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Legal Liability of Land Deed Officials in the Era of Electronic Land Title Certificates

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ABSTRACT

This study examines the legal liability of Land Deed Officials in the era of electronic land title certificates, focusing on the challenges arising from digital transformation in land administration. The main problem lies in the inadequacy of existing legal frameworks to address system-based errors, cybersecurity risks, and the distribution of liability among multiple actors. Accordingly, this research aims to analyze the shift in liability concepts, evaluate the sufficiency of current regulations, and propose adaptive legal solutions. The study employs a normative juridical method with a descriptive-analytical approach, relying on statutory regulations, legal doctrines, and relevant scholarly literature. The findings reveal a significant transformation from individual, document-based liability toward a system-dependent and multi-actor model, where responsibility is shared among officials, government institutions, and system providers. However, the absence of clear legal boundaries creates uncertainty and potential unfairness, particularly when errors originate from digital systems. Furthermore, professional responsibility has expanded to include technological competence, making digital literacy an essential component of due diligence. The study emphasizes the need for regulatory reform to establish a comprehensive and adaptive legal framework. The adoption of a proportional multi-actor liability model, strengthening cybersecurity systems, and enhancing continuous professional training to ensure legal certainty, accountability, and fairness in digital land administration.

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INTRODUCTION

The rapid advancement of digital technology has significantly transformed public administration, including land governance systems (Balaji, 2025). In many jurisdictions, the shift from conventional paper-based land registration to electronic land title certificates represents a major legal and institutional reform aimed at increasing efficiency, transparency, and security (Noor et al., 2025). This transformation is particularly relevant in the context of land administration, where accuracy, authenticity, and legal certainty are essential. Within this evolving framework, the role of Land Deed Officials becomes increasingly complex, as they serve as key actors in ensuring the legality of land transactions. The emergence of electronic land title certificates introduces new legal challenges, especially regarding the

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extent and nature of liability borne by these officials in the event of errors, fraud, or system failures.

Traditionally, Land Deed Officials have operated within a well-established legal framework that emphasizes formal verification, physical documentation, and face-to-face transactions. Their responsibilities include drafting authentic deeds, verifying the identity of parties, and ensuring that land transactions comply with applicable laws and regulations (Trayama & Adhari, 2025). However, the digitalization of land certificates fundamentally alters these processes. Electronic systems reduce direct physical interaction and rely heavily on digital data, electronic signatures, and integrated databases (Penubadi et al., 2023). While these innovations offer efficiency and accessibility, they also raise concerns regarding data integrity, cybersecurity, and the potential for systemic errors. Consequently, questions arise as to whether the existing legal framework governing the liability of Land Deed Officials remains adequate in addressing these new risks.

A growing body of literature has examined the implications of digital transformation in land administration. Previous studies highlight that electronic land registration systems can enhance transparency, reduce corruption, and streamline administrative procedures (Tunde, 2024)(Rashid et al., 2025). For instance, Verna et al. (2025) that digital platforms improve traceability and minimize human error by automating key processes. Other research emphasizes the role of electronic certificates in strengthening legal certainty, as they are often integrated with centralized databases that allow real-time verification (Espinal De Aza, 2025; Toyi & Hamidun, 2025; Saragih et al., 2025). These studies collectively suggest that digitalization represents a significant step forward in modernizing land governance systems.

The novelty of this study lies in its focus on the intersection between traditional legal principles and emerging digital technologies in land administration. Unlike previous research that predominantly emphasizes technical or administrative aspects, this study places legal liability at the centre of analysis. It seeks to bridge the gap between normative legal theory and practical implementation by examining how liability frameworks can be restructured to accommodate digital innovation. In doing so, the study contributes to the development of a more coherent and adaptive legal framework that ensures both accountability and fairness in the digital era.

Furthermore, this research is expected to offer practical recommendations for policymakers and practitioners. By identifying the key challenges and proposing feasible solutions, it aims to support the development of regulations that provide legal certainty while fostering innovation. This is particularly important in ensuring that Land Deed Officials can perform their duties effectively without facing disproportionate legal risks. At the same time, it underscores the importance of safeguarding the rights and interests of parties involved in land transactions.

