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The Effectiveness of Electronic Land Certificates in Ensuring Legal Certainty of Land Rights

Efektivitas Sertipikat Tanah Elektronik Dalam Menjamin Kepastian Hukum Hak Atas Tanah

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Abstract

This research examines the effectiveness of electronic land certificates in ensuring legal certainty of land rights in Pekalongan City. The digital transformation of land administration represents a strategic initiative by the government to improve public services, yet its implementation faces significant challenges. The study aims to compare the effectiveness of conventional and electronic certificates, identify supporting and inhibiting factors, and assess their impact on legal certainty and protection of land rights. Employing an empirical approach, data was collected through interviews with officials at the Pekalongan City Land Office, direct observations, and document analysis of relevant

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regulations including the 1960 Basic Agrarian Law, Government Regulation No. 24/1997, and Ministerial Regulation ATR/BPN No. 1/2021. Content analysis and normative interpretation were applied to analyze the data. The findings reveal that while electronic certificates offer advantages in security, accessibility, and administrative efficiency, their implementation remains suboptimal due to uneven technological infrastructure, low digital literacy among communities, and internal resistance from land office employees toward system changes. Challenges include risks of certificate duplication and data overlap, while opportunities lie in enhanced transparency of land services. The research concludes that certificate digitalization has not yet achieved full effectiveness due to structural, cultural, and institutional barriers. The study recommends developing digital infrastructure at regional levels, providing intensive training for land office staff, and conducting massive public outreach to optimize land digitalization as an instrument of agrarian reform and state administration modernization.

KEYWORDS *Electronic Land Certificate, Legal Certainty, Land Registration, Digital Transformation, Agrarian Law*

Penelitian ini mengkaji efektivitas sertipikat tanah elektronik dalam menjamin kepastian hukum hak atas tanah di Kota Pekalongan. Transformasi digital administrasi pertanahan merupakan inisiatif strategis pemerintah untuk meningkatkan pelayanan publik, namun implementasinya menghadapi berbagai tantangan. Penelitian ini bertujuan membandingkan efektivitas sertipikat konvensional dan elektronik, mengidentifikasi faktor pendukung dan penghambat, serta mengkaji dampaknya terhadap kepastian hukum dan perlindungan hak atas tanah. Dengan menggunakan pendekatan empiris, data dikumpulkan melalui wawancara dengan petugas Kantor Pertanahan Kota Pekalongan, observasi langsung, dan analisis dokumen peraturan terkait termasuk UUPA 1960, PP No. 24/1997, dan Permen ATR/BPN No. 1/2021. Analisis isi dan interpretasi normatif diterapkan untuk

menganalisis data. Temuan penelitian mengungkapkan bahwa meskipun sertipikat elektronik menawarkan keunggulan dalam keamanan, aksesibilitas, dan efisiensi administrasi, implementasinya belum optimal karena infrastruktur teknologi yang tidak merata, rendahnya literasi digital masyarakat, dan resistensi internal pegawai kantor pertanahan terhadap perubahan sistem. Tantangan mencakup risiko duplikasi sertipikat dan tumpang tindih data, sedangkan peluangnya terletak pada peningkatan transparansi layanan pertanahan. Penelitian menyimpulkan bahwa digitalisasi sertipikat belum mencapai efektivitas penuh karena hambatan struktural, kultural, dan institusional. Penelitian merekomendasikan pengembangan infrastruktur digital di tingkat daerah, pelatihan intensif bagi staf kantor pertanahan, dan sosialisasi masif kepada masyarakat untuk mengoptimalkan digitalisasi pertanahan sebagai instrumen reforma agraria dan modernisasi administrasi negara.

KATA KUNCI Sertipikat Tanah Elektronik, Kepastian Hukum, Pendaftaran Tanah, Transformasi Digital, Hukum Agraria

Introduction

The land law system in Indonesia continues to undergo transformation in line with technological developments and the need for more efficient administrative services. As a state of law, Indonesia regulates the law in the field of land in accordance with the 1945 Constitution stated in Article 33 paragraph (3): "The earth, water, and natural resources contained therein are controlled by the state to be used for the greatest prosperity of the people". The provisions of the article contain the meaning that the state or government is the ruler, regulator, and manager, and has the authority to distribute land rights to the people for the greatest prosperity of the people.

In terms of the use of land rights granted by the state to Indonesian citizens, it must be protected and guaranteed by the state as stated in the applicable laws and regulations. As proof of ownership, Indonesian citizens are given a certificate of land

rights such as property rights as evidenced through a land book issued by the Ministry of Agrarian and Spatial Planning/National Land Agency of the Republic of Indonesia (ATR/BPN).[1]

Land registration is one of the important instruments in the implementation of land administration in Indonesia. Through a structured registration system, the state ensures legal certainty and protection of land rights, which are vital resources for national development and community welfare. This provision is normatively regulated in Law Number 5 of 1960 concerning Basic Agrarian Regulations (UUPA), which is then further elaborated in Government Regulation Number 24 of 1997 concerning Land Registration.

A preliminary study conducted by researchers at the Pekalongan City Land Office shows that out of a total of 7,287 registered land plots, only 2,732 plots (around 37.49%) have been transformed into electronic certificates. This figure is still below the average of Central Java province which reaches 47.79%, where of the 1,359,348 registered land plots, as many as 649,669 plots have been digitized[2]. This condition indicates that there is a gap in the implementation of electronic certificate policies at the regional level.

Along with the development of information and communication technology, the need for a more efficient, transparent, and safe land system encourages ATR/BPN to implement a digitalization system in the form of electronic land certificates. The implementation of electronic certificates is regulated in the Regulation of the Minister of ATR/BPN Number 1 of 2021 concerning Electronic Certificates. In the regulation, the conventional certificate system began to be transferred to a digital form that contains the legal identity of land parcels, rights holders, and the history of rights changes in an integrated national database.

Digitization of land administration is part of the government's efforts to realize good governance through the implementation of e-government. Haqie and Arfa (2021) stated

[1] Hendra Putranto, "Electronic Land Registration Policy in the Perspective of State Administrative Law," *Journal of Law & Development* 52, no. 1 (2022): 82-98.
[2] Data of the Pekalongan City Land Office (2025) and Data of the Central Java BPN Electronic Certificate (2025).

that digital transformation of land is able to increase transparency, accountability, and reduce corrupt practices in land administration[3]. Furthermore, Nugroho and Setiawan (2023) emphasized that electronic systems in land administration can minimize land conflicts which often stem from unclear ownership status and land boundaries[4].

However, there is a gap between expectations and reality in the implementation of electronic land certificates. Nitiyudo's research (2023) revealed weaknesses in institutional and regulatory aspects, especially the unpreparedness of land institutions in providing a safe and efficient system for the community[5]. On the other hand, Cahyoadi (2024) found that obstacles also arise from cultural factors, such as people's resistance to changes from physical to digital certificates. Many people still feel safer with physical certificates that can be stored privately, rather than electronic documents stored in government-owned cloud systems[6].

The research by Sari (2024) added that the public's lack of understanding of the legality of digital documents often raises doubts about the validity of electronic certificates in legal transactions or court evidence[7]. This obstacle is further exacerbated by the low intensity of socialization from BPN to the community, especially in areas where access to information is limited.

Contradictions can also be seen in the regulatory and implementation aspects. On the one hand, the central government through ATR/BPN encourages the acceleration of the digitization of land certificates, but on the other hand, there

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[3] Zaki Ahmad Haqie and Mizaj Arfa, "Digital Transformation in Land Administration: An Analysis of the Implementation of E-Government in Land Offices," *Journal of Administrative Science* 18, no. 2 (2021): 231-246.

[4] Bagus Adhi Nugroho and Andri Reza Setiawan, "The Effectiveness of Electronic Systems in the Prevention of Land Conflicts in Indonesia," *Journal of Agrarian Law* 7, no. 1 (2023): 45-62.

[5] Gilang Nitiyudo, "Institutional Analysis in the Implementation of Electronic Land Certificates in Indonesia," *Journal of Social and Political Sciences* 26, no. 3 (2023): 178-195.

[6] Fajar Cahyoadi, "Community Resistance to the Digitalization of Land Administration: A Case Study on the Island of Java," *Journal of Rural Sociology* 12, no. 1 (2024): 25-42.

[7] Dina Putri Sari, "Challenges in the Implementation of Electronic Certificates in the Indonesian Land Law System," *Journal of Land Law and Policy* 9, no. 1 (2024): 67-85.

has been no comprehensive harmonization of regulations, especially related to the recognition of electronic certificates in banking transactions and legal proof. Adimurti and Prasetyo (2022) identified a misalignment between the ATR/BPN policy and regulations in the banking and notary sectors, which caused these institutions to still require physical certificates for transaction and legal proofing purposes[8].

Controversy has also arisen regarding data security in the electronic certificate system. Some parties consider that the digitization of land certificates increases the risk of hacking and manipulation of electronic data. On the other hand, advocates of digitalization argue that encryption technology and digital signatures actually strengthen the security of land documents compared to manual systems that are vulnerable to physical forgery. Rahmadi and Kurniawan (2023) highlight that cyber resilience is still a crucial issue in the implementation of electronic certificates, considering the inadequate data security infrastructure in many land offices in the region[9].

The implementation of electronic land certificates in Pekalongan City, which will begin in June 2024, is an interesting unit of analysis to study. As a city with dynamic economic activity but not included in the category of big cities, Pekalongan represents the conditions of digital transition in middle-class urban areas in Indonesia. A critical analysis of the effectiveness of the implementation of electronic land certificates in this region can provide a comprehensive picture of the various challenges faced in the digitization of land administration at the regional level.

By considering various gaps, contradictions, and controversies in the implementation of electronic land certificates, this study intends to analyze: (1) the level of effectiveness of the implementation of electronic land certificates at the Pekalongan City Land Office; (2) factors that affect the effectiveness of the implementation of electronic

[8] Karina Adimurti and Hendra Prasetyo, "Harmonization of Electronic Certificