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Digitalization of Land Certificates and Its Implications for the Accountability of Notaries and Land Deed Officials in Achieving Good Land Governance

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Abstract: The digitalization of land certificates has become a key component of Indonesia's land administration reform, requiring corresponding changes in legal accountability and governance. This study examines the implications of electronic land certificates for the accountability of Notaries and Land Deed Officials (PPAT) in achieving Good Land Governance. A qualitative literature review was conducted by analyzing statutory regulations, academic books, peer-reviewed journal articles, and publications from international organizations related to digital governance, land administration, and public accountability. The findings identify four major themes: digital transformation as institutional reform, the reconstruction of PPAT accountability, the allocation of legal responsibility among PPAT, ATR/BPN, and electronic system administrators, and the development of a legal accountability framework for electronic land administration. The study concludes that accountability should be differentiated according to statutory authority and institutional functions rather than treated as a shared obligation. It proposes a Legal Accountability Framework consisting of preventive accountability, procedural accountability, professional accountability, administrative and civil liability, disciplinary accountability, and institutional oversight. This framework strengthens legal certainty, transparency, institutional coordination, and public trust while providing a conceptual basis for implementing accountable and sustainable electronic land administration in Indonesia.

Keywords: digitalization of land certificates, land administration, notaries and land deed officials, accountability, Good Land Governance.

INTRODUCTION

Digital transformation has become one of the primary agendas in public sector reform, encouraging government institutions to provide services that are more efficient, transparent, and accountable. In public administration, digitalization is no longer interpreted solely as the adoption of information technology but also as an institutional transformation capable of improving governance quality and public trust (Janssen & van der Voort, 2016). Consistent with this development, the United Nations (2022) identifies digital government as an important

instrument for enhancing accessibility, responsiveness, and inclusiveness in public service delivery. Furthermore, the Organisation for Economic Co-operation & Development (2023) emphasizes that successful digital transformation depends not only on technological infrastructure but also on institutional governance and accountability mechanisms. Consequently, the legal implications of digital transformation extend beyond improvements in administrative performance and increasingly concern the redistribution of institutional responsibilities and legal accountability within public administration.

Land administration is one of the industries in Indonesia undergoing a major digital change. The Regulation of the Minister of ATR/BPN Number 1 of 2021 about Electronic Certificates is the result of the government's progressive implementation of electronic-based land services through the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN). This policy represents a strategic milestone in modernizing Indonesia's land registration system by replacing paper-based certificates with electronic certificates integrated into the national land database. Subsequently, the Peraturan Menteri Agraria dan Tata Ruang/Kepala Badan Pertanahan Nasional Nomor 3 Tahun 2023 tentang Penerbitan Dokumen Elektronik dalam Kegiatan Pendaftaran Tanah (2023) further strengthened the legal foundation for electronic land registration. Rather than merely introducing technological innovation, these regulations fundamentally reshape the legal and administrative framework governing land registration by integrating digital systems into official decision-making and legal documentation.

The implementation of electronic certificates is expected to address persistent challenges within Indonesia's land administration, including overlapping land ownership records, certificate forgery, fragmented land databases, lengthy administrative procedures, and recurring land disputes. Marella & Silviana (2024) argues that electronic certificates constitute a legal innovation intended to modernize the national land registration system while strengthening legal certainty. Similarly, Halim (2025) explains that digital land administration contributes to broader agrarian governance reform by improving administrative efficiency and institutional performance. From the perspective of land governance, Silviana, Elvani, & Priyono (2025) demonstrate its contribution to Good Land Governance. However, these anticipated benefits should not obscure the fact that digital transformation simultaneously creates new legal relationships, redistributes institutional authority, and generates new forms of accountability that require legal clarification.