The transition to electronic land title certificates represents a significant shift in land administration that necessitates a re-evaluation of existing legal frameworks. While digitalization offers numerous benefits, it also introduces new challenges that must be carefully addressed to ensure legal certainty and accountability. The identification of these challenges and the formulation of appropriate research objectives are therefore essential

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steps in advancing both academic understanding and practical solutions. Clear research objectives not only guide the analytical process but also ensure that the study remains focused on addressing the identified problems, ultimately contributing to the development of a more robust and responsive legal system in the era of digital transformation.

RESEARCH METHODS

This research employs a normative juridical methodology, focusing on the analysis of legal principles, statutory regulations, and doctrinal approaches related to the liability of Land Deed Officials in the era of electronic land title certificates. A normative juridical method is understood as research that examines law as a system of norms, emphasizing legal principles, rules, and doctrines as the primary object of analysis (Marzuki, 2017). The study adopts a descriptive-analytical approach to examine how existing legal frameworks govern the roles and responsibilities of Land Deed Officials, particularly in the context of digital land administration systems. The data used consist primarily of secondary legal materials, including primary sources such as statutory laws and regulations, as well as secondary sources such as academic literature, journal articles, and previous research relevant to digital land governance. Tertiary materials, including legal dictionaries and encyclopaedias, are also utilized to support conceptual understanding. These materials are systematically collected through a literature review to identify relevant legal doctrines and scholarly perspectives.

The analysis is conducted using a qualitative approach, emphasizing legal interpretation and systematic comparison of regulatory frameworks. According to Soekanto & Mamudji (2010), qualitative legal analysis in normative research is carried out by interpreting legal materials and constructing logical arguments to answer legal issues. This study applies statutory, conceptual, and comparative approaches to assess how liability is constructed within both conventional and electronic systems. Through this method, the research seeks to identify gaps, inconsistencies, and ambiguities in the current legal framework, while also exploring potential legal solutions to address challenges arising from technological developments in land administration. Overall, this methodological approach provides a clear overview of how the research is conducted and ensures that the findings are both theoretically grounded and practically relevant.

RESULTS AND DISCUSSION

Transformation of Legal Responsibilities in the Digital Land System

The transition from conventional land registration to electronic land title certificates has significantly changed the scope of responsibility of Land Deed Officials. Previously, liability was based on physical documents, direct verification, and face-to-face interactions. In the digital system, these are replaced by electronic verification, digital signatures, and integrated databases.

The findings show a shift from document-based liability to system-dependent liability, where officials still bear responsibility for legal accuracy but increasingly rely on digital systems managed by other parties. This creates potential legal uncertainty when errors originate from the system rather than from the official's conduct.

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This transformation can be further understood through the lens of legal modernization and digital governance theories. According to Horwitz et al. (1977), law consists of structure, substance, and legal culture. In the context of electronic land registration, the structural aspect shifts from manual bureaucratic processes to digital platforms, while the substance of law struggles to keep pace with technological change. As a result, the legal culture of Land Deed Officials must also evolve, particularly in adapting to digital workflows and risk management. This indicates that the transformation is not merely technical but also systemic, affecting how responsibility is conceptualized and implemented.

In addition, Roscoe Pound's theory of law as a tool of social engineering emphasizes that law must adapt to societal changes, including technological advancements (Amr Ibn Munir, 2025). The digitalization of land certificates reflects an attempt to align legal mechanisms with the demands of efficiency, transparency, and accessibility. However, this adaptation also creates tension between traditional doctrines of liability and the realities of automated systems. The findings of this study confirm that while digital systems improve administrative efficiency, they simultaneously blur the boundaries of individual accountability.

This research supports this observation. For instance, Jahani Chehrehbargh et al. (2024) argues that electronic land administration systems enhance efficiency and reduce human error through automation, yet they also introduce systemic risks that are difficult to attribute to individual actors. Similarly, Ameyaw & de Vries (2020) highlight that digital land systems increase transparency and traceability but require robust legal frameworks to address accountability issues arising from technological failures. These studies suggest that the shift toward digital systems necessitates a redefinition of legal responsibility beyond traditional fault-based approaches.

The perspective of liability theory, the transition reflects a movement from fault-based liability toward elements of risk-based liability. In conventional systems, Land Deed Officials are held accountable when negligence or intentional misconduct can be proven. However, in digital environments, errors may arise from algorithmic processes, database inconsistencies, or system integration failures. Rasmussen (1997), modern liability systems increasingly recognize that risks generated by complex systems cannot always be attributed to a single actor, thereby requiring a broader allocation of responsibility.

This is particularly relevant in the context of electronic signatures and digital authentication. According to UNCITRAL Model Law on Electronic Signatures, the reliability of electronic authentication methods depends not only on the user but also on the system provider and certification authority. This implies that Land Deed Officials operate within a network of shared responsibility, where their liability is influenced by external technological factors. The findings of this study confirm that such interdependence complicates the determination of legal accountability, especially when system errors undermine the validity of electronic documents.

Moreover, Anthony Giddens' theory of modernity and risk society provides additional insight into this transformation. Giddens argues that modern institutions increasingly rely on abstract systems, such as technology and expert knowledge, which create new forms of risk. In the case of electronic land certificates, Land Deed Officials must place trust in digital

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infrastructures that they do not fully control. This reliance introduces what Giddens describes as “manufactured risk,” where uncertainties are produced by the very systems designed to enhance efficiency. The findings demonstrate that this risk directly impacts the legal position of officials, as they may be held accountable for outcomes influenced by these abstract systems.

According to Akshalova et al. (2025), land administration systems undergoing digitalization frequently experience a transitional phase in which legal frameworks lag behind technological implementation. This gap creates ambiguity in the allocation of rights and responsibilities, particularly for professionals involved in land transactions. The present study corroborates this argument by showing that Land Deed Officials operate in a regulatory environment that does not fully accommodate the complexities of electronic systems.

In addition, the concept of professional liability must be reinterpreted in light of technological integration. Traditionally, professional responsibility is grounded in the principle of due diligence, requiring officials to act carefully and in accordance with legal standards. However, as digital systems automate certain processes, the scope of due diligence expands to include the verification of electronic data and the proper use of digital tools. Bosbach (2022), the digital transformation of legal services requires professionals to develop technological competence as part of their core responsibilities. This aligns with the findings of this study, which indicate that failure to understand or properly utilize digital systems may constitute a form of negligence.

The reliance on centralized databases raises concerns regarding data integrity and system reliability. Previous research by Egho-Promise et al. (2024) emphasizes that while integrated land information systems improve efficiency, they also create vulnerabilities related to data accuracy and cybersecurity. When inaccuracies occur, it becomes difficult to determine whether the error originates from human input, system malfunction, or external interference. This ambiguity directly affects the legal responsibility of Land Deed Officials, as the traditional assumption of individual control over the transaction process no longer fully applies.

Therefore, the transformation of legal responsibilities in the digital land system reflects a broader shift in the nature of liability. It moves from a clear, individualized framework toward a more complex and distributed model of accountability. The findings demonstrate that Land Deed Officials remain central to ensuring legal certainty, but their role is increasingly influenced by technological systems and institutional arrangements beyond their direct control.

The digitalization of land registration necessitates a reconceptualization of legal responsibility that integrates traditional legal principles with contemporary technological realities. Theories of legal systems, social engineering, and risk society collectively illustrate that this transformation is both inevitable and multifaceted. Previous studies reinforce the view that while digital systems offer significant benefits, they also require adaptive legal frameworks to ensure fairness and accountability. Without such adjustments, the gap between responsibility and control will continue to pose challenges for Land Deed Officials in the era of electronic land title certificates.

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Inadequacy of Existing Legal Frameworks

The study finds that existing legal regulations are not fully equipped to address issues arising from electronic land certificates. Current frameworks still emphasize conventional concepts such as fault-based liability and procedural compliance, without clearly regulating responsibility in cases of system failure, data breaches, or technological errors.

This results in a normative gap, particularly in determining whether Land Deed Officials should be held liable for factors beyond their control. Consequently, the lack of clear legal provisions creates uncertainty and increases the risk of unfair liability.

This inadequacy can be understood through the perspective of legal lag theory, which explains that law often develops more slowly than technological innovation. Haspada (2025), social and technological changes tend to outpace the development of legal norms, resulting in a gap between regulation and reality. In the context of electronic land certificates, this gap is evident in the persistence of conventional legal doctrines that are applied to fundamentally different technological conditions. The findings of this study confirm that existing frameworks have not been sufficiently updated to reflect the complexities of digital land administration systems.

From a doctrinal standpoint, the dominance of fault-based liability theory (liability based on negligence or intent) becomes increasingly problematic in a digital environment. Traditionally, Land Deed Officials are held liable when they fail to exercise due diligence or violate procedural requirements. However, as highlighted by Bell (2024), fault-based liability assumes that the actor has a reasonable degree of control over the circumstances leading to harm. In electronic systems, this assumption is weakened because errors may arise from automated processes, software malfunctions, or external cyber interference. The findings suggest that applying traditional fault-based standards in such contexts may lead to unjust outcomes, as officials can be held responsible for events beyond their direct control.

According to Peter Kennedy Okoth (2023), while digital land registration systems improve efficiency and reliability, they also shift risks from human error to systemic vulnerabilities. Similarly, Clarabella Marella & Ana Silviana (2025) argue that electronic land administration requires a reconfiguration of legal frameworks to address issues of accountability in technologically mediated processes. These studies emphasize that without regulatory adaptation, the legal system may fail to provide adequate protection for both professionals and the public.

The inadequacy of current frameworks can be analysed using Hans Kelsen's Pure Theory of Law, which emphasizes the hierarchical structure of legal norms. In the case of electronic land certificates, there is often a lack of synchronization between higher-level statutory regulations and lower-level technical or administrative rules governing digital systems. This inconsistency creates ambiguity in legal interpretation, particularly when determining liability. The findings indicate that the absence of harmonized regulations contributes to uncertainty, as different legal instruments may provide conflicting guidance on responsibility.

Another relevant theoretical perspective is legal certainty (rechtszekerheid), which is a fundamental principle in civil law systems. Legal certainty requires that laws be clear,

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predictable, and consistently applied. However, the study demonstrates that the current framework fails to meet these criteria in the context of digital land administration. As Mullock (1974) argues in his theory of the "inner morality of law," legal rules must be coherent and understandable to be effective. The lack of clear provisions regarding electronic systems undermines this principle, leaving Land Deed Officials uncertain about the extent of their obligations and potential liabilities.

The concept of risk society, as developed by Parviainen et al. (2017), provides a useful lens for understanding the challenges posed by digitalization. Beck argues that modern societies are increasingly characterized by risks that are produced by technological advancement and are difficult to predict or control. In electronic land registration systems, risks such as data breaches, system errors, and cyberattacks are inherent features of the technology itself. The findings reveal that existing legal frameworks do not adequately address these "manufactured risks," particularly in terms of allocating responsibility among different actors involved in the system.

Fang et al. (2017) note that integrated land information systems require comprehensive legal support to ensure data integrity and system reliability. Without such support, the effectiveness of digital systems may be compromised, and disputes regarding liability may become more frequent. Similarly, Williamson (2001) emphasizes that the success of electronic land administration depends not only on technological infrastructure but also on the development of clear and enforceable legal frameworks. The present study aligns with these findings, demonstrating that technological advancement alone is insufficient to ensure legal certainty.

Moreover, the inadequacy of legal frameworks is also reflected in the regulation of electronic signatures and digital authentication. The UNCITRAL Model Law on Electronic Signatures provides general principles for recognizing the legal validity of electronic signatures, but its implementation at the national level often varies. In many cases, regulations do not clearly define the extent of liability for parties relying on electronic authentication systems. This creates ambiguity for Land Deed Officials, who must depend on these systems to verify the identity and intent of transaction parties. The findings indicate that such ambiguity increases the risk of disputes and legal challenges.

Another important issue is the lack of clear liability allocation mechanisms among multiple stakeholders. In electronic land systems, responsibility is distributed among government agencies, system developers, service providers, and users. However, Kraakman (1986), effective liability systems require clear identification of responsible parties to ensure accountability and deterrence. The absence of such clarity in current frameworks leads to overlapping responsibilities and potential conflicts, particularly when determining who should bear the consequences of system-related failures.

From a comparative perspective, several jurisdictions have begun to address these challenges by introducing hybrid liability models that combine elements of fault-based and strict liability. These models recognize that in highly technological environments, certain risks should be borne collectively rather than individually. The findings of this study suggest that

similar approaches may be necessary to address the limitations of existing legal frameworks in the context of electronic land certificates.

The inadequacy of existing legal frameworks reflects a broader misalignment between traditional legal doctrines and contemporary technological realities. Theories of legal lag, fault-based liability, legal certainty, and risk society collectively illustrate the complexity of regulating digital systems. Previous research consistently highlights the need for regulatory adaptation to address emerging challenges in electronic land administration. Without such adaptation, the normative gap identified in this study will persist, undermining both legal certainty and the fairness of liability allocation for Land Deed Officials.

Expansion of Risk and Multi-Actor Liability

Electronic land systems introduce new risks, including data manipulation, cybersecurity threats, and inaccuracies in digital records. The findings indicate that liability in this context involves multiple actors, such as Land Deed Officials, government institutions, and system providers.

However, the absence of clear legal boundaries between these actors often leads to overlapping responsibilities. In practice, Land Deed Officials may still be held accountable even when the primary cause of error lies within the electronic system, highlighting the need for clearer liability distribution.

This expansion of risk can be analysed through the framework of Ulrich Beck's risk society theory, which posits that modern technological development generates new types of risks that are systemic, complex, and often beyond the control of individual actors. In electronic land administration, risks are no longer confined to human error but are embedded within digital infrastructures, including databases, networks, and software systems. These risks are "manufactured risks," meaning they arise from human-designed systems but are difficult to predict and control. The findings of this study confirm that Land Deed Officials operate within such a risk environment, where liability may arise not only from their own actions but also from failures in interconnected systems.

In addition, systems theory, as developed by Luhmann, provides a useful perspective for understanding the distribution of responsibility in complex institutional environments. Luhmann (1995) argues that modern society is composed of functionally differentiated systems, each with its own logic and operational boundaries. In the context of electronic land certificates, the legal system, administrative system, and technological system interact but do not fully overlap. As a result, failures in one system (e.g., a technological malfunction) may produce consequences in another system (e.g., legal liability), without clear mechanisms for assigning responsibility. The findings indicate that this structural complexity contributes to the ambiguity in determining liability among multiple actors.

According to Ameyaw & de Vries (2021), digital land administration systems inherently involve a network of stakeholders, including government agencies, private sector technology providers, and legal professionals. This networked structure increases efficiency but also complicates accountability, as responsibilities are distributed across multiple entities. Similarly, Abdulai & Ochieng (2017) notes that the reliability of land registration systems depends not only on legal procedures but also on the integrity of technical infrastructures,

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thereby expanding the scope of potential liability. These studies suggest that traditional single-actor liability models are inadequate for addressing the realities of digital systems.

From a legal perspective, the expansion of risk necessitates a shift toward multi-actor liability theory, where responsibility is shared among parties contributing to a particular outcome. As discussed by Kraakman (1986), modern legal systems increasingly rely on "gatekeepers"—third parties who play a role in preventing harm to distribute responsibility more effectively. In the context of electronic land systems, Land Deed Officials can be seen as gatekeepers who ensure the legality of transactions, while system providers and government agencies act as technical and regulatory gatekeepers. The findings demonstrate that without clear allocation of these roles, liability may be disproportionately imposed on Land Deed Officials, despite their limited control over technological processes.

Furthermore, the concept of strict liability becomes relevant in situations where risks are inherent in the use of technology. Unlike fault-based liability, strict liability does not require proof of negligence but is based on the existence of harm resulting from certain activities. Epstein (1973), strict liability is often in contexts involving hazardous or high-risk activities, where it is difficult to determine fault. In electronic land systems, certain risks such as system failures or cyberattacks may fall into this category. However, the absence of clear legal provisions applying strict liability to system operators creates a gap, leaving Land Deed Officials exposed to liability under traditional fault-based standards.

Another important theoretical framework is cyber law and data protection theory, which emphasizes the importance of safeguarding digital information and ensuring accountability in the use of technology. According to Andreas & Kaal (2025), "code is law," meaning that the architecture of digital systems can regulate behaviour as effectively as legal rules. In electronic land registration, system design plays a crucial role in determining how data is processed, verified, and stored. The findings indicate that when system architecture is flawed or insecure, it can lead to errors that have legal consequences. However, current legal frameworks often fail to adequately address the responsibility of system designers and operators, focusing instead on end-users such as Land Deed Officials.

Luhmann (1995) emphasize that integrated land information systems are vulnerable to cyber threats, including unauthorized access and data manipulation. Such vulnerabilities can undermine the integrity of land records and create disputes regarding ownership and rights. Similarly, Ono et al. (2023) argue that the effectiveness of digital land systems depends on the reliability and security of underlying technologies. The present study supports these findings, demonstrating that cybersecurity risks are a significant factor in the expansion of liability.

Moreover, the principle of proportional liability becomes increasingly important in multi-actor environments. This principle suggests that responsibility should be allocated according to the degree of control and contribution of each actor. However, the findings reveal that current legal frameworks do not adequately implement this principle in the context of electronic land systems. Instead, liability tends to be concentrated on Land Deed Officials, who are more visible and directly involved in transactions, even though other actors may have greater control over the technological infrastructure.

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The issue is further complicated by the concept of information asymmetry, where different actors possess varying levels of knowledge about the system. Land Deed Officials may not fully understand the technical aspects of digital platforms, while system providers may lack knowledge of legal requirements. Xiang et al. (2012), information asymmetry can lead to inefficiencies and unfair outcomes, particularly in situations involving risk allocation. The findings suggest that this asymmetry contributes to the imbalance in liability, as officials may be held responsible for issues they are not equipped to identify or prevent.

Comparative experiences from other jurisdictions demonstrate that addressing multi-actor liability requires comprehensive regulatory reform. Some countries have introduced frameworks that clearly define the responsibilities of each stakeholder, including provisions for system accountability and compensation mechanisms for victims of system failures. These approaches align with the findings of this study, which emphasize the need for clearer liability distribution to ensure fairness and legal certainty.

The expansion of risk in electronic land systems reflects a fundamental shift from individual to collective responsibility. Theories of risk society, systems theory, multi-actor liability, and cybersecurity collectively illustrate the complexity of assigning liability in technologically mediated environments. Previous research consistently highlights the interconnected nature of digital systems and the need for adaptive legal frameworks. The findings of this study confirm that without clear allocation of responsibility among Land Deed Officials, government institutions, and system providers, the current legal framework will continue to produce uncertainty and potential injustice in the determination of liability.

Reinterpretation of Professional Responsibility

The research shows that the professional responsibilities of Land Deed Officials must evolve alongside digital transformation. In addition to legal expertise, officials are now required to understand digital systems, verify electronic data, and comply with technological procedures.

This expansion implies that professional liability also includes technological competence. Failure to adapt to digital processes may be interpreted as negligence, making it essential for officials to continuously improve their digital literacy while maintaining legal accuracy.

This reinterpretation can be analysed through the framework of professional responsibility theory, which emphasizes that professionals are expected to exercise a higher standard of care based on their expertise and role in society. Traditionally, the responsibility of Land Deed Officials has been grounded in legal competence, particularly in drafting authentic deeds, verifying identities, and ensuring compliance with applicable regulations. However, with the integration of digital systems, the standard of care expands to include the ability to operate and critically assess technological tools. Susskind (2017), the digital transformation of legal services requires professionals to “augment their traditional expertise with technological understanding,” indicating that competence is no longer limited to doctrinal knowledge.

From a theoretical perspective, this shift can also be understood through the doctrine of due diligence. Due diligence requires professionals to take reasonable steps to prevent harm

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and ensure the accuracy of their work. In conventional systems, due diligence involves physical verification and document examination. In electronic systems, however, due diligence extends to verifying the reliability of digital data, ensuring the authenticity of electronic signatures, and understanding system-generated outputs. The findings of this study indicate that failure to perform these additional tasks may constitute a breach of professional duty, even if the error originates from technological processes.

According to Kalantari et al. (2015), the implementation of digital land administration systems necessitates the development of new competencies among professionals, including the ability to interact with integrated information systems. Similarly, Luhmann (1995) highlight that the effectiveness of land administration depends not only on legal frameworks but also on the capacity of professionals to manage and interpret digital data accurately. These studies suggest that professional responsibility is increasingly intertwined with technological capability.

The reinterpretation of responsibility can be linked to Anthony Giddens' concept of expert systems. Oktaviani.J (2018) argues that modern societies rely on expert systems complex networks of technical and professional knowledge that require trust from users. Land Deed Officials function as part of this expert system, bridging the gap between legal norms and technological processes. However, the reliance on digital platforms means that officials must trust systems they may not fully control or understand. The findings show that this reliance creates a dual responsibility: maintaining trust in the system while also ensuring its proper use. Failure to do so may undermine both legal certainty and public confidence.

Another relevant theoretical approach is competence-based liability, which holds that professionals are responsible for maintaining the level of competence required by evolving industry standards. Hylton (2019) negligence can be determined by comparing a professional's conduct with what is reasonably expected under current conditions. In the digital era, this standard includes familiarity with electronic systems and the ability to identify potential technological risks. The study finds that Land Deed Officials who lack digital literacy may be considered negligent, not because of intentional wrongdoing, but due to their inability to meet contemporary professional standards.

