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Electronic Land Registration and Document Forgery: A Socio-Legal Analysis of Criminal Liability Under Indonesia's Omnibus Law

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Abstract: This study examines the socio-legal dimensions of criminal liability arising from document forgery within Indonesia's electronic land registration system, as reshaped by the Omnibus Law on Job Creation (Law No. 11 of 2020, as amended by Law No. 6 of 2023) and Minister of Agrarian Affairs and Spatial Planning/National Land Agency Regulation No. 1 of 2021 on Electronic Certificates. The transition from paper-based to electronic land registration was intended to enhance efficiency, transparency, and legal certainty; however, digitalization has simultaneously generated new typologies of forgery, including manipulated scanned files, falsified digital signatures, and duplicated electronic certificates. This research employs a socio-legal method combining normative analysis of statutory provisions with an empirical review of enforcement practice and institutional case handling. The findings indicate that although the Criminal Code and sectoral regulations criminalize forgery of authentic land documents, criminal liability remains fragmented across three tiers-individual perpetrators, notaries/PPAT, and platform or institutional operators-producing overlapping jurisdiction and inconsistent enforcement. Technical vulnerabilities at the verification stage have not yet been matched by corresponding criminal law adaptations. The article recommends harmonizing sectoral and general criminal provisions, strengthening digital forensic capacity within law enforcement, and establishing clearer corporate criminal liability standards for land registration platform operators.

Keywords: Electronic Land Registration, Document Forgery, Criminal Liability, Omnibus Law, Socio-Legal Studies.

INTRODUCTION

Indonesia's land administration system has entered a period of fundamental technological transformation. Since 2021, the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN) has progressively replaced physical land certificates with electronic certificates, a policy formalized through Minister of Agrarian Affairs and Spatial Planning/National Land Agency Regulation No. 1 of 2021 on Electronic Certificates. This transition forms part of a broader digital transformation agenda intended to accelerate the Complete Systematic Land Registration (Pendaftaran Tanah Sistematis Lengkap/PTSL) program, reduce administrative backlogs, and minimize opportunities for manual manipulation that have long plagued conventional land registration (Silviana, 2021). Sound land administration infrastructure of this kind is widely regarded as a precondition for effective land policy implementation and broader governance outcomes (Williamson, 2001; Deininger & Feder, 2009).

The enactment of the Omnibus Law on Job Creation (Law No. 11 of 2020), subsequently revised into Law No. 6 of 2023, further reshaped the institutional and procedural landscape of land governance by streamlining licensing processes, introducing the land bank institution, and adjusting several provisions of the Basic Agrarian Law (UUPA) relevant to registration authority. While these reforms were designed to strengthen legal certainty and ease of doing business, they have also generated new points of legal ambiguity, particularly concerning the allocation of criminal responsibility when land documents-now largely digital-are falsified, manipulated, or fraudulently issued (Jaelani & Vinata, 2022).

Digitalization does not eliminate forgery; it transforms its methods. Empirical reports from legal aid organizations and land dispute monitoring bodies indicate a rising pattern of digitally manipulated scanned documents, misuse of digital signatures, and the appearance of duplicate or 'ghost' electronic certificates issued without proper underlying rights (Salma & Adjie, 2023). Comparative experience from other jurisdictions implementing e-land administration confirms that digitization shifts, rather than removes, the registration and recording of rights, restrictions, and responsibilities that underpin forgery risk (Fourie, 2002; Wallace & Williamson, 2006).

These emerging typologies raise a pressing legal question: do existing provisions of the Criminal Code-both the former Criminal Code (Law No. 1 of 1946) and the New Criminal Code (Law No. 1 of 2023), which criminalize the forgery of authentic deeds under Articles 263-266 and Articles 391-395 respectively-adequately capture offenses committed through electronic land registration systems, and how does the Omnibus Law's reallocation of institutional authority affect the enforcement of such provisions?

This study aims to: (1) map the legal framework governing electronic land registration and its intersection with criminal law; (2) identify the typologies and technical vulnerability points through which document forgery occurs within the electronic registration process; (3) analyze the tiered structure of criminal liability applicable to individuals, notaries/PPAT, and corporate or platform operators; and (4) evaluate the socio-legal barriers that hinder effective enforcement. The research is expected to contribute to the emerging scholarly discourse on the criminal law implications of e-government land administration in Indonesia.

Prior research on this subject clusters into two strands. The first strand addresses the technical-administrative dimension of electronic certification-Silviana (2021) documents the policy rationale for the PTSL and electronic-certificate program, while Arrizal & Ali Fauzi (2023) and Andari & Mujiburohman (2023) examine the legal validity and service quality of electronic certificates-but stops short of the criminal law consequences of failures in that system. The second strand addresses forgery-related criminal liability under the Criminal Code in general terms (Jaelani & Vinata, 2022; Hidayat & Badriyah, 2022) or the professional liability of notaries in land mafia cases (Miranda, 2022), but treats "land documents"

generically, without differentiating the specific technical stages of the electronic registration workflow at which forgery occurs or which class of actor bears liability at each stage. The principal limitation shared by both strands is that neither offers a stage-by-stage account of where, within the electronic registration process, forgery risk is concentrated, nor a corresponding tiered account of who is criminally liable at each point. This study differs from that prior work in two respects: first, it integrates the technical-administrative literature with the doctrinal criminal liability literature rather than treating them separately; second, it organizes criminal liability into three explicit tiers of actor (individual, notary/PPAT, corporate/platform operator) mapped directly onto the four technical stages of the electronic registration workflow, rather than discussing liability in the abstract. The novelty of this study is precisely this integrated, stage-to-tier mapping, which allows the analysis to identify specific points of legal-technical misalignment-such as the gap between the ministerial-regulation basis of electronic certificates and the Criminal Code's silence on electronic instruments-that neither strand of prior research, taken alone, is positioned to reveal.

METHOD

This research adopts a socio-legal method, combining normative-doctrinal analysis with a contextual examination of enforcement practice. The normative dimension focuses on statutory interpretation and systematization of the legal instruments governing electronic land registration and document forgery, drawing on a systems approach to land registration and cadastre that treats legal, institutional, and technical components as interdependent (Zevenbergen, 2004), while the socio-legal dimension examines how these norms operate in practice, including institutional reporting patterns, case handling procedures, and structural barriers to enforcement (Bedner et al., 2012).

The study employs three complementary approaches: (1) the statutory approach, analyzing the Basic Agrarian Law (UUPA) No. 5/1960, the Criminal Code (both the 1946 Code and the New Criminal Code, Law No. 1/2023), the Omnibus Law on Job Creation (Law No. 11/2020 jo. Law No. 6/2023), Government Regulation No. 18/2021, Minister of ATR/BPN Regulation No. 1/2021, the Notary Law (UUJN) No. 2/2014, and the Electronic Information and Transactions Law (ITE Law) No. 19/2016; (2) the conceptual approach, drawing on doctrines of criminal liability, corporate criminal responsibility, and legal certainty in digital administration; and (3) the case-oriented approach, reviewing publicly available court decisions, Ombudsman reports, and secondary reports from legal aid institutions concerning land document forgery.

Legal materials are classified into primary sources (statutes, government regulations, ministerial regulations, and court decisions), secondary sources (legal textbooks, journal articles, and institutional reports), and tertiary sources (legal dictionaries and official glossaries). Data were collected through library research and documentation studies and analyzed using a prescriptive-analytical method to evaluate the coherence and adequacy of the current criminal liability framework relative to the risks introduced by electronic land registration.

The socio-legal approach was selected over a purely normative approach because doctrinal analysis alone can establish what the Criminal Code and its implementing regulations prescribe, but cannot show whether or how that prescription is actually applied by ATR/BPN, POLRI, the Notary/PPAT Supervisory Board, or the Ombudsman in practice; only an approach that combines legal doctrine with an empirical reading of enforcement patterns can reveal where the formal liability framework and institutional practice diverge, which is the central question this study investigates. For the case-oriented component, the study reviewed a purposive sample of publicly available decisions accessed through the Supreme Court's decision database (Direktori Putusan Mahkamah Agung), together with Ombudsman RI reports

and secondary case reports from legal aid institutions. Because litigation specifically concerning forgery of electronic (rather than paper-based) land certificates is still nascent-electronic certification having only been introduced in 2021-the sample was drawn using the following criteria: (1) decisions rendered from 2022 onward, spanning first-instance, administrative (PTUN), and cassation levels; and (2) decisions directly concerning forged underlying rights, falsified transfer documents, or disputed certificate validity, treated as the closest available proxy for electronic-registration-era forgery risk pending the maturation of case law specific to electronic certificates. The resulting cases were analyzed using content analysis, coding each decision for the tier of liability involved (individual, notary/PPAT, or corporate/platform), the forgery typology at issue, and the enforcement outcome, in order to identify recurring patterns of jurisdictional overlap and inconsistent case handling referred to in the Result and Discussion section. To situate Indonesia's tiered liability framework within a broader frame of reference, the study additionally applies a comparative legal analysis technique, juxtaposing Indonesia's approach against e-land administration and electronic-evidence practice documented for South Africa (Fourie, 2002) and against the general registration-of-rights model described by Wallace & Williamson (2006), and drawing on corporate criminal responsibility doctrine as articulated in comparative criminal law scholarship (Ashworth & Horder, 2013) to assess whether Indonesia's platform-operator liability tier is conceptually consistent with that doctrine. Finally, findings were checked through data triangulation across three independent sources-statutory and regulatory text, court/Ombudsman case data, and the secondary institutional-report literature-so that a pattern identified in one source (for example, jurisdictional overlap suggested by the statutory allocation of authority) is treated as substantiated only where it is also reflected in the case-level and institutional-report data, reducing reliance on any single source of evidence.

RESULTS AND DISCUSSION

Consistent with the comparative and triangulation techniques set out in the Method section, the discussion below does not merely restate the content of Indonesian statutes and regulations; each subsection is read against comparative e-land administration experience and against modern criminal law theory. Comparatively, South Africa's e-land administration reform shifted rather than eliminated forgery risk to different points in the registration workflow (Fourie, 2002), a pattern this study finds replicated-though with a different institutional configuration-in Indonesia's four-stage electronic registration process; and the general registration-of-rights model of Wallace & Williamson (2006) suggests that legal protection should track the point at which a right, restriction, or responsibility is actually recorded, a benchmark against which Indonesia's ministerial-regulation-based electronic certificate falls short, as discussed below. Theoretically, the corporate-operator tier of liability is read against corporate criminal responsibility doctrine (Ashworth & Horder, 2013), which asks whether liability should attach to individual culpable actors within an organization or to systemic failures of organizational control; Indonesia's reliance on the Omnibus Law and the ITE Law for platform-operator liability, discussed further below, reflects the latter, systemic-failure model rather than an individual-culpability model, with direct consequences for how such liability can be proven in practice.

Legal Framework Governing Electronic Land Registration in Indonesia

The legal architecture underpinning electronic land registration in Indonesia is layered, combining constitutional principles, general agrarian law, sectoral implementing regulations, and general criminal provisions. At the constitutional level, Article 33(3) of the 1945 Constitution establishes the state's right of avail (*hak menguasai negara*) over land, water, and natural resources, providing the foundational legitimacy for the state to organize and regulate

land registration in whatever form-paper-based or electronic (Harsono, 2008). The Basic Agrarian Law No. 5 of 1960 (UUPA) operationalizes this authority through the land registration mandate later detailed in Government Regulation No. 24 of 1997 and, following the digitalization reform, Government Regulation No. 18 of 2021.

The direct legal basis for electronic certificates is Minister of ATR/BPN Regulation No. 1 of 2021, which grants electronic certificates the same legal force as their physical counterparts, provided they are generated through the state's verified system and secured with valid electronic signatures. The Omnibus Law on Job Creation, through its amendments to several UUPA-related provisions and the introduction of the land bank institution, reallocates certain administrative authorities but does not by itself create new criminal provisions specific to electronic document forgery; criminal liability for forgery therefore continues to rest primarily on the general Criminal Code framework, applied by analogy to electronic instruments (Arrizal & Ali Fauzi, 2023).

This layered structure, however, is not free of normative tension. First, applying the Criminal Code to electronic land documents by analogy-rather than through express statutory language-creates interpretive uncertainty as to whether a manipulated digital file or a forged electronic signature qualifies as "surat" (a document) or "akta autentik" (an authentic deed) within the meaning of Articles 263-266 of the former Criminal Code and Articles 391-395 of the New Criminal Code; the New Criminal Code itself does not explicitly extend these provisions to electronic instruments, leaving courts to resolve the question case by case. Second, Permen ATR/BPN No. 1/2021 grants electronic certificates equal legal force to physical certificates but is a ministerial regulation, subordinate in the legal hierarchy to the Criminal Code and the Basic Agrarian Law; it therefore cannot itself create or expand criminal liability, which produces a disharmony between the administrative validity the certificate enjoys and the criminal protection actually available when that certificate is forged-a gap that also falls short of the registration-of-rights benchmark noted in the comparative framing above (Wallace & Williamson, 2006). Third, the Omnibus Law's reallocation of institutional authority-particularly the introduction of the land bank and streamlined licensing-was designed around administrative efficiency rather than criminal enforcement, and neither the Omnibus Law nor its implementing regulations assign clear investigative responsibility for electronic-specific forgery typologies, leaving this coordination gap to be filled informally by POLRI and ATR/BPN in practice. These three points of normative disharmony are examined further in relation to enforcement outcomes in the following sections.

Table 1. Hierarchy of Legal Instruments Governing Electronic Land Registration and Related Criminal Liability

No.	Legal Instrument	Subject Matter	Relevance to Electronic Registration & Forgery Liability
1	UUD NRI 1945 (Art. 28D, 28G, 33)	Constitutional guarantees on legal certainty, property, and state control over land	Constitutional ceiling for regulating digital land administration and rights protection
2	Law No. 5/1960 (UUPA)	Basic Agrarian Law; state's right of avail (hak menguasai negara)	Foundational authority for land registration, including its electronic form
3	Law No. 1/1946 jo. Law No. 1/2023 (KUHP)	Criminal Code; forgery of authentic deeds (Art. 263-266 / Art. 391-395)	General criminal basis for prosecuting forgery of land certificates and deeds
4	Law No. 11/2020 jo. Law No. 6/2023	Harmonization of land, licensing, and administrative provisions	Reshapes institutional authority over land data and registration systems

No.	Legal Instrument	Subject Matter	Relevance to Electronic Registration & Forgery Liability
	(Omnibus Law/Cipta Kerja)		
5	PP No. 18/2021	Management rights, land rights, apartment units, and land registration	Operational basis for the transition to electronic land registration
6	Permen ATR/BPN No. 1/2021	Electronic Certificates	Direct legal basis for the issuance and validity of electronic land certificates
7	Law No. 2/2014 (UUJN)	Notary/PPAT professional duties and liability	Basis for professional liability of notaries/PPAT in document authentication

Source: Analysis of Primary Legal Materials (2024)

Typologies and Vulnerability Points of Document Forgery in Electronic Registration

As illustrated in Figure 1, the electronic land registration process consists of four principal stages: applicant data submission, digital document verification, electronic signature and encryption, and electronic certificate issuance by ATR/BPN. Each stage carries a distinct forgery risk. At the submission stage, applicants or intermediaries may present falsified source documents-such as fabricated underlying rights (*alas hak*) or altered prior certificates-that are subsequently scanned and entered into the system (Hidayat & Badriyah, 2022). At the verification stage, scanned files themselves may be digitally manipulated using image-editing techniques that are difficult to detect through conventional administrative review, particularly where land offices lack dedicated digital forensic tools.

The signature and encryption stage introduces a further vulnerability: unauthorized use or replication of digital signatures, whether through credential theft, insider misuse, or exploitation of weak authentication protocols. Finally, at the issuance stage, systemic or procedural gaps may result in duplicate or 'ghost' certificates being generated for land parcels that already possess valid registration, creating overlapping claims that are functionally indistinguishable from legitimate certificates until a dispute arises (Roestamy et al., 2023). These four vulnerability points collectively demonstrate that digitalization redistributes, rather than eliminates, the opportunities for forgery present in the conventional paper-based system, underscoring the need for a coherent national land administration infrastructure that integrates legal, institutional, and technical safeguards (Bennett et al., 2012).

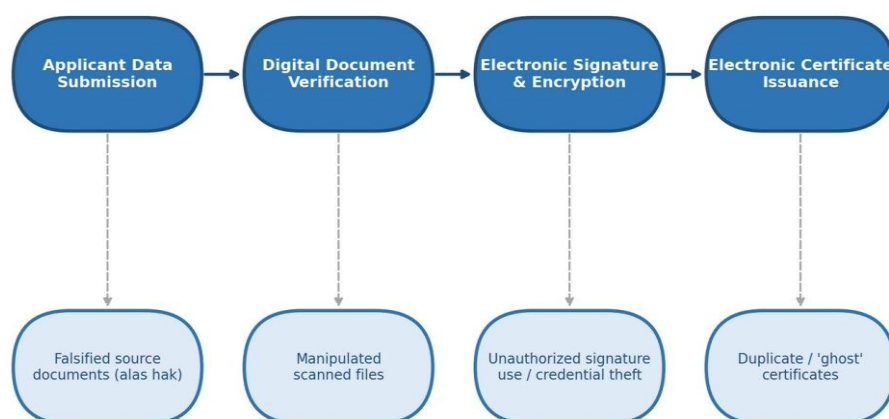


Figure 1. Electronic Land Registration Process and Corresponding Document Forgery Vulnerability Points

Source: Research Results

These four vulnerability points are not merely theoretical; they are reflected in documented enforcement practice. In its decision Number 693 K/Pdt/2023 (12 April 2023), the Supreme Court upheld the cancellation of a land certificate on the ground that the underlying transfer was supported only by an unverifiable payment receipt rather than a valid *alas hak*, illustrating submission-stage vulnerability. Similarly, Central Jakarta District Court Decision Number 248/Pid.B/2022/PN.Jkt.Brt and Jakarta Administrative Court (PTUN) Decision Number 204/G/2024/PTUN-JKT, both concerning falsified land transfer documentation, show how forged source documents that pass initial administrative review can still result in certificates later contested in both criminal and administrative fora. Broader land mafia case patterns documented in the secondary literature-involving syndicates that combine falsified underlying rights with insider complicity at the verification stage-illustrate how the submission- and verification-stage vulnerabilities identified above are exploited in practice (Miranda, 2022; Roestamy et al., 2023). Ombudsman RI's 2022 Rapid Assessment of land registration and certificate-splitting services found that of 37 case files examined, only 9 (24%) were processed within the standard operating procedure timeframe, with identified maladministration including prolonged delays, denial of service, and abuse of authority-institutional weaknesses in intake and processing that create the same procedural openings on which document-forgery schemes rely (Ombudsman RI, 2022). These case-level illustrations reinforce the argument that vulnerability is distributed unevenly across the registration workflow rather than concentrated at any single point.

Tiered Criminal Liability: Individual, Professional, and Corporate/Platform Responsibility

The analysis identifies three distinct, though interconnected, tiers of criminal liability applicable to document forgery in electronic land registration, as summarized in Table 2 and illustrated in Figure 2. The first tier concerns individual perpetrators, who may be prosecuted under Articles 263-266 of the former Criminal Code or Articles 391-395 of the New Criminal Code (Law No. 1 of 2023) for falsifying, altering, or knowingly using forged authentic land documents, carrying a maximum penalty of eight years' imprisonment (Jaelani & Vinata, 2022).