Despite these advantages, digital transformation also introduces new legal challenges concerning accountability. Under conventional land registration, legal responsibility primarily relied upon physical documents and manual administrative verification. In contrast, electronic land administration depends on digital authentication, electronic databases, integrated information systems, and electronic document management. Consequently, administrative errors may originate not only from human negligence but also from inaccurate digital data, system failures, cybersecurity vulnerabilities, or weaknesses in institutional coordination. According to Bovens (2007), accountability requires every public institution and public official exercising governmental authority to remain answerable for decisions and administrative actions. Accordingly, digital land administration raises a fundamental legal question regarding how accountability should be allocated among legal professionals, government institutions, and administrators of electronic systems when digital errors occur. Therefore, digital transformation inevitably requires the reconstruction of accountability mechanisms to ensure that technological innovation continues to uphold legal certainty and public trust.

Among the legal actors directly affected by electronic land administration are Notaries and Land Deed Officials (Pejabat Pembuat Akta Tanah/PPAT). PPAT plays an essential role in preparing authentic deeds that serve as the juridical basis for registering transfers and encumbrances of land rights. Adjie (2022) explains that the authority of a Notary and PPAT is

inseparable from the obligation to guarantee the authenticity, legality, and formal validity of legal documents. Likewise, Santoso (2023) emphasizes that the land registration process depends upon the accuracy of juridical and physical data submitted by the authorized officials. Consequently, the migration toward electronic land registration expands the professional responsibilities of PPAT from conventional document preparation to electronic document verification, digital submission, and compliance with electronic administrative standards. This transition also raises important questions regarding the legal limits of PPAT's responsibility, particularly when administrative failures result from interactions between human actions and electronic systems.

Recent legal studies have begun to discuss the implications of electronic land registration for legal practice. Iqbal (2025) focuses on legal protection and legal certainty arising from electronic land certificates, whereas Aritonang & Busro (2025) examine how the public is protected when using digital certificates. Marella & Silviana (2024) analyze the transformation of land administration through electronic mortgage services, while Putri & Nugroho (2025) discuss the implementation of electronic certificates by PPAT and Notaries from the perspective of administrative law. Furthermore, Socialista, Putri, & Fernando (2025) evaluate the legal validity of electronic mortgage certificates, whereas Sofyan & Hafidz (2025) explain the contribution of electronic certificates in preventing certificate forgery. Zain & Santoso (2025) also consider the legal status of traditional land certificates in the digital age.

Although these studies provide valuable insights, they predominantly examine the legality of electronic certificates, legal certainty, administrative implementation, or technical adaptation to digital services. Existing studies rarely examine how digitalization reconstructs the legal allocation of accountability among PPAT, ATR/BPN, and other institutional actors responsible for electronic land administration. Likewise, studies on Good Land Governance generally emphasize institutional reform and digital governance but pay limited attention to how accountability should be legally distributed among actors participating in electronic land registration. Consequently, an important conceptual gap remains concerning the legal accountability framework governing electronic land administration.

To address this gap, this study investigates the implications of electronic land certificates for the accountability of Notaries and PPAT within the framework of Good Land Governance. Unlike previous studies that primarily discuss legal certainty or administrative implementation, this research focuses on how digital transformation reconstructs the allocation of legal responsibility among PPAT, ATR/BPN, and other institutions involved in electronic land administration. Furthermore, this study seeks to contribute conceptually by developing a legal accountability perspective that explains the distribution of institutional responsibilities in electronic land administration while providing recommendations for strengthening accountable, transparent, and legally certain digital land governance in Indonesia.

METHOD

This study employed a qualitative approach using a literature review (library research) method to examine the implications of electronic land certificate digitalization for the accountability of Notaries and Land Deed Officials (Pejabat Pembuat Akta Tanah) in realizing Good Land Governance. A literature review was considered appropriate because the study aims to synthesize legal regulations, academic discussions, and previous research findings concerning electronic land administration, digital governance, and professional accountability without involving field observations or primary empirical data.

The literature search was conducted systematically between May and June 2026 using multiple academic databases and legal information sources, including Google Scholar, Scopus, Crossref, and official institutional websites such as ATR/BPN, the United Nations (UN), the Organisation for Economic Co-operation and Development (OECD), the Food and Agriculture

Organization (FAO), and the World Bank. The search employed combinations of the following keywords: "electronic land certificate", "digital land administration", "electronic land registration", "PPAT accountability", "Notary accountability", "Good Land Governance", "digital governance", and "Indonesia", combined using Boolean operators (AND/OR) where appropriate.