In addition, legal ethics theory provides insight into the moral dimension of professional responsibility. Legal professionals are expected to uphold integrity, accountability, and public trust. The introduction of digital systems does not diminish these ethical obligations; rather, it expands them. As argued by Rhode (2000), professional ethics must evolve in response to changes in the legal environment, including technological advancements. The findings of this study indicate that ethical responsibility now includes ensuring that digital tools are used in a manner that protects the rights and interests of all parties involved in land transactions.

Kirgis (2012) notes that the future of legal professions will be shaped by the ability to integrate legal knowledge with technological innovation. Similarly, Bennett et al. (2021) argue that professionals involved in land administration must adapt to digital systems to remain effective and relevant. The present study confirms these observations, demonstrating that the inability to adapt to technological changes may result in both professional and legal consequences.

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Moreover, the reinterpretation of responsibility also involves a shift in the concept of accountability. In traditional systems, accountability is primarily individual, based on the actions of the professional. In digital systems, accountability becomes more complex, as it involves interactions between humans and technology. López Jiménez et al. (2021), digital environments are regulated not only by law but also by code, meaning that system design influences professional behaviour. The findings suggest that Land Deed Officials must be aware of how technological systems shape their actions and responsibilities, and must take steps to ensure that these systems are used appropriately.

Another important aspect is the role of continuous professional development. Given the rapid pace of technological change, static knowledge is insufficient to meet evolving professional demands. According to Horwitz et al. (1977), the legal system is dynamic and requires ongoing adaptation by its actors. The study indicates that continuous training and education in digital systems are essential for Land Deed Officials to maintain their professional competence. Without such efforts, the gap between legal knowledge and technological capability will widen, increasing the risk of errors and liability.

In addition, the principle of legal certainty (rechtszekerheid) remains central to professional responsibility. Land Deed Officials play a crucial role in ensuring that land transactions are legally valid and enforceable. The integration of digital systems introduces new challenges to this role, particularly in verifying the authenticity and accuracy of electronic data. Choi (2024) argues the effectiveness of law depends on its clarity and reliability. The findings show that professionals must adapt their practices to ensure that digital processes meet these standards, thereby maintaining legal certainty in an increasingly complex environment.

Comparative perspectives also demonstrate that jurisdictions implementing electronic land systems often require enhanced professional standards, including certification in digital competencies and adherence to specific technological protocols. These measures reflect an understanding that professional responsibility must evolve in parallel with technological innovation. The study suggests that similar approaches may be necessary to ensure that Land Deed Officials can effectively fulfil their roles in the digital era.

The reinterpretation of professional responsibility reflects a fundamental shift in the nature of legal practice in the context of digital transformation. Theories of professional responsibility, due diligence, expert systems, and competence-based liability collectively illustrate that technological competence is now an integral component of professional duty. Previous research consistently highlights the need for professionals to adapt to digital environments, while the findings of this study confirm that failure to do so may result in legal and ethical consequences. Therefore, the evolution of professional responsibility is not merely an option but a necessity to ensure accountability, legal certainty, and public trust in the era of electronic land title certificates.

CONCLUSION

The study concludes that the digital transformation of land administration through electronic land title certificates has fundamentally altered the legal liability of Land Deed Officials.

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Liability has shifted from a document-based and individual framework toward a system-dependent and multi-actor model, where responsibility is increasingly influenced by digital infrastructures beyond the officials' direct control. However, existing legal frameworks remain inadequate to address issues such as system errors, data inaccuracies, and cybersecurity risks, resulting in normative gaps and legal uncertainty. Furthermore, the expansion of professional responsibility now requires Land Deed Officials to possess not only legal expertise but also technological competence, as failure to adapt to digital systems may be interpreted as negligence under evolving standards of due diligence.

In light of these findings, regulatory reform is necessary to establish a more adaptive and comprehensive legal framework that clearly defines liability in electronic land systems. This includes the adoption of a multi-actor liability model that proportionally allocates responsibility among Land Deed Officials, government institutions, and system providers, as well as the harmonization of legal norms across regulatory levels. Additionally, strengthening digital infrastructure and cybersecurity, alongside continuous professional training for Land Deed Officials, is essential to ensure legal certainty and accountability. Finally, the development of legal protection mechanisms for officials acting in good faith within digital systems is crucial to prevent disproportionate liability and to support the effective implementation of electronic land administration.

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