Role of Land Deed Officials in the Issuance of Electronic Certificates," *Student Research Journal*, Vol. 2, No. 4.
- Zainuddin Muhammad and Aisyah Dinda Karina, (2023), "Use of Normative Legal Methods in Verifying Accuracy in Legal Research," *Smart Law Journal*, Vol. 2, No. 2.