The initial search identified 112 publications. After removing duplicate records ($n = 18$), 94 publications remained for title and abstract screening. Subsequently, 57 full-text publications were assessed for eligibility. Following the application of the inclusion and exclusion criteria, 31 sources were selected for qualitative synthesis. These consisted of statutory regulations, peer-reviewed journal articles, academic books, and publications issued by reputable international organizations.

The study relied exclusively on secondary data collected from authoritative legal and academic sources. Primary legal materials consisted of Law Number 5 of 1960 concerning Basic Agrarian Principles, Regulation of the Peraturan Menteri Agraria dan Tata Ruang/Kepala Badan Pertanahan Nasional Nomor 1 Tahun 2021 tentang Sertipikat Elektronik (2021) concerning Electronic Certificates, and Peraturan Menteri Agraria dan Tata Ruang/Kepala Badan Pertanahan Nasional Nomor 3 Tahun 2023 tentang Penerbitan Dokumen Elektronik dalam Kegiatan Pendaftaran Tanah (2023) with relation to Electronic Documents in Land Registration Operations. Peer-reviewed journal publications about digital land administration, legal protection, accountability, electronic land certificates, and good land governance were examples of secondary materials. (Aritonang & Busro, 2025; Halim, 2025; Iqbal, 2025; Marella & Silviana, 2024; Silviana, 2021). To provide broader theoretical and policy perspectives, this study also referred to publications issued by the United Nations (2022), the Organisation for Economic Co-operation & Development (2023), the Food & of the United Nations (2007), and the World Bank (2020).

The literature was selected based on three inclusion criteria: (1) publications discussing electronic land certificates, digital land administration, accountability of Notaries/PPAT, or Good Land Governance; (2) publications appearing in peer-reviewed journals, academic books, statutory regulations, or official reports issued by reputable national or international institutions; and (3) publications issued primarily between 2021 and 2025, while seminal works were retained where necessary to establish theoretical foundations. Publications that lacked relevance to the research objectives, duplicated previous records, or consisted solely of news reports, opinion articles, or non-academic documents were excluded from the analysis.

The literature selection process followed four sequential stages: identification, screening, eligibility assessment, and final inclusion. During the identification stage, records were retrieved from the selected databases. Screening involved removing duplicate records and evaluating titles and abstracts. The remaining publications underwent full-text eligibility assessment based on the predefined inclusion criteria. Finally, eligible sources were included in the qualitative synthesis. This process enhanced the transparency and reproducibility of the literature review.

The literature included in this study was selected based on three criteria: (1) relevance to electronic land certificates, digital land administration, accountability of Notaries/PPAT, or Good Land Governance; (2) publication in peer-reviewed journals, academic books, official government regulations, or publications issued by reputable international organizations; and (3) publication currency, with priority given to studies published between 2021 and 2025 while retaining seminal references necessary for theoretical foundations.

Data analysis was conducted using qualitative descriptive analysis. The collected literature was organized according to major research themes, including electronic land certificates, accountability of Notaries/PPAT, digital governance, and Good Land Governance. Subsequently, the selected sources were critically reviewed and synthesized to identify

recurring legal issues, institutional challenges, governance implications, and patterns of legal accountability arising from the implementation of electronic land administration in Indonesia. The findings were then interpreted by integrating statutory provisions with contemporary scholarly discussions to construct a legal accountability framework explaining the distribution of responsibilities among PPAT, ATR/BPN, and other institutional actors within Indonesia's electronic land administration system.

RESULTS AND DISCUSSION

Digital Transformation of Land Administration as Institutional Reform

The literature consistently demonstrates that digital transformation in land administration should be understood as an institutional reform rather than merely the adoption of digital technology. Unlike the conventional land registration system, which relies primarily on physical documents and manual administrative procedures, electronic land administration integrates digital information systems, electronic records, and online public services into a unified governance framework. This transition reflects a broader shift from document-based administration toward data-driven governance, in which the quality, integrity, accessibility, and security of electronic information become central elements in ensuring legal certainty and effective public service delivery (Janssen & van der Voort, 2016).

This finding is consistent with international perspectives on digital governance. According to the Organisation for Economic Co-operation & Development (2023), emphasizes that digital government should be viewed as institutional transformation that strengthens transparency, responsiveness, accountability, and citizen-oriented public services rather than merely introducing new technologies. Likewise, the United Nations (2022) explains that successful digital government requires institutional adaptation, effective governance arrangements, and integrated public administration capable of utilizing digital technologies responsibly.

Within the Indonesian context, these institutional changes are reflected in the issuance of Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency Number 1 of 2021 concerning Electronic Certificates and Regulation Number 3 of 2023 concerning Electronic Documents in Land Registration Activities (Organisation for Economic Co-operation & Development, 2023). The literature consistently identifies these regulations as the legal foundation for transforming Indonesia's land administration from a paper-based registration system into an integrated electronic governance system. Rather than merely authorizing the issuance of electronic certificates, these regulations establish electronic documents and digital databases as legally recognized components of land registration, thereby changing both administrative procedures and institutional responsibilities.

The reviewed literature also identifies several institutional objectives underlying this transformation. Electronic land administration is expected to improve administrative efficiency, strengthen legal certainty, reduce opportunities for document forgery, improve inter-agency coordination, and facilitate more reliable land information management (Silviana, 2021; Halim, 2025; Silviana et al., 2025). These recurring findings demonstrate that digitalization is regarded not only as a technological innovation but also as a governance strategy designed to modernize Indonesia's land administration system.

Nevertheless, the literature simultaneously identifies new governance risks emerging from digital transformation. These include inaccurate electronic data, interoperability problems among government institutions, cybersecurity threats, electronic document authentication, and digital evidence management. As electronic information becomes the principal basis for administrative decision-making, legal certainty increasingly depends upon the integrity of digital information systems rather than solely upon the authenticity of physical documents. Consequently, successful implementation of electronic land administration requires not only

reliable technological infrastructure but also adaptive legal institutions, effective regulatory frameworks, and clearly defined accountability mechanisms (World Bank, 2020).

Accordingly, the first theme emerging from the literature demonstrates that digital transformation fundamentally reconstructs the governance structure of land administration in Indonesia. The implementation of electronic certificates therefore represents an institutional reform that reshapes administrative processes, legal relationships, and the allocation of authority among public institutions involved in land registration. This institutional transformation provides the basis for understanding the second theme identified in this study, namely the reconstruction of PPAT accountability within electronic land administration.

Reconstruction of PPAT Accountability in Electronic Land Administration

The literature consistently identifies that the implementation of electronic land administration has reconstructed the nature of PPAT accountability rather than merely expanding its administrative duties. Across the reviewed studies, a recurring theme is that the transition from conventional to electronic land registration changes the object of professional accountability from paper-based documentation toward digitally integrated legal information. This reconstruction is driven not only by technological innovation but also by the legal recognition of electronic certificates and electronic documents as integral components of Indonesia's land registration system.

Under the conventional land registration system, PPAT primarily exercised responsibility by verifying the identity of the parties, examining supporting documents, preparing authentic deeds, and ensuring compliance with statutory procedures before submitting documents to the land office. Accordingly, professional accountability was predominantly associated with the authenticity of legal documents and the correctness of administrative procedures (Adjie, 2022; Santoso, 2023). The reviewed literature consistently demonstrates that this conventional model of accountability remains legally valid but is no longer sufficient within electronic land administration.

The introduction of Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency Number 1 of 2021 concerning Electronic Certificates and Regulation Number 3 of 2023 concerning Electronic Documents in Land Registration Activities fundamentally changes the administrative environment in which PPAT performs these statutory functions. These regulations recognize electronic certificates and electronic documents as legally valid components of land registration, requiring PPAT to ensure not only the legality of authentic deeds but also the accuracy, consistency, and completeness of electronic information submitted through the digital registration system. Accordingly, digital verification becomes inseparable from juridical verification because the validity of electronic registration depends upon the consistency between physical legal documents and electronic records.

The literature further reveals that the reconstruction of accountability occurs in three interconnected dimensions. First, juridical accountability remains attached to PPAT through the obligation to ensure that authentic deeds comply with applicable land laws and accurately reflect the legal intentions of the parties. Second, administrative accountability expands to include compliance with electronic registration procedures, digital document submission, and verification of electronic information before registration. Third, digital accountability emerges as a new professional responsibility requiring PPAT to maintain the integrity, accuracy, and reliability of electronic data throughout the registration process. These dimensions collectively demonstrate that accountability in electronic land administration extends beyond traditional legal drafting toward comprehensive information governance.

This thematic finding is supported by several recent studies. Putri & Nugroho (2025) explain that electronic land certificates require PPAT to adapt to new administrative procedures

involving digital document verification and electronic submission systems. Likewise, Socialista et al. (2025) demonstrate that electronically registered mortgage certificates increase the importance of administrative precision because the legal validity of registered rights depends upon the accuracy of electronic information entered into the national database. Similarly, Iqbal (2025) argues that although electronic certificates strengthen legal certainty, such certainty ultimately depends upon the reliability of electronic information managed throughout the registration process.

The synthesis therefore indicates that digital transformation has not altered the legal authority of PPAT but has fundamentally reconstructed how that authority is exercised. Professional responsibility is no longer confined to producing legally valid authentic deeds but also encompasses ensuring that electronic information accurately represents juridical facts and complies with Indonesia's electronic land registration framework. This reconstruction reflects the broader institutional transformation identified in Theme 1, where legal accountability evolves alongside digital governance rather than remaining solely document-oriented. Table 1 summarizes the principal transformation of PPAT accountability identified through the literature review.

Table 1. Transformation of PPAT Accountability in Electronic Land Administration

Challenges	Implications	Recommended Strategies
Limited digital competence	Errors in electronic verification	Continuous professional training
Data inconsistency	Reduced legal certainty	Strengthen verification procedures
Institutional coordination	Administrative overlap	Integrated digital governance
Regulatory gaps	Unclear legal responsibilities	Harmonization of regulations
Information security	Risk of data misuse	Strengthen cybersecurity & digital auditing

Source: Research data

Legal Allocation of Institutional Responsibility in Electronic Land Administration

The literature synthesis demonstrates that the concept of shared institutional accountability should not be interpreted as an equal distribution of responsibility among all actors participating in electronic land administration. Instead, accountability must be allocated according to the statutory authority, institutional functions, and legal obligations assigned to each actor within Indonesia's electronic land registration system. This finding emerged consistently from the reviewed literature, which emphasizes that although electronic land administration integrates PPAT, ATR/BPN, and electronic information systems into a unified administrative process, each institution retains distinct legal responsibilities derived from applicable land regulations.

From the perspective of Indonesian land law, PPAT remains responsible for the preparation of authentic deeds, verification of the legal identity and authority of the parties, examination of supporting juridical documents, and the accuracy of legal information submitted through the electronic registration system. These responsibilities originate from PPAT's statutory authority as a public official authorized to prepare authentic deeds supporting the registration and transfer of land rights. Consequently, errors resulting from inaccurate legal documents, incorrect digital data entry, incomplete electronic submissions, or negligence in verifying juridical information remain attributable to PPAT because such matters fall within the scope of professional responsibility.

By contrast, ATR/BPN exercises institutional authority over the administration of electronic land registration, including the validation of electronic applications, management of the national land database, issuance of electronic certificates, and supervision of administrative procedures. Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency Number 1 of 2021 and Regulation Number 3 of 2023 recognize electronic documents and electronic certificates as integral components of the land registration system, thereby

placing responsibility for maintaining the integrity, consistency, and legality of electronic land records upon ATR/BPN as the competent government authority. Accordingly, administrative errors arising from database inconsistencies, incorrect validation procedures, or institutional failures in land registration remain within the institutional responsibility of ATR/BPN.

The operation of electronic land administration also depends upon the reliability of digital infrastructure. Although Indonesian land regulations do not explicitly establish a separate legal regime governing electronic system administrators in land registration, the literature consistently recognizes that the technical operation of electronic systems constitutes a distinct institutional function. System failures, software malfunctions, server disruptions, cybersecurity incidents, or failures affecting the availability and integrity of electronic services therefore represent technical or institutional responsibilities associated with the operation of the electronic system rather than professional negligence on the part of PPAT. Consequently, legal assessment should distinguish between errors originating from human administrative conduct and those resulting from technological failures.

The reviewed literature further indicates that practical disputes frequently involve a combination of human error and system failure. For example, inaccurate electronic land records may result from incorrect data entered by PPAT, delayed validation by ATR/BPN, or failures occurring during electronic data processing. In such circumstances, legal responsibility cannot reasonably be attributed to a single actor. Instead, liability should be allocated proportionally according to each institution's statutory obligations and causal contribution to the administrative error. This proportional allocation reflects the principle of shared institutional accountability while preserving the legal distinction between professional responsibility, administrative responsibility, and technical responsibility.

Based on the synthesis of the literature and Indonesian land regulations, this study proposes that legal accountability in electronic land administration should be distinguished according to the nature of the administrative activity giving rise to the dispute. Professional liability remains attached to PPAT for matters relating to authentic deeds and juridical verification; institutional administrative responsibility belongs to ATR/BPN for the management and validation of electronic land registration; while technical responsibility relates to the operation, security, and reliability of the electronic land administration system. Such differentiation provides greater legal certainty than treating accountability as a single collective obligation and offers a clearer framework for resolving disputes involving electronic land records.

Table 2. Transformation of PPAT Accountability in Electronic Land Administration

Source of Error	Primary Responsible Actor	Nature of Accountability
Incorrect preparation of authentic deeds	PPAT	Professional accountability
Incorrect verification of juridical documents	PPAT	Professional and administrative accountability
Incorrect electronic data entry	PPAT	Administrative accountability
Errors in validation of electronic registration	ATR/BPN	Institutional administrative accountability
Inconsistency of the national land database	ATR/BPN	Institutional responsibility
Server disruption or software malfunction	Electronic system administrator	Technical responsibility
Cybersecurity breach affecting land records	ATR/BPN and electronic system administrator	Shared institutional responsibility
Human error combined with system failure	PPAT, ATR/BPN, and system administrator (proportionally)	Shared liability based on causal contribution

Source: Research data

The proposed allocation of responsibilities demonstrates that shared institutional accountability should not be interpreted as an undifferentiated collective obligation. Rather, accountability must be distributed according to statutory authority, institutional competence, and the source of the administrative error. This allocation provides a clearer legal framework for resolving disputes involving electronic land registration while reinforcing legal certainty and institutional accountability within Indonesia's digital land administration system.

A Legal Accountability Framework for Achieving Good Land Governance

The thematic synthesis conducted in this study demonstrates that the implementation of electronic land administration requires a more structured accountability model than that discussed in previous studies. While existing research has primarily emphasized legal certainty, administrative efficiency, or the implementation of electronic certificates, the reviewed literature consistently indicates that digital transformation simultaneously reconstructs institutional authority, professional responsibility, and legal liability. Accordingly, the findings of this study support the development of a Legal Accountability Framework for Electronic Land Administration that integrates the legal responsibilities of all actors participating in Indonesia's electronic land registration system.

The proposed framework is founded upon the four themes identified through the literature review. The first theme establishes that electronic land administration represents an institutional reform supported by Law Number 5 of 1960, Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency Number 1 of 2021 concerning Electronic Certificates, and Regulation Number 3 of 2023 concerning Electronic Documents in Land Registration Activities. These regulations transform land registration from a paper-based administrative system into an integrated electronic governance system, thereby requiring corresponding changes in accountability mechanisms.

The second theme demonstrates that the accountability of PPAT has undergone substantial reconstruction. Although PPAT retains its statutory authority to prepare authentic deeds, electronic land administration expands professional responsibility to include digital verification, electronic document management, data accuracy, and compliance with electronic registration procedures. Consequently, accountability is no longer limited to the legal validity of authentic deeds but extends to ensuring the integrity and consistency of electronic information submitted through digital registration systems.