The second tier addresses the professional liability of notaries and land deed officials (PPAT), who play a gatekeeping role in authenticating land transactions. Under the Notary Law (UUJN) No. 2 of 2014, as adjusted by the Omnibus Law, notaries/PPAT who negligently authenticate forged instruments-or who are complicit in their production-face both criminal sanction and administrative revocation of their professional license by the Notary/PPAT Supervisory Board. The third tier extends liability to corporate or platform operators, including private application service providers integrated into the electronic registration ecosystem, whose systemic failures in data governance or access control may enable large-scale certificate manipulation. Such liability draws on the corporate criminal responsibility doctrine embedded in the Omnibus Law and the Electronic Information and Transactions Law (ITE Law) No. 19 of 2016 (Miranda, 2022; Yuliana et al., 2024).

This three-tier structure is not adopted from a single pre-existing doctrinal model; rather, it is the authors' own analytical construction, built inductively from the electronic registration workflow mapped in Figure 1. Each tier corresponds to a distinct class of actor positioned at a different stage of that workflow-the individual perpetrator at the submission stage, the notary/PPAT at the verification and authentication stage, and the corporate/platform operator at the signature, encryption, and issuance stages-and each is governed by a materially different legal basis (general criminal law, professional liability law, and corporate criminal responsibility doctrine, respectively). Structuring the analysis this way follows the general logic of tiered or stratified criminal liability found in comparative corporate criminal law

scholarship (Ashworth & Horder, 2013), adapted here to the specific institutional actors involved in Indonesia's electronic land registration ecosystem, rather than being drawn directly from a single named theory. As the comparative framing above notes, Indonesia's corporate/platform tier follows a systemic-failure conception of corporate liability rather than an individual-culpability conception, which is consistent with the Omnibus Law's and ITE Law's focus on data-governance and access-control failures rather than on identifying a specific culpable individual within the platform operator's organization.

Table 2. Tiered Criminal Liability Framework for Document Forgery in Electronic Land Registration

Liability Tier	Legal Basis	Nature of Liability	Sanction Range
Individual Perpetrator	KUHP Art. 263-266 / Art. 391-395 (New KUHP)	Falsifying, altering, or using forged authentic land documents	Up to 8 years imprisonment
Notary/PPAT (Professional)	UUJN No. 2/2014; Job Creation Law amendments	Negligent or complicit authentication of forged instruments	Criminal sanction + administrative revocation of license
Corporate/Platform Operator	Omnibus Law on Job Creation; ITE Law No. 19/2016	System failure enabling data manipulation or unauthorized certificate issuance	Corporate criminal liability; fines and supervisory sanctions

Source: Analysis of Statutory Provisions (2024)

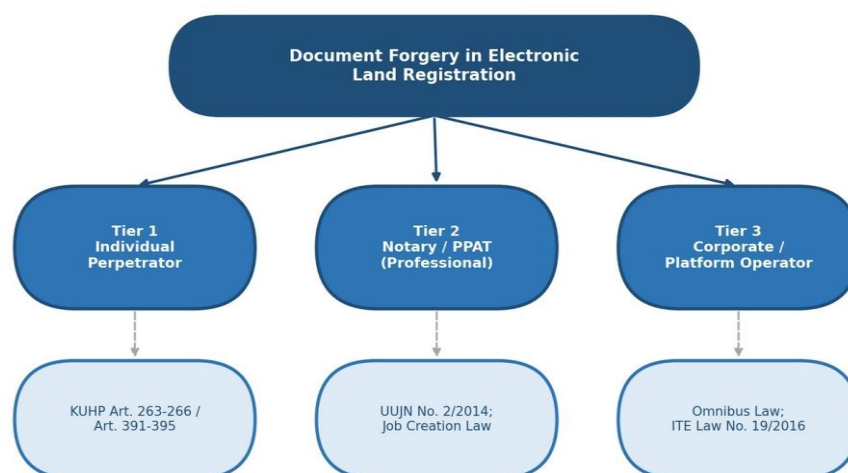


Figure 2. Three-Tier Framework of Criminal Liability for Document Forgery in Electronic Land Registration

Source: Research Results

Enforcement Challenges and Socio-Legal Barriers

Despite the existence of a formally adequate criminal framework, enforcement in practice faces significant socio-legal barriers, summarized in Table 3. Land offices under ATR/BPN, as the front-line institution verifying documents and issuing electronic certificates, generally lack dedicated digital forensic capacity to detect manipulated scanned files or falsified metadata at the point of intake (Andari & Mujiburohman, 2023). The Indonesian National Police (POLRI), which holds investigative authority over criminal forgery, frequently encounters jurisdictional overlap with administrative channels, resulting in cases being

redirected between administrative complaint mechanisms and criminal investigation without clear coordination protocols.

The Notary/PPAT Supervisory Board (MPD/MPP) primarily imposes administrative sanctions and rarely refers cases for criminal prosecution even where negligence approaches complicity, reflecting a broader pattern in which professional self-regulation dilutes criminal accountability. Meanwhile, the Ombudsman of the Republic of Indonesia can review maladministration in public land services but possesses no binding authority to compel criminal referral. These structural gaps are compounded by limited digital literacy among affected communities, particularly in rural and peri-urban areas where land transactions are increasingly mediated by digital platforms but where victims of forgery often lack the technical means to detect manipulation until a dispute over competing certificates arises (Bedner et al., 2012). This pattern echoes broader findings that underrepresented and lower-capacity land right holders bear a disproportionate share of the risks generated by formalization and titling reforms (Zevenbergen et al., 2013; Ho & Spoor, 2006).

The link between weak institutional coordination and low enforcement effectiveness is not merely correlational but traceable through the case-handling pathway itself. Because ATR/BPN, POLRI, the Notary/PPAT Supervisory Board, and the Ombudsman each hold only a partial mandate—verification, investigation, professional discipline, and maladministration review, respectively—a forgery case that surfaces at one institution frequently requires referral to another before criminal liability can be established. In the absence of a binding inter-agency coordination protocol, that referral step is where cases stall: ATR/BPN has no authority to compel POLRI to open an investigation, POLRI's caseload and evidentiary requirements give administrative-looking complaints low investigative priority, and the Supervisory Board's incentive to protect professional reputation further reduces the rate at which negligence findings are escalated to criminal referral. Each additional institutional handoff therefore functions as a distinct point of attrition, so that the fragmentation described above translates directly into fewer cases reaching prosecution, rather than merely coexisting with low enforcement rates as a separate phenomenon.

Table 3. Comparative Institutional Roles in Handling Land Document Forgery Cases

Institution	Formal Role	Key Limitation
ATR/BPN (Land Office)	Verifies documents and issues electronic certificates; handles administrative complaints	Limited forensic-digital capacity to detect manipulated files at intake
Indonesian National Police (POLRI)	Investigates criminal forgery under the Criminal Code and sectoral laws	Overlapping jurisdiction with administrative channels; slow inter-agency data sharing
Notary/PPAT Supervisory Board (MPD/MPP)	Supervises professional conduct of notaries and PPAT	Sanctions are largely administrative and rarely trigger criminal referral
Ombudsman RI	Reviews maladministration in public land services	No binding enforcement power over criminal matters

Source: Author's compilation based on institutional mandates (2024)

CONCLUSION

This study finds that Indonesia's electronic land registration system has redistributed, rather than eliminated, document forgery risk across four technical vulnerability points, and that criminal liability for such forgery remains fragmented across three tiers of actors due to overlapping institutional jurisdiction and the largely administrative orientation of professional

oversight bodies. The novelty of this study lies in integrating a stage-by-stage technical vulnerability map with a tiered doctrinal analysis of criminal liability-benchmarked against comparative e-land administration experience and corporate criminal responsibility theory-showing concretely where legal accountability and technical safeguards fail to align. The principal implication is that criminal law adaptation has not kept pace with the technical realities of e-government land administration, with direct consequences for legal certainty in land ownership and for how corporate/platform liability can practically be proven.

These implications point to a shared underlying need: statutory harmonization between the Criminal Code and electronic-certificate regulations, matched by dedicated digital-forensic capacity and clearer corporate liability standards, so that the promise of digital transformation in land administration is matched by a commensurate strengthening of legal accountability; the detailed institutional measures needed to achieve this are set out in the Result and Discussion section above and are not repeated here.

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