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Legal Challenges of Electronic Land Certificates as Credit Collateral: Aligning Land Digitalization and Consumer Protection in Indonesia

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Abstract

The research is focussed on the influence of digitalization on land matters in relation to consumer protection in banking credit services. It focuses on the use of an electronic land certificate as collateral for credit. Employing the normative juridical method with a Human Rights-Based Approach, this paper has investigated to what extent the digitalization of land policies and banking regulations are aligned in order to protect citizens' rights in an economic sense. The outcome shows that land digitalization improves administrative efficiency in accelerating processes related to credit and also increases transparency in public administration. Registration and execution of mortgage rights may be executed online nowadays, reducing the average time of processing from seven to three days and cutting document forgery by more than 60%. However, issues yet to be overcome include contradictory regulations between Mortgage Law and Government Regulation No. 18/2021, a gap between institutional and community digital literacy, and uncertainty over the protection of personal data relating to debtors. In addressing these challenges, the study suggests harmonization of regulations across the land administration, banking, and personal data protection sectors, strengthening the digital competency of human resources in land and banking institutions, implementing standards of national cybersecurity, and establishing a digital ombudsman to ensure timely and fair dispute resolution. These measures need to be taken so that digitalization of land affairs can genuinely underpin legal certainty, consumer protection and legal certainty in the era of Indonesia's digital economy.

Introduction

Digital technology development has become a significant stimulant in modifying public and financial services in this era of globalization and the Fourth Industrial Revolution. In the agrarian and land sector, which long relies on physical documents, manual bureaucracies, and time-consuming administrative systems, digital transformation poses a vast opportunity to increase efficiency, transparency, and legal certainty[1]. The Ministry of Agrarian Affairs and Spatial Planning/National Land Agency has implemented Electronic Mortgage Rights and Electronic Land Certificates (el-Certificate) in Indonesia. This initiative also transforms Standard Operating Procedures (SOPs) traditionally used in land offices. The same transformation is reflected in institutional policies of the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN) through the implementation of Electronic Mortgage Rights and Electronic Land Certificates (el-Certificates) in Indonesia. This effort not only modernizes the system of land administration but also influences the banking credit sector directly, whereby land rights represent the main forms of collateral[2]. Moreover, land digitalization supports the national agendas on the development of the digital economy and the Ease of Doing Business, which is strengthened by the Presidential Regulation No. 95 of 2018 regarding Electronic-Based Government System and Law No. 11 of 2008 on Electronic Information and Transactions (UU ITE).

Prior to the introduction of digital land services, Indonesia's land administration system was based on physical documentation. Conventional printing of land certificates, manual entry into the land books, and physical archives were highly vulnerable to damage or loss due to fire, humidity, or natural disasters[3]. These conditions have often led to delayed services, duplicate certificates, lost or damaged documents, and bureaucratic inefficiency, negatively affecting both citizens and the private sector[4]. Furthermore, under the negative publication system applied in Indonesian land registration, a land certificate does not automatically guarantee absolute ownership free from third-party claims, thus increasing risks for both creditors and debtors in using land certificates as collateral in banking transactions[5][6].

By early 2022, an estimated 101.1 million land parcels across the nation were registered (representing about 80.2% of the estimated total of about 126 million), out of which some 85 million (67.5%) were certified. These figures indicate a considerable backlog in land

[1] Trias Aditya et al., "Title Validation and Collaborative Mapping to Accelerate Quality Assurance of Land Registration," *Land Use Policy* 109 (2021): 105689, https://doi.org/https://doi.org/10.1016/j.landusepol.2021.105689.
[2] Andi Tira and Abdul Karim, "Electronic Certificate As a Means of Legal Protection of Land Rights Holders," *Russian Law Journal* XI, no. 5 (2023): 2753.
[3] Walter Timo de Vries, Claudia Lindner, and Walter Dachaga, "Assessing Perceptions of Digitalization of Land Administration and Land Management BT - Advances in Geoinformation Sciences," ed. Alias Abdul-Rahman et al. (Cham: Springer Nature Switzerland, 2025), 272–82.
[4] Elisa Novianti, "Legal Strength of Electronic Certificates in Land Sale and Purchase Agreements in Indonesia," *JIHAD : Jurnal Ilmu Hukum Dan Administrasi* 7, no. 2 (2025): 443–48, https://doi.org/10.58258/jihad.v7i2.8698.
[5] Heribertus Richard Chascarino et al., "Legal Certainty of Electronic Land Tittle Certificates," *JOSS: Journal of Social Science* 3, no. 6 (2024): 1264–82, https://joss.al-makkipublisher.com/index.php/js.
[6] Damianus Krismantoro, "The Urgency of Electronic Land Certificates in the Land Registration Legal System in Indonesia," *Journal of Law and Sustainable Development* 11, no. 10 (2023): e1808, https://doi.org/10.55908/sdgs.v11i10.1808.

registration and certification[7]. To improve this state of affairs, the ATR/BPN launched a digital transformation roadmap for 2020-2025 that aimed at increasing the tempo of electronic registration, mapping, and certification, with added improvements to services. Application of the policy framework has included the adoption of electronic land services, the replacement of physical certificates with digital format certificates, the simplification of SOPs by the use of information technology, and increased integration of data into the national electronic system. Applications such as *Sentuh Tanahku* have been developed to allow for digital verification and online land services[8].

Land digitalization is essential from a banking perspective, whereby almost 70% of the national credit portfolio depends on land as collateral. E-HT and electronic certificates facilitate faster and more secure online registration, transfer, and cancellation of mortgage rights, reducing the potential for forgery of certificates at up to IDR 10 billion losses in Cirebon in 2024. The National Electronic Certificate Program was launched in 2023 by President Joko Widodo with the ambitious target of 120 million digital certificates out of a total 126 million plots of land by 2025, underlining the high commitment of the government to pursue efficiency and transparency in land governance[9]. Yet, such a transition also requires increased consumer protection. New risks opened by digital systems relate to debtor rights, data security, and legal certainty in conducting collateral verification and enforcement.

Low digital literacy, uneven infrastructure development, and poor regulatory harmonization are significant implementation barriers for land digitalization in Indonesia. At the 2023 National Digital Literacy Index, the score is only 3.65 out of 5; therefore, electronic land systems are not well understood by the public or government officials. A study by Permadi & Herlindah[10] showed that even though ATR/BPN Regulation No. 1 of 2021 has been issued, there is still legal uncertainty. Similarly, from the infrastructural point of view, data from Statistics Indonesia in 2022 showed that only 62.9% of villages enjoyed stable internet access, while regional land offices were highly technologically fragmented. Indonesia also scored 63.64 in the NCSI ranking in the year 2023, indicating vulnerabilities on cyber resilience. More importantly, ATR/BPN, banks, and Land Deed Official (Pejabat Pembuat Akta Tanah – PPAT) experience suboptimal coordination due to the interoperability of systems and unclear procedures for binding mortgages, sanctions for document forgery, and electronic executions. On consumer protection aspects, data errors, cyberattacks with a lack of clear redress mechanisms require stronger mitigation of risks, improved information transparency, and increased digital literacy for using e-certificates and e-mortgages as collateral to be safe and reliable.

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[7] Widia Safitri, Diyan Isnaeni, and Misranto Misranto, "Legal Analysis of Land Certification Policy from the Perspective of Legal Certainty of Land Rights," *Journal La Sociale* 6, no. 6 (2025): 1695–1704, https://doi.org/10.37899/journal-la-sociale.v6i6.2476.
[8] Damianus Krismantoro, "Application of Electronic Certificates as a Form of Legal Protection & Land Tenure Hak," *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)* 5, no. 3 (2022): 28657–65, https://www.bircu-journal.com/index.php/birci/article/view/6975.
[9] Secretariat RI, "President Jokowi Launches E-Land Certificate," Cabinet Secretariat of The Republic of Indonesia, 2023.
[10] Iwan Permadi and Herlindah, "Electronic Title Certificate as Legal Evidence: The Land Registration System and the Quest for Legal Certainty in Indonesia," *Digital Evidence and Electronic Signature Law Review* 20 (2023): 47–61.