The third theme identifies that accountability within electronic land administration should be allocated according to the statutory authority of each institution. Professional responsibility remains attached to PPAT in matters relating to authentic deeds and juridical verification, while ATR/BPN bears institutional responsibility for administrative validation, electronic databases, and land registration governance. Technical responsibility relates to the operation, security, and reliability of the electronic system. This allocation demonstrates that accountability should be differentiated according to the origin of the administrative error rather than being interpreted as an undivided institutional obligation.

Based on these thematic findings, this study proposes a legal accountability framework consisting of six interrelated dimensions.

Preventive accountability requires every institution to minimize legal risks before electronic registration is conducted through accurate juridical verification, document authentication, standardized administrative procedures, and secure digital infrastructure.

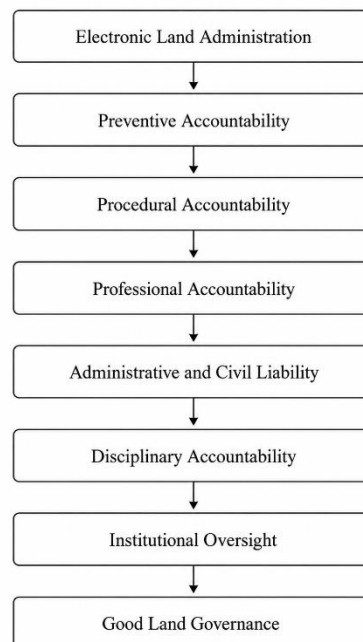
Procedural accountability ensures that every stage of electronic registration complies with statutory administrative procedures established by Indonesian land regulations, thereby maintaining transparency and legal certainty throughout the registration process.

Professional accountability remains attached to PPAT as the public official responsible for preparing authentic deeds, verifying juridical documents, and ensuring that electronic submissions accurately reflect the legal facts supporting land registration.

Administrative and civil liability arise where statutory obligations are violated or negligence causes legal losses to land-right holders. The allocation of liability therefore depends upon identifying the institution whose conduct directly contributes to the administrative failure.

Disciplinary accountability functions through professional supervision and ethical enforcement to ensure that PPAT continues to perform statutory duties in accordance with professional standards despite the transition toward electronic administration.

Finally, institutional oversight integrates the responsibilities of PPAT, ATR/BPN, and electronic system administrators through coordinated supervision, regulatory harmonization, digital auditing, cybersecurity protection, and continuous evaluation of electronic land administration.



Source: Developed by the authors (2026).

**Figure 1. Accountability Framework for Electronic Land Administration
Toward Good Land Governance**

Practical Strategies for Strengthening Accountability in Electronic Land Administration

The proposed legal accountability framework has several practical implications for strengthening the implementation of electronic land administration in Indonesia. The literature consistently indicates that technological innovation alone cannot ensure accountable land governance without corresponding institutional adaptation, regulatory clarity, and professional capacity development. Accordingly, the successful implementation of electronic land certificates requires coordinated strategies involving PPAT, ATR/BPN, professional organizations, and electronic system administrators.

The first strategic priority concerns strengthening the professional competence of PPAT. The transition toward electronic land administration requires PPAT to possess not only legal expertise but also digital competence in electronic verification, digital document management, cybersecurity awareness, and compliance with electronic administrative procedures.

Continuous professional education and certification programs are therefore necessary to ensure that PPAT can perform statutory duties effectively within an increasingly digital administrative environment.

The second priority involves strengthening institutional governance and regulatory harmonization. Although Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency Number 1 of 2021 and Regulation Number 3 of 2023 provide the legal basis for electronic land administration, the literature indicates that further operational guidance remains necessary regarding electronic verification standards, digital evidence, data protection, cybersecurity responsibilities, and institutional coordination. More detailed regulatory harmonization would reduce legal uncertainty while providing clearer accountability for all institutions participating in electronic land administration.

Another important strategy concerns improving institutional coordination and digital oversight. Effective implementation of electronic land administration requires continuous collaboration among PPAT, ATR/BPN, professional organizations, and electronic system administrators. Integrated supervision, periodic digital audits, standardized operating procedures, and reliable information-sharing mechanisms are essential to maintain database integrity, prevent administrative irregularities, and strengthen public confidence in electronic land registration.

The literature also highlights the importance of risk management and information security. As electronic land registration increasingly depends upon digital infrastructure, cybersecurity protection, system reliability, database integrity, and business continuity planning become indispensable components of accountable land governance. Consequently, regular security assessments, system maintenance, and digital auditing should be institutionalized to minimize technical failures that may affect legal certainty.

Table 3. Practical Strategies for Strengthening Accountability in Electronic Land Administration

Challenge	Practical Implication	Recommended Strategy
Limited digital competence	Errors in electronic verification	Continuous professional education and digital competency certification for PPAT
Data inconsistency	Reduced legal certainty	Standardized electronic verification and data validation procedures
Institutional coordination	Administrative overlap	Integrated governance involving PPAT, ATR/BPN, and system administrators
Regulatory uncertainty	Ambiguous legal responsibility	Harmonization of electronic land administration regulations
Information security risks	Cybersecurity vulnerabilities	Digital auditing, cybersecurity strengthening, and periodic system evaluation

Source: Research data

Overall, the practical strategies identified through this study demonstrate that strengthening accountability in electronic land administration requires a balanced integration of legal reform, institutional governance, professional competence, and technological reliability. The proposed strategies complement the Legal Accountability Framework developed in the previous section by translating its conceptual dimensions into practical measures capable of supporting transparent, accountable, and legally certain electronic land administration in Indonesia.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The digitalization of land certificates represents a fundamental institutional transformation in Indonesia's land administration system, shifting conventional paper-based

registration toward an integrated electronic governance model. This study demonstrates that electronic land administration extends beyond technological modernization by reconstructing administrative processes, institutional relationships, and legal accountability within the land registration system. The findings indicate that the accountability of Notaries and Land Deed Officials (PPAT) has evolved from conventional document-based verification toward digital verification, electronic information management, and compliance with electronic administrative procedures.

This study further concludes that accountability in electronic land administration should be allocated according to the statutory authority and institutional functions of the actors involved. Professional responsibility remains attached to PPAT in matters relating to authentic deeds and juridical verification, whereas ATR/BPN bears institutional responsibility for electronic land registration governance and the integrity of the national land database. Technical responsibility relates to the operation and reliability of the electronic system. Such differentiation provides greater legal certainty than treating accountability solely as a shared institutional obligation.

The principal contribution of this study is the development of a Legal Accountability Framework for Electronic Land Administration, consisting of preventive accountability, procedural accountability, professional accountability, administrative and civil liability, disciplinary accountability, and institutional oversight. This framework contributes to legal scholarship by providing a structured explanation of how accountability should be allocated within Indonesia's electronic land administration system while supporting the realization of transparent, accountable, and legally certain Good Land Governance.

Limitations

This study is subject to several limitations. First, the analysis is based exclusively on a qualitative literature review and therefore relies on the availability and scope of existing legal regulations, academic publications, and institutional reports. Second, the proposed Legal Accountability Framework is developed through theoretical and normative synthesis rather than empirical investigation, and thus has not yet been validated through observations of actual administrative practices. Third, because Indonesia's electronic land administration system continues to evolve, future regulatory developments and institutional practices may influence the practical application of the proposed framework.

Recommendations

Future research should validate the proposed Legal Accountability Framework through empirical studies involving PPAT, ATR/BPN officials, electronic system administrators, and land service users. Comparative studies examining electronic land administration in other jurisdictions may also enrich the understanding of institutional accountability within digital land governance. In addition, further research may explore the implementation of digital auditing, cybersecurity governance, and electronic evidence management to strengthen accountability and legal certainty within Indonesia's evolving electronic land administration system.

Author Contributions

Satrio Parikesit Kusumo Nugroho conceived the research, conducted the literature review, analyzed and interpreted the data, developed the legal accountability framework, and prepared the initial manuscript. Prof. Dr. Rasji, S.H., M.H. contributed to the research design, provided academic supervision, critically reviewed the legal analysis, revised the manuscript for important intellectual content, and approved the final version for publication. Both authors

read and approved the final manuscript and agree to be accountable for all aspects of the work, ensuring the accuracy and integrity of the research.

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