Research A study Yanti & Budiono[11] shows that, even though there are policies on digitalization, public trust is still low and technological disparities, especially in inaccessible areas, prevail. The study further points out that the admissibility of electronic certificates as evidence in courts is usually objected to on the ground that most judges, advocates, and citizens do not fully understand the validity of an electronic document. The situation above proves that technological transformation does not necessarily match social and institutional preparedness[12]. This means that in the banking industry, which relies highly on land collateral, the uncertainty over electronic documentation may raise the risk of non-performing loans[13]. For example, if the land collateralized under an electronic certificate is disputed because of double data entry or a clerical error in its verification, both banks and debtors stand to lose. For instance, in 2023, the ATR/BPN office in Bekasi recorded a case where two electronic certificates were issued for the same land parcel (NIB) due to a data migration error from the manual registry, causing a dispute between a bank creditor and a private buyer. Similarly, verification failures in the electronic land book (BT-el) in several regional offices have resulted in outdated encumbrance records being presented as active collateral. According to the Agrarian Reform Consortium (KPA), agrarian conflicts in Indonesia increased 21% in 2024 to 295 cases, with 1.1 million hectares of land having overlapping ownership. These facts reveal that even registered land can be subject to conflict, which impacts financial institutions that rely on land as collateral.

Therefore, this study will comprehensively assess the impact of land digitalization, especially Electronic Mortgage Rights and the implementation of electronic certificates on consumer protection within the scope of banking credit services. Some dimensions to be analyzed include integration between the digital process of land with the banking system in the process of binding, verification, and mortgage discharge, readiness of institutions and infrastructure in ATR/BPN and within the financial sector, conditions of public and institutional digital literacy, the security and authentication of electronic documents, and the legal framework and mechanism of consumer protection. Effectively, land digitization as the basis for Indonesia's digital economy relies on the robustness of consumer protection and the reliability of the electronic system. If rights and security regarding debtors' data are not guaranteed, it risks further increasing inequality, weakening the consumers' bargaining position, and creating new vulnerabilities in credit and cyber risk management.

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[11] Erlinda Risma Yanti and Arief Budiono, "Electronic Land Certificate for Property Security in Indonesia," *Proceeding International Conference Restructuring and Transforming Law* 3, no. 2 (2025): 763–88, https://proceedings.ums.ac.id/icrtlaw/article/view/5480/4766.

[12] Markus Goldstein et al., "Formalization without Certification? Experimental Evidence on Property Rights and Investment," *Journal of Development Economics* 132 (2018): 57–74, https://doi.org/https://doi.org/10.1016/j.jdeveco.2017.12.008.

[13] Phillip Dangaiso et al., "Examining the Interplay of Internet Banking Service Quality, e-Satisfaction, e-Word of Mouth and e-Retention: A Post Pandemic Customer Perspective," *Cogent Social Sciences* 10, no. 1 (2024), https://doi.org/10.1080/23311886.2023.2296590.

Problem Statement

Indonesia's rapid digital transformation of land administration-which includes the implementation of Electronic Mortgage Rights and Electronic Land Certificates-also comes with great opportunities but at the same time, a host of complex challenges to consumer protection in banking credit services. Even while digitalization enhances efficiency, transparency, and data access, it exposes many legal, technical, and human vulnerabilities on issues such as inconsistency between the Mortgage Law (Undang-Undang Hak Tanggungan – UUHT) and Government Regulation No. 18 of 2021, low levels of digital literacy, interoperability between ATR/BPN and banking systems, and the ever-present threat of breaches to personal data. These will compromise the electronic collaterals' security and legal certainty and may negate the rights of the debtors, promoting disputes or financial losses. This paper thus investigates a critical problem: a disconnection in how policies of digital land administration and frameworks of consumer protection are aligned may prevent the establishment of a safe, fair, and trustworthy digital credit service ecosystem in Indonesia's developing digital economy.

Methods

This paper applies a normative juridical method within the analytical framework of human rights. Primary legal materials were selected based on their direct regulatory relevance to electronic land administration and banking credit services. The analysis employs content analysis to identify normative gaps and regulatory inconsistencies. The human rights framework is operationalized by mapping state obligations—to respect, protect, and fulfill—against three specific rights: the right to information (Article 4 of Law No. 8/1999), the right to personal data protection (Law No. 27/2022), and the right to property and legal certainty (Mortgage Law and Government Regulation No. 18/2021). Legal materials involved consist of Law No. 8 of 1999 on Consumer Protection, Law No. 11 of 2008 on Electronic Information and Transactions (ITE Law), Law No. 4 of 1996 on Mortgage Rights, and Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency (Permen ATR/BPN) No. 3 of 2023 on Electronic Certificates. As supporting data, this research uses secondary legal materials such as academic literature, legal commentaries, policy papers, and relevant jurisprudence to strengthen the legal analysis. The data are analyzed qualitatively, focusing on the relationship between digitalization policies, consumer rights, and the state's obligation to protect citizens from economic and legal uncertainties arising from the digital transformation of land and banking services.

Digital Land Transformation and Its Legal Basis

The digitalization of land administration in Indonesia through the implementation of Electronic Mortgage Rights and Electronic Land Certificates is more than a shift from paper-based records to digital formats. It impacts the way property rights are recognized and exercised, how data is governed, and collaterals executed. Further, it requires legal certainty along several dimensions: land law, electronic evidence, personal data protection, digital public administration, and prudential banking. Although it has been relatively wide-ranging, the complete legal framework has only been partly harmonized. First, at the highest legal level, Law No. 4 of 1996 on Mortgage Rights confirmed that the status of mortgage certificates is preferential and executorial. At the same level, Law No. 11 of 2008 on Electronic Information and Transactions (UU ITE) defines that electronic documents and digital signatures are authentic evidence, provided those criteria meet the requirement for integrity, completeness, and accessibility. In the digital governance sphere, the architecture, service mechanism, and interoperability standards across agencies are defined by Presidential Regulation No. 95 of 2018 on the Electronic-Based Government System. From a consumer protection perspective, these interoperability standards are critical because gaps in system integration directly expose debtors to risks of inconsistent data, unverified collateral versions, and lack of real-time access to their own land records. More than that, the Law No. 27 of 2022 on Personal Data Protection (PDP Law) dictates the principle of privacy-by-design, processing of data based on lawfulness, and cybersecurity incident management. Within the sectoral framework, land registration procedures (including electronic mechanisms) are ruled by Government Regulation No. 18/2021, while Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency No. 5 of 2020 concerning Electronic Land Registration and No. 3 of 2023 concerning Electronic Certificates detail the digital level of these land services.

These legal documents, publicly available through the state legal information platforms like JDIH BPK and peraturan.go.id, constitute the normative basis for the development of institutional SOPs and internal compliance systems within financial institutions. From the policy perspective, the Electronic-Based Government System framework puts an emphasis on interoperability throughout the administrative chain, meaning that agencies shall communicate via compatible formats, standard protocols, and standardized security controls. International experiences suggest that successful electronic land registration systems are based on three crucial building blocks: harmonization of legal norms related to guarantees, electronic evidence, and enforcement; application of security-by-design principles; and effective redress mechanisms. Recent literature reviews, including those in Land Use Policy, have underscored data standardization, three-dimensional cadastral structures, and good interoperability governance as important preconditions for reducing transaction costs and disputes. Indonesia has only recently initiated a shift toward 3D cadastre and Digital Twin initiatives in a process developed in cooperation with the World Bank and the International Federation of Surveyors - FIG. Further refinements will be needed in the conceptualization of spatial evidence, particularly with respect to vertical and horizontal identification of property boundaries within Electronic Land Book (Buku Tanah Elektronik – BT-el).[14][15]

Table 1. Legal Instruments and Substances Governing Land Digitalization and Consumer Protection

Instrument	Main Substance	Information
Law No. 4 of 1996 on Mortgage Rights on Land	Regulation on the establishment and	Serves as the principal legal foundation for securing collateral

[14] Salah El Haddati and Mina El Maallam, "Application of Blockchain in the Continuous Audit of the Integrity of the Electronic Land Register BT - Advances in Intelligent Systems and Digital Applications," ed. Noreddine Gherabi, Janusz Kacprzyk, and Sara Arezki (Cham: Springer Nature Switzerland, 2025), 220–29.

[15] Atul Lal Shrivastava, Rajendra Kumar Dwivedi, and Shiva Prakash, "Revolutionizing Security in Land Management System with Integration of Efficient Consensus and Smart Contract Enabled Blockchain in Land Registry Procedure," *SN Computer Science* 6, no. 1 (2025): 76, https://doi.org/10.1007/s42979-024-03436-6.

and Objects Related to Land (UUHT)	execution of Mortgage Rights; granting preferential rights to creditors	in the form of land rights. In the digital context, explicit recognition of the moment when Mortgage Rights are created within electronic systems is essential to ensure legal certainty and maintain creditors' preferential position under the Electronic Mortgage Rights framework.
Law No. 11 of 2008 on Electronic Information and Transactions (ITE Law)	Legal validity of electronic documents and electronic signatures	Provides the legal basis for electronic instruments such as Electronic Mortgage Certificate (Sertipikat Hak Tanggungan Elektronik – SHT-el) and Electronic Land Certificates (El-Certificates). This law guarantees that electronic data and digital signatures hold the same legal force as physical documents and promotes the development of a trusted viewer system for verifying document authenticity.
Law No. 27 of 2022 on Personal Data Protection (PDP Law)	Principles of privacy by design, lawful basis, and data security	Establishes the obligation to safeguard personal and property-related data of debtors, including mandatory data breach notifications, multi-layered security mechanisms, and legal accountability for data management entities such as ATR/BPN and financial institutions.
Law No. 8 of 1999 on Consumer Protection (UU PK)	Rights to information, security, and complaint mechanisms (redress)	Provides the normative foundation for consumer protection in digital-based credit transactions. This law ensures the right to accurate information, the protection of transaction data, and access to dispute resolution in cases of system failure or misuse of electronic collateral data.
Presidential Regulation No. 95 of 2018 on the Electronic-Based Government System	Electronic-Based Government System interoperability, architecture, and governance	Establishes interoperability standards among government institutions, including the integration of systems between ATR/BPN, banks, PPAT, and state auction bodies. It also promotes the "one data, one policy" principle,

		audit trails, and measurable security standards in electronic public service delivery.
Government Regulation No. 18 of 2021 on Management Rights, Land Rights, Apartment Units, and Land Registration	Regulations on land registration and Electronic Mortgage Rights mechanisms	Defines the procedures and service deadlines for registering Electronic Mortgage Rights, limited to a maximum of seven days after document verification, and formalizes the workflow for online land registration within the national electronic land system.
Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 5 of 2020 on Electronically Integrated Mortgage Rights Services	Integrated Electronic Mortgage Rights services	Establishes standard operating procedures (SOPs) for the registration, modification, transfer, re-assignment, and cancellation of mortgage rights through electronic systems, and delineates the roles of creditors, Land Deed Officials (PPAT), and Land Offices in the digital service process.
Regulation of the Minister of Agrarian Affairs and Spatial Planning/Head of the National Land Agency No. 3 of 2023 on the Issuance of Electronic Documents in Land Registration Activities	Electronic Land Certificates, Electronic Land Books (BT-el), and digital document archives	Replaces ATR/BPN Regulation No. 1 of 2021 and introduces a versioning and audit trail system for electronic certificates. This regulation governs the issuance, storage, and updating of electronic land documents, ensuring data integration within the national land information system.

Source: Data processed by the author

The above-mentioned eight legal instruments together form a sound basis for the digital transformation of land administration and consumer protection in the banking credit sector. Law No. 4 of 1996 on Mortgage Rights (UUHT) is the main legal instrument for using land as collateral but still needs further harmonization with Government Regulation No. 18 of 2021 to stipulate the exact "moment of creation" of electronic mortgage rights and guarantee executorial legal certainty identical to physical ones. Law No. 11 of 2008 on Electronic Information and Transactions (ITE Law) and Law No. 27 of 2022 on Personal Data Protection (PDP Law) secure electronic documents' validity and debtors' personal data confidentiality in response to public anxiety about leakage and digital manipulation. Law No. 8 of 1999 on Consumer Protection consolidates the debtor's legal position to ensure that their rights to information and fair treatment are protected in digital credit transactions. On the other hand, Presidential Regulation No. 95 of 2018 on Electronic-Based Government System dictates the structural framework of inter-agency integration through national electronic system interoperability. Finally, the technical and operational procedures for implementing Electronic Mortgage Rights and electronic certificates were regulated by the Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency No. 5 of 2020 and No. 3 of 2023, respectively.

For this reason, the overall success in the land and banking sectors shall be determined by how well vertical synchronisation among legislative instruments has taken place (laws, government regulations, and ministerial regulations) and horizontal coordination among institutions such as ATR/BPN, the Financial Services Authority, and the banking industry can take place, ensuring that technological efficiency keeps pace with consumer protection and legal certainty at the national level.

Intersection of Digital Land Administration and Consumer Rights

Consumers or debtors at the intersection of digital land administration and banking credit services simultaneously possess three categories of data: (1) personal data (name, National Identity Number, address), (2) object data (Plot Identification Number (Nomor Identifikasi Bidang – NIB), area, boundaries, and ownership status), and (3) transaction data (APHT, ruya, and cession/blocking records). In the e-HT and e-certificate systems, these datasets flow through digital interfaces in the form of a partner application, API, and web service interconnected in the Electronic-Based Government System [16][17]. It means that consumer protection is not only a question of a transparency requirement within a credit agreement but a comprehensive end-to-end protection architecture comprising the right to information, the right to data security, the right to redress, and the right to legal certainty[18]. Law No. 8 of 1999 guarantees accurate information, a sense of security, and mechanisms for complaint resolution, while Law No. 27 of 2022 on Personal Data Protection Law (PDP Law) establishes legal boundaries for data processing, access control, and incident response. Furthermore, the ITE Law guarantees the admissibility of electronic evidence in dispute resolution. On the land administration side, the Mortgage Law, Government Regulation No. 18 of 2021, and Ministerial Regulations No. 5 of 2020 and No. 3 of 2023 establish the operational logics of the e-HT and the e-certificate system, guaranteeing that any legal event will be recorded in the BT-el. The four clusters of risk below are the most influential ones in shaping the position of consumers:

1. Data Security, Transparency, and Information Asymmetry in Digital Mortgage Transactions

Identity and property data, including coordinates and spatial layouts, become highly valuable. All obligations under the Personal Data Protection Law (PDP Law) need to be properly implemented: lawful basis for data processing, purpose limitation, data minimization, role-based access control, multi-factor authentication, encryption in transmission and storage, vendor risk management, and cross-agency incident notification between ATR/BPN, Financial Services Authority, and Kominfo. It only takes a systemic risk if one of those points in the chain is weak, like the PPAT endpoint or a third-party integration. Because Electronic-Based Government System standards and

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[16] Fatemeh Jahani Chehrehbargh et al., "Current Challenges and Strategic Directions for Land Administration System Modernisation in Indonesia," *Journal of Spatial Science* 69, no. 4 (2024): 1097–1129, https://doi.org/10.1080/14498596.2024.2360531.

[17] Akbar Ramadhan Nugroho, Surya Anoraga, and Fitria Esfandiari, "Guarantee of Protection of Electronic Land Certificates as Proof of Ownership of Land Rights," *Indonesia Law Reform Journal* 3, no. 2 (2023): 234–42, https://doi.org/10.22219/ilrej.v3i2.29197.

[18] Hae O Choi, "An Evolutionary Approach to Technology Innovation of Cadastre for Smart Land Management Policy," *Land*, vol. 9, no. 2 (2020):50 https://doi.org/10.3390/land9020050.

OJK's digital banking policy cover electronic transactions, IT cooperation, customer protection, and data privacy, these must be aligned with technical standards that ATR/BPN issues to avoid inconsistencies in cybersecurity governance.

The right to information under Law No. 8 of 1999, when implemented in a digital environment, requires a consumer-centric dashboard that is user-oriented, designed in clear and accessible language. Such a dashboard should reflect the most current version of electronic certificates, block records, event histories including mortgage and release registrations, and timestamped updates. This level of transparency protects debtors from staying unaware that the certificate held with a bank is obsolete or includes unsettled encumbrances. Research studies conducted in Indonesia's digital finance segment clearly indicate that literacy is strongly correlated with trust and adoption; inadequate literacy heightens the chances of transactional distortions like mis-selling or over-collateralization.

The financial sector has access, analytical capabilities, and expertise that the individual consumers lack, and this creates an inherent asymmetry. This asymmetry needs to be reduced by an obligation of disclosure of the identification and version of the certificate at the time of the collateral binding, access to trusted viewer to authorities and consumers for reviewing the read-only details of the certificate, and notifications automatically in case of any change in status like release, unblocking, or cession. In the absence of such mechanisms, consumers are faced with unequal bargaining power, leading to contractual injustice and a loss of confidence in the digital credit system.

2. Legal Certainty

Because the Mortgage Law and Government Regulation No. 18 of 2021 are ambiguous regarding the legal origin of mortgage rights, such ambiguity directly influences the determination of creditor preference. The legal consequence of this ambiguity is significant: if mortgage rights are deemed created at the moment the deed (APHT) is signed, but the electronic system only completes registration seven days later, there exists a window during which a third party could validly claim priority over the same asset. This renders the creditor's preferential right legally precarious, undermining both the enforceability of collateral and the debtor's protection against double pledging. Such a normative gap is not merely administrative—it constitutes a structural deficiency that erodes confidence in electronic mortgage instruments. It must be clear since when the creditor's rights will be binding against third parties. If the APHT is regarded as effective at the moment of its signing, then the electronic system has to guarantee the immediate entry into the BT-el as confirmation of the effect. Where the binding occurs only upon completion of the electronic service process under Government Regulation No. 18 of 2021, then detailed specifications are needed about time-stamping and priority rules. Several Indonesian legal studies highlighted these conflicting norms, together with the uncertain evidentiary weight of the electronic mortgage certificate, known as SHT-el. In this respect, a pressing need has been raised for normative harmonization and for proper, detailed regulation of the procedural aspects of digital execution.

To sharpen the analysis, it is important to distinguish three distinct risk categories: (1) risks borne by consumers/debtors, such as data breaches and lack of access to collateral status; (2) risks facing banks/creditors, including legal uncertainty over mortgage creation and collateral validity; and (3) systemic risks to government institutions, particularly regarding interoperability failures and regulatory non-compliance. This paper primarily focuses on consumer/debtor risks, while acknowledging that bank and institutional risks have indirect implications for consumer protection

Table 2. Consumer Risk Mapping and Mitigation Measures

Risk	Real Scenario	Impact on Consumers	Technical and Legal Control
Asset and identity data breaches	System endpoint infiltration resulting in leaked NIB or land plot data	Fraud, forgery, and targeted scams	End-to-end encryption, multi-factor authentication (MFA), role-based access control (RBAC), vendor due diligence, mandatory breach notification Personal Data Protection Law (PDP Law), and periodic cybersecurity audits
Outdated e-certificate version	Bank retains an outdated version while the landowner holds a newer one	Validity disputes and potential double pledging of collateral	Version disclosure requirements, trusted viewer access for certificate verification, and open event logs accessible to consumers
Ambiguity in the creation of Mortgage Rights (HT)	Divergent interpretations between Mortgage Law and Government Regulation No. 18 of 2021	Unclear priority of creditor rights and execution disputes	Legal harmonization through amendment or interpretation of Mortgage Law, establishment of time-stamp rules in BT-el, and detailed SOPs for Electronic Mortgage Rights execution
Low literacy and lack of transparency	Debtors are unaware of blocking, repayment, or cession procedures	Mis-selling and restricted access to credit services	Development of plain-language consumer dashboards, coordinated education programs by OJK, ATR/BPN, and banks, and in-application guidance features
Cyber vulnerabilities in third-party systems	Breach occurs in a partner institution connected to the network	Service disruption and systemic cybersecurity risks	Implementation of unified Electronic-Based Government System standards, compliance with Financial Services Authority Regulation digital service regulations on IT, electronic transactions, and privacy, and integration of shared Security Operations Centers (SOC) and Security Information and Event Management (SIEM) systems

Source: Data processed by the author

Individual research on electronic land registration and e-cadastre systems reveals that in cases where legal and procedural synchronization, such as normative alignment and means of redress, is more or less ensured, diffusion rates are higher and dispute resolution costs are lower. In contrast, discrepancies between normative frameworks and technical frameworks tend to create new sources of techno-legal conflict. Research on Indonesia's e-Certificate and e-HT systems also identifies potential normative inconsistencies between Mortgage Law and the digital regulatory framework in respect to executorial validation of electronic mortgage rights. On the technical level, 3D cadastral system development and the Digital Twin Indonesia initiative represent the next stage of digital transformation for volumetric representation of land and spatial rights. These innovations call for the development of updated legal rules for spatial evidence in order to prevent ambiguity regarding collateral objects, especially those above or below ground level[19].

Consumer Protection Principles in Digital Credit Services

In the current context of digitalization of land-based credit securities, especially through the use of Electronic Mortgage Rights, or Electronic Certificates and Electronic Mortgage Rights, the consumer protection principles contained in Law No. 8 of 1999 on Consumer Protection, or UU PK, become increasingly vital. The debtors, in their capacity as credit consumers, interact with the banks and also with digital systems and electronic public services regarding land rights, data management, and access to services[20]. In this context, three fundamental rights must be ensured:

1. Right to Accurate and Accessible Information

Article 4 of the Consumer Protection Law stipulates that consumers have the right to be correctly, clearly, and honestly informed regarding the condition and safety of their collateral, especially land certificates. This includes, in the digital environment, information on the most current version of the electronic certificate; active blocking or mortgage records; document edition histories; and verification procedures available for both banks and debtors through the ATR/BPN system. The lack of transparency over such information makes consumers vulnerable to information asymmetry-that is, while the financial institutions have complete access to the data, debtors receive just the printed outputs without real-time exposure to event logs or blocking histories. Studies on consumer protection in digital financial ecosystems highlight that information literacy is a precondition of transactional fairness[21]. For example, when a debtor registers an e-HT on an electronic certificate that is replaced by a more current version without notification, the debtor's collateral position may weaken and the bank may face protracted and costly legal disputes.

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[19] Airin Rachmi Diany et al., "E-Land Registration System in Indonesia: Policy, Progress, and Challenges," *International Journal of Public Law and Policy* 10, no. 4 (January 1, 2024): 411–29, https://doi.org/10.1504/IJPLAP.2024.141713.
[20] Zaidah Nur Rosidah and Lego Karjoko, "Enhancing Consumer Protection in Electronic Transactions in Indonesia," *Sriwijaya Law Review* 9, no. 1 (2025): 194–207, https://doi.org/10.28946/slrev.Vol9.Iss1.3942.pp194-207.
[21] Muchammad Shidqon Prabowo and Dewi Sulistianingsih, "Reformulation of Consumer Protection Legal Policies in the Digital Business Era in Indonesia," *Diponegoro Law Review* 8, no. 1 (2023): 14–24, https://doi.org/10.14710/dilrev.8.1.2023.14-24.

The importance of accurate and accessible information becomes even more significant in the context of electronic public services, where consumers often rely entirely on digital interfaces to verify the legal status of their assets. Recent studies on personal data governance in the Asia-Pacific region emphasize that transparency is not limited to providing information, but also includes ensuring that information is understandable, accessible, and capable of supporting informed decision-making by citizens [22]. In the context of electronic land certificates, consumers should be able to access clear information regarding certificate status, encumbrances, transaction history, and verification procedures without excessive technical barriers. This approach is consistent with the broader objective of consumer empowerment, namely reducing information asymmetry between institutions that control digital systems and citizens who depend on those systems to protect their legal and economic interests[23]. Such transparency is particularly important when land certificates are used as credit collateral, where inaccurate or inaccessible information may expose consumers to financial and legal risks

Beyond transparency, the availability of information is closely connected to the broader objective of legal certainty in digital land administration. Recent studies on the digitalization of land certificates emphasize that the effectiveness of electronic certification systems depends not only on technological infrastructure but also on the availability of reliable and accessible information for rights holders. The implementation of electronic certificates creates opportunities for real-time verification, traceable document histories, and improved monitoring of ownership records, thereby reducing the risks associated with document manipulation and fraudulent land transactions[24]. Furthermore, transparent access to land information strengthens public trust in digital land services and supports efforts to prevent land mafia practices by limiting opportunities for unauthorized alterations, duplicate certificates, and hidden encumbrances[25]. Therefore, the right to accurate and accessible information should be regarded as a fundamental prerequisite for ensuring both consumer protection and legal certainty within digital credit transactions involving land collateral.

2. Right to Data Security

In digital land-credit transactions, a number of parties are involved: ATR/BPN, PPAT, and banks handle, store, and exchange data on persons and properties, including National Identity Number, parcel coordinates, land area, and the status of ownership. According to the Personal Data Protection Law (Law No. 27 of 2022), any processing of data must be based on the principle of lawful basis, minimization of data, privacy by design, and

[22] Heppy Endah Palupy, Ronald Nawing and Susi Susantijo, "Personal Data Protection Governance in the Asia Pacific Region: A Review of the Scope, Effectiveness, and Legal Challenges." *Volksgeist: Jurnal Ilmu Hukum Dan Konstitusi*, 9 no. 1 (2026): 197-225. https://doi.org/10.24090/volksgeist.v9i1.15362.

[23] Siti Mariyam, Adhi Putra Satria, Hariyanto, and Ahmad Masum, "Safeguarding Personal Data in Indonesian E-Commerce from a Constitutional Rights Perspective," *Jambe Law Journal* 8, no. 2 (2025): 683–711, https://doi.org/10.22437/x5q9y093.

[24] Iwan Permadi, Diah Pawestri Maharani, and Md Yazid Ahmad, "Legal Perspectives on Digitalising Land Certificates: Analyzing Synchronization and Harmonization in Indonesia's Job Creation Law," Jurisdictie: Jurnal Hukum dan Syariah 15, no. 2 (2024): 337–379, https://doi.org/10.18860/j.v15i2.28859.

[25] Shinta Pangesti and Debora Pasaribu, "Electronic Land Certificates to Prevent Land Mafia in Indonesia," *Administrative and Environmental Law Review* 6, no. 2 (2025): 133–144, https://doi.org/10.25041/aelr.v6i2.4419.

obligatory notification in case of breach. If at any point of integration there is a breach-an example could be a security breach in the data interface between banks and ATR/BPN-consumers are vulnerable to data leak and manipulative action regarding their ownership or forging documents. Legal gaps in protecting electronic banking customers show that Indonesia's legal framework for data protection is still fragmented and not integrated into a single structure[26]. For instance, electronic certificates or records of Electronic Mortgage Rights are stored in the system, but the bank's authentication process is only a password without two-factor authentication; this makes debtors vulnerable to phishing or fraudulent links that can change blocking or cession records.

Data security in electronic land administration should not be understood solely as a technical matter of cybersecurity, but also as a legal obligation to protect constitutional rights and maintain public trust in digital governance. Studies on personal data protection in Indonesia demonstrate that the increasing integration of government databases and digital platforms creates new vulnerabilities relating to unauthorized access, misuse of personal information, and institutional accountability[27]. These concerns become particularly relevant in electronic land certificate systems because land records contain not only personal identification data but also economically valuable information regarding ownership, location, and encumbrance status. Consequently, effective data protection requires a combination of technological safeguards, clear institutional responsibility, and accessible legal remedies for affected consumers[28]. Without these elements, security breaches may undermine public confidence in electronic land administration and reduce the willingness of citizens to participate in digital land services.

Another important dimension of data security concerns the integrity and authenticity of electronic land records throughout their lifecycle. As land administration increasingly relies on digital platforms, maintaining accurate, secure, and tamper-resistant records becomes essential for preserving public confidence in electronic land services. Studies on electronic land registration indicate that secure digital systems can reduce opportunities for document forgery and unauthorized modifications by creating verifiable audit trails and strengthening document authentication mechanisms[29]. At the same time, the effectiveness of these protections depends on the ability of institutions to ensure continuous monitoring, data integrity verification, and coordinated responses to cybersecurity threats[30]. Consequently, the protection of electronic land data should be viewed not only as a matter of information security but also as an essential component of

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[26] Sriono, Risdalina, Kusno, Indra Kumalasari M, and Hengki Syahyunan, "Uncovering Legal Gaps in Digital Banking: Customer Protection and Bank Accountability in Indonesia," *LITIGASI* 25, no. 2 (2024): 301–330, https://doi.org/10.23969/litigasi.v25i2.18538.
[27] Heppy Endah Palupy, Ronald Nawing and Susi Susantijo, "Personal Data Protection Governance in the Asia Pacific Region: A Review of the Scope, Effectiveness, and Legal Challenges."
[28] Siti Mariyam, Adhi Putra Satria, Hariyanto, and Ahmad Masum, "Safeguarding Personal Data in Indonesian E-Commerce from a Constitutional Rights Perspective".
[29] Iwan Permadi, Diah Pawestri Maharani, and Md Yazid Ahmad, "Legal Perspectives on Digitalising Land Certificates: Analyzing Synchronization and Harmonization in Indonesia's Job Creation Law".
[30] Rosmidah, Indriya Fathni, Supeno, and Yusuf Sani Abubakar, "Can Electronic Land Rights Registration Help Prevent Land from Mafia Practices?" Jambe Law Journal 7, no. 2 (2024): 539–558, https://doi.org/10.22437/home.v7i2.375

legal protection for consumers who rely on electronic certificates as evidence of ownership and collateral rights.

3. Right to Redress - Recovery and Dispute Resolution

Under Article 7(f) of the Consumer Protection Law, consumers have the right to compensation, replacement, or restitution in case of any failure or defect in the performance of services or products. Therefore, in case of system malfunction, incorrect versions of the certificate, or omission of blocking records, in digital collateral-based credit, debtors need to be accorded prompt, affordable, and effective redress mechanisms. However, from empirical research, the narrow definition of "consumer" and fragmented regulations between the Consumer Protection Law and the Electronic Information and Transactions Law show that redress in digital transactions is highly complicated[31]. For example, if there is an electronic block on a certificate and yet a debtor cannot find information on where to settle the issue, there needs to be an integrated mechanism to enable fair and efficient dispute resolution, such as a digital ombudsman channel, online mediation, or regulated electronic arbitration.

Failure to incorporate the three aforementioned rights into the digital land-credit system may result in violations of consumers' economic and legal entitlements, such as loss of the debtor's access to financing, uncertainty over the validity of collateral, and prolonged litigiousness burdening the credit rate and inhibiting public financial inclusion. To that end, consumer protection can no longer be an ancillary issue of credit agreements but an overall public service framework that encompasses data collection and document verification right from collateral binding, status modification, including blocking, release, or cession, to dispute resolution within the new ecosystem currently being shaped in land-collateral-based credit in Indonesia, with Electronic Land Certificates (e-Certificates) and Electronic Mortgage Rights. Law No. 8 of 1999 on Consumer Protection stipulates basic consumer rights, including the right to accurate, clear, and honest information; the right to a sense of security; and the right to compensation. In the context of digital credit transactions based on electronic land documentation, the rights mentioned above mean the following operational guarantees: the right of the consumer to be informed of the latest version of the electronic certificate used as collateral; the right to the protection of the integrity and confidentiality of the data; and the right to an effective redress mechanism in case of malfunctioning of systems, document inconsistency, or fraud[32].

In that regard, the rights granted under the Consumer Protection Law must be effectively implemented within the digital platforms and procedural frameworks of banks, PPAT, and ATR/BPN. The legal basis for the right to information and the evidentiary validity of electronic documents is clearly provided for in the Consumer Protection Law and the Electronic Information and Transactions Law, which both ensure consumer protection and certainty of evidence when disputes go to court for litigation or execution. For such provisions, the relevant law references can be further looked up through the official

[31] Bambang Sugeng Ariadi Subagyono, Mochamad Kevin Romadhona, Zahry Vandawati Chumaida, Bambang Suheryadi, and Noureldin Samy Elkhashab, "Can Indonesia's Laws Keep Up? Protecting Consumer Rights in Digital Transactions," Journal of Law and Legal Reform 5, no. 3 (2024): 869–890, https://doi.org/10.15294/jllr.v5i3.4202.
[32] Aditya et al., "Title Validation and Collaborative Mapping to Accelerate Quality Assurance of Land Registration."

repositories of JDIH BPK and JDIH Kominfo. Personal data protection will be a basic prerequisite for doing e-HT and e-Certificate services, whereby debtor and land object data, like NIB identifiers, spatial coordinates, and legal status, are transmitted over interconnected systems, including banks, PPAT, and ATR/BPN, which are all vulnerable at their integration points. Law No. 27 of 2022 on Personal Data Protection and Presidential Regulation No. 95 of 2018 on the Electronic-Based Government System mandate institutions to implement privacy-by-design principles, access control mechanisms, and incident notification procedures. In 2023, BSSN reported more than 16,000 digital data breaches in the public sector, which raises a red flag to seriously reinforce cybersecurity. On the other hand, the Financial Services Authority Regulation No. 22 of 2023 on Consumer and Community Protection in the Financial Services Sector, along with the OJK Digital Services Framework for Commercial Banks, introduces and increases obligations related to data protection and risk management within digital banking channels. The integration of the Personal Data Protection Law (PDP Law), and Financial Services Authority Regulation Digital will be of prime importance for the implementation of consistent standards in both land administration and banking systems with respect to identity and access management, encryption, multi-factor authentication, security information and event management (SIEM/SOC), and vendor risk control.

The third aspect, usually ignored by most, refers to digital literacy and interface transparency. According to the Consumer Protection Law, Article 4 stipulates that the right to information must be developed towards a plain-language, user-friendly consumer dashboard displaying the secured version status of the e-certificate, blocking record data, mortgage (HT), release (roya), or cession, accompanied by accurate registration timestamps and automatic notification if a new version is issued or if there are any changes to the collateral status. When this design is not inclusive, debtors in frontier, outermost, remote (3T) regions or with limited digital literacy may be trapped into a situation of information asymmetry, where financial institutions can access it but not consumers. From an academic standpoint on the digitization of public services and consumer protection in Indonesia, deficiencies in disclosure and consent management erode public trust and increase the risk of disputes. Best practices encourage the summaries of the consumers' rights and obligations to be re-issued through other communication channels, like SMS or email, for accessibility[33]. In the realm of financial policy, OJK has also issued guidelines and research on data protection in banking, which encourages customer education to be at the heart of the consent framework.

The fourth problem touches on the core of legal certainty: the difference in interpretation between the Mortgage Law, which stipulates that the creation of mortgage rights occurs upon the recording of the deed of mortgage in the land book, and Government Regulation No. 18 of 2021, which specifies that electronic services should be completed within seven days after verification of the documents. This has begged the question of when exactly a creditor's preference becomes binding upon third parties. In the implementation of Electronic Mortgage Rights, the timestamp of entry into the BT-el and the issuance of SHT-el need to be explicitly recognized as the moment of legal creation so that the order

[33] Chuanhao Tian, Yichen Luo, and Yu Teng, "Land Certification, Tenure Security and off-Farm Employment: Evidence from China," *Land Use Policy* 147 (2024): 107328, https://doi.org/https://doi.org/10.1016/j.landusepol.2024.107328.

of filing is clear and any window for double pledging during the interim period will not exist. Recent legal studies highlight that the need for harmonization of regulations and detailed digital execution procedures makes electronic documents enforceable in the auction process State Assets and Auction Service Office and parate executie. Such a legal framework is based on the integrated implementation of the ITE Law on electronic evidence, Government Regulation No. 18 of 2021 concerning electronic land services, the Regulation of the Minister of Agrarian Affairs and Spatial Planning/National Land Agency No. 5 of 2020 concerning Electronic Mortgage Rights, and Regulation No. 3 of 2023 concerning electronic certificates and electronic land books.

This will only be effective if the national level of cybersecurity is strong. According to the National Cyber Security Index, Indonesia scored only 38.96 in 2022, one of the lowest among the G20 members, but rose to 63.64 in 2023, placing it approximately 49th in the world. While the positive movement in rank is a good trend, a consistent baseline of controls across all government agencies, banks, and PPAT offices is still key. These findings emphasize the urgent need for security-by-design principles and coordinated incident response systems. Consumer protection cannot stand alone; it rests fundamentally on national cyber resilience and the technical compliance of each participating institution[34]. The principles of consumer protection in digital collateral-based credit should be implemented in a comprehensive manner. Firstly, the right to information through version disclosure and the provision of an appropriate consumer dashboard needs to be realized. Secondly, the right to data security should be guaranteed by applying standards from the Personal Data Protection Law (PDP Law), Electronic-Based Government System, and Financial Services Authority Regulation consistently beyond the internal banking policy range. Third, the right to redress is guaranteed by providing quick and affordable access to a digital ombudsman or other forms of alternative dispute resolution. Fourth, legal certainty is to be maintained so that the harmonization of Mortgage Law, Government Regulation No. 18/2021, and Ministerial Regulations No. 5/2020 and No. 3/2023 ensure that the establishment and performance of Electronic Mortgage Rights do not create a legal vacuum. A consistent implementation of these four pillars is crucial for technological efficiency to support, instead of compromise, Indonesian consumers' legal and economic security.

The human rights framework applied in this study identifies three specific rights affected by land digitalization: (1) the right to information, particularly debtors' right to access accurate and updated collateral data; (2) the right to personal data protection, encompassing privacy, security, and consent in data processing; and (3) the right to property and legal remedies, ensuring effective redress when digital systems fail. These rights are analyzed against the tripartite state obligations framework: the obligation to respect (refrain from actions that violate rights), to protect (prevent third-party violations), and to fulfill (create systems that realize these rights). Failure at any of these levels constitutes a human rights deficit in the digital governance of land administration.

[34] Ming Qin et al., "Impact of Land Registration and Certification on Land Rental by Chinese Farmers," *Land Use Policy* 99 (2020): 104875, https://doi.org/https://doi.org/10.1016/j.landusepol.2020.104875.

The Role of the State and Banks in Safeguarding Human Security

It is in this sense that the concept of human security extends the notion of protection beyond conventional consumer safeguards to citizens' economic and legal security in the face of increasingly complex digital risks[35]. In this respect, both state and banking institutions have interrelated mandates: the state's role is to oversee cross-sectoral legal architectures and ensure implementation and enforcement are effective, while banks are the main implementers who interact directly with the debtors[36].

The state, through institutions like the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN), the Ministry of Communication and Information Technology (Kominfo), the Financial Services Authority (OJK), and related agencies, needs to ensure that digitalization in the area of land administration and credit services runs within a consistent legal framework and cybersecurity standards. First, the unification of norms needs to end the legal uncertainty of the moment of creation for mortgage rights in electronic systems through the revision or authoritative interpretation of the Mortgage Law (UUHT) to stipulate BT-el timestamps as the moment of creation. Secondly, the Electronic-Based Government System architecture based on Presidential Regulation No. 95 of 2018 should be implemented in a harmonious integration design that connects ATR/BPN, PPAT, banks, and auction institutions with standard APIs, trusted viewers, event logs documented, and role-based access controls, with the proviso that no party applies discretionary security measures. Thirdly, digital literacy and infrastructure gaps need to be dealt with by the state since low levels of connectivity, devices, and personnel trained in regional land offices can result in unequal access and digital exclusion. Fourth, detailed implementation guidelines for electronic certificates and mortgage rights in KPKNL auctions are needed to ensure full electronic execution of the parate executie procedures, rather than falling back on physical execution. The above-mentioned responsibilities are embedded in current legislation and OJK regulations; what remains important is implementation in concert, consistently, as an integral part of the policy framework in force.

From the banking perspective, the mandate goes beyond the basic prudential requirements to include digital due diligence on electronic collateral and protection of data. Banks should establish verification procedures that cover confirmation of the version number of the e-certificate used as collateral (identification number, edition, hash, and QR code), blocking records, the status of the certificate regarding its registration, release, and cession, and an obligation to automatically notify debtors if there is an update of the version affecting their collateral[37]. Based on cybersecurity considerations, banks are called upon to introduce multi-factor authentication into all internal accounts related to land systems. Also, the encryption of data, when in transit or at rest, would be required along with running SIEM and SOC systems for monitoring

[35] McArthur Fundira et al., "Assessing Digital Competencies and AI Ethics Awareness among Customers in the Banking Sector," *African Journal of Science, Technology, Innovation and Development* 16, no. 6 (2024): 792–807, https://doi.org/10.1080/20421338.2024.2388619.
[36] Trias Aditya et al., "Participatory Land Administration in Indonesia: Quality and Usability Assessment," *Land*, 2020, https://doi.org/10.3390/land9030079.
[37] Van Dinh et al., "Determinants Affecting Digital Financial Consumer Protection: Evidence from 135 Countries," *The Journal of Economic Asymmetries* 27 (2023): e00301, https://doi.org/https://doi.org/10.1016/j.jeca.2023.e00301.

access anomalies and implementing vendor risk management associated with the PPAT and government service integration[38]. This would enable consumers to view the status of their electronic collateral through a digital dashboard or status interface, thus alleviating the information asymmetry between consumers and banks that has been prevalent in the past[39]. Indeed, the OJK strengthened its regulatory framework related to consumer protection and digital banking services. Recent policy analysis of Bank Indonesia and OJK, particularly related to consent management and privacy governance, is recognized as core elements of digital credit services.

Human security also necessitates the implementation of an effective digital dispute resolution mechanism, such as an ombudsman or online ADR channel, supported by a clear SLA for approximately 30 to 60 days. It needs to be integrated into ATR/BPN for event log corrections and BT-el status updates and integrated with OJK for financial service remediation. Should a cyber incident occur, such as a data breach targeting a PPAT endpoint or a credential compromise of a banking account, the cross-authority notification protocol should kick in pursuant to Personal Data Protection Law (PDP Law) and guidelines by OJK. The process may include containment measures, root-cause analysis, and proportional compensation for affected consumers, stressed[40]. Indeed, improvement in Indonesia's NCSI from 38.96 in 2022 to 63.64 in 2023 is expected-but it must not give a false sense of security because one single point of vulnerability might defeat the integrity of the whole system. By positioning the state as the systemic orchestrator and banks as accountable implementers, the transformation of land in the digital domain will reinforce the citizens' legal and economic security, not weaken it[41].

Recommendations on Policy

This integrated policy framework supports the digital transformation of land administration through regulatory harmonization, consistent security standards, effective complaint mechanisms, and inclusive services to improve efficiency and maintain consumer protection and human security.

To ensure the practicality and sequencing of these recommendations, they are organized into three implementation horizons. In the short term (0–1 year), priority should be given to strengthening public information campaigns regarding electronic certificate procedures, issuing official regulatory interpretations that clarify the legal moment of HT-el creation, and mandating debtor notifications whenever changes occur in collateral status. In the medium term (1–3 years), efforts should focus on establishing national cybersecurity protocols, including multi-factor authentication (MFA), encryption, and Security Information and Event Management/Security Operations Center (SIEM/SOC) standards applicable to all ATR/BPN and banking integrations. During this phase,

[38] Tilahun Habtamu Adere et al., "The Impact of Land Certification and Risk Preferences on Investment in Soil and Water Conservation: Evidence from Southern Ethiopia," *Land Use Policy* 123 (2022): 106406, https://doi.org/https://doi.org/10.1016/j.landusepol.2022.106406.
[39] Kusmiarto Kusmiarto et al., "Digital Transformation of Land Services in Indonesia: A Readiness Assessment," *Land*, 2021, https://doi.org/10.3390/land10020120.
[40] Elza Syarief, "Electronic Land Certificates: Its Goals and Challenges," *Research Horizon* 1, no. 4 (2021): 120–25, https://doi.org/10.54518/rh.1.4.2021.120-125.
[41] Yudha Purbawa et al., "Public Acceptance of Electronic Land Certificate," in *ICoSPACS 2022* (Atlantis Press SARL, 2024), 3–14, https://doi.org/10.2991/978-2-38476-106-7_2.

authorities should also develop and pilot a debtor dashboard with plain-language interfaces and establish inter-agency breach notification procedures to enhance transparency and accountability. In the long term (3–5 years), the objective should be to achieve full Electronic-Based Government System (SPBE) integration among ATR/BPN, banks, PPAT, and KPKNL. Legislative reforms should also be pursued by amending the Mortgage Law to explicitly recognize BT-el timestamps as the legal moment of mortgage creation, while the proposed Credit-Collateral Digital Ombudsman should be institutionalized as a permanent mechanism for dispute resolution and oversight within the digital credit ecosystem

Table 3. Integrated Consumer Protection Policy Matrix in Electronic Mortgage Rights (HT-el) and Electronic Certificates

Policy Focus	Core Recommendations	Main Executor	Regulatory References and Literature	Success Indicators
Certainty of Electronic Mortgage Rights Creation and Execution	Establish the BT-el timestamp (recording and transaction ID) as the legal moment of creation of mortgage rights. Ensure that the Electronic Mortgage Certificate (SHT-el) holds the same executorial authority as the physical certificate in state auctions, supported by an official viewer and digital evidence procedures.	DPR, Ministry of Law and Human Rights (Kemenkumham), ATR/BPN (normative); DJKN/KPKNL (execution)	Mortgage Law (UUHT), Government Regulation No. 18 of 2021, Electronic Information and Transactions Law (ITE), Ministerial Regulations No. 5 of 2020 and No. 3 of 2023; validity studies on SHT-el.	State auctions recognize SHT-el; reduction in disputes over “moment of creation”; shorter execution turnaround time.
Interoperability and Electronic-Based Government System	Integrate ATR/BPN, banks, PPAT, and auction institutions through standardized APIs, trusted viewers, and audit trails. Ensure that changes to e-certificate versions can be	Ministry of Administrative and Bureaucratic Reform (Electronic-Based Government System), ATR/BPN, OJK, Banks, PPAT	Presidential Regulation No. 95 of 2018 on Electronic-Based Government System; OJK guidelines on digital services.	Availability of secure open APIs; interoperable audit trails; compliance with uptime and SLA standards.

	verified across institutions.			
Data Security and Incident Response	Implement national standards for cybersecurity including MFA, encryption, RBAC, SIEM/SOC monitoring, penetration testing, and vendor risk management. Enforce breach notification protocols across authorities and to consumers.	ATR/BPN, OJK, Kominfo/KPPDP, Banks	Personal Data Protection Law (PDP), OJK Regulation No. 22 of 2023, OJK Circular on Data Confidentiality, Bank Indonesia research.	Fewer than one incident per 10,000 transactions; breach notifications issued within 72 hours; annual cybersecurity audit conducted.
Transparency and Consumer Literacy	Develop debtor dashboards that display Electronic Mortgage Rights status, e-certificate version, blocking, release (roya), and cession records, including timestamps, in plain language with access through alternative channels such as SMS or email.	OJK (disclosure standards), Banks, ATR/BPN	Consumer Protection Law (PK Law), OJK Regulation No. 22 of 2023, best practices in digital consumer disclosure.	Over 90 percent of debtors access the dashboard; at least 70 percent show comprehension in surveys; decline in complaints related to status unawareness.
Redress and Digital Ombudsman	Establish a Credit-Collateral Digital Ombudsman Unit offering online mediation and electronic arbitration, with a 60-day SLA. Allow temporary suspension of execution during version or validity disputes.	Consumer Protection Institutions (LPKSM), Ombudsman, ATR/BPN, OJK, DJKN	Consumer Protection Law (PK Law), ITE Law, Government Regulation No. 18 of 2021 (service flow), electronic ADR practices.	Average resolution time under 60 days; satisfaction rate above 80 percent; reduction in repeated disputes.
3T Inclusiveness and	Provide service kiosks and help desks in land offices	ATR/BPN, Banks, Local Governments	Presidential Regulation No. 95 of	Services operational in over 90

Assisted Services	and banks, enable USSD/SMS status checking, offer PPAT and civil service (ASN) training, and maintain offline service fallback during disruptions.		2018 on Electronic-Based Government System (inclusive public services), OJK literacy guidelines.	percent of offices; increasing use of alternative channels; decreasing number of 3T access complaints.
Synchronization of Power of Attorney to Impose Mortgage Rights (Surat Kuasa Membebankan Hak Tanggungan – SKMHT) and MSME Products	Redefine the role of SKMHT within the digital framework by allowing temporary records in BT-el with time limits and notifications to support smooth MSME credit processes while preserving legal certainty.	ATR/BPN, OJK, Banking Sector	Mortgage Law (UUHT), Ministerial Regulation No. 3 of 2023, academic studies on digital SKMHT.	Stable MSME credit performance; improved collateral visibility; reduced risk of unperfected liens.

Source: Data processed by the author

Table 3 presents an integrated framework by which all normative, technical, and service dimensions are combined into one single coherent and sustainable operational system. The formulation of the above has removed uncertainty regarding the point of creation of Mortgage Rights, stating that electronic registration in BT-el stands as the 'official moment of origin' of such rights. This concept is in tune with Government Regulation No. 18 of 2021 and Law No. 11 of 2008 on Electronic Information and Transactions (ITE Law) while still being consonant with the framework of Law No. 4 of 1996 on Mortgage Rights (UUHT), which may be explicitly confirmed at the level of regulations, either by amendment or by authoritative interpretation. Interoperability is written into the Electronic-Based Government System framework, which requires integration through standardized APIs, one trusted viewer system that allows auction officials and relevant authorities to see the same documents, and a cross-verifiable audit trail in handling concerns for inconsistent institutional security standards.

The framework also ensures the minimum non-negotiable standards of cybersecurity, including multi-factor authentication, encryption, role-based access control, integrated security monitoring systems, penetration testing, and vendor risk management. Mechanisms for cyber incident notifications from regulatory authorities and debtors must be available in line with the provisions under Law No. 27 of 2022 on the Protection of Personal Data and the Financial Services Authority Regulation No. 22 of 2023, to prevent digital disruptions from scaling up into a wider crisis of confidence. The right to information is improved by providing a debtor dashboard that will ensure full transparency on the status of collateral and the credit process. This will not be an accessory but an effective system for closing information gaps, averting mis-selling practices, and expediting the resolution of simple disputes.

In addition, there is the need for a digital ombudsman in order to ensure equal access to justice from debtors amid disputes over the validity of documents or discrepancies between the versions of digital data. This would allow the system to suspend the execution process until the resolution of the matter. The principle of inclusivity of the service also needs to ensure that citizens in underdeveloped, frontier, and outermost (3T) regions are not excluded from the benefits of digital transformation. For this, USSD/SMS and assisted service channels should be designed for alternative forms of engagement. Together with the adaptation of the Power of Attorney to Impose Mortgage Rights (SKMHT) mechanism to the digital environment, to avoid disruption in the distribution of credit to MSMEs, it can be done by introducing a temporary record in BT-el system by setting valid and visible parameters.

This framework allows for a clear and implementable path forward for regulators, the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN), the banking sector, and Land Deed Officials (PPAT) through the adoption of measurable indicators of success for each policy dimension. The ultimate aim of these recommendations is to ensure that technological innovation serves to enhance consumer rights, strengthen legal certainty, and increase equitable access to credit and does not produce new forms of uncertainty. The digital transformation of land governance will, when legal norms are harmonized, cybersecurity standards integrated, transparency increased, and redress mechanisms accessible with a maintained inclusiveness, truly reflect the perspective of human rights and human security, fostering efficiency, safety, and equity for all stakeholders.

Conclusion

In the Indonesian land administration, the development of electronic documentation, Electronic Mortgage Rights, and Electronic Certificates creates both huge opportunities and serious challenges for consumer protection in banking credit services. It will increase efficiency, transparency, and public trust by smoothing administrative procedures and enhancing legal certainty in electronic documentation. On the other hand, it opens new areas of risks related to personal data protection, legal certainty assurance of digital transactions, and equal access, considering that the digital infrastructure is still underdeveloped in many regions. Meanwhile, the government, if moving in the light of Human Rights and Human Security values, should enshrine consumer protection in every level of the digitalization process, from data governance and document verification through electronic dispute resolution. A human rights-based approach to digital governance would ensure that technological advances serve not only to accelerate public services but also reinforce the legal and economic security of all Indonesian consumers in this Digital Transformation Era.

This study acknowledges a methodological limitation: the analysis relies primarily on statutory and regulatory materials without the incorporation of court decisions or documented dispute cases involving electronic certificates. Future research should address this gap by examining judicial precedents and empirical conflict cases to validate the normative findings presented here.

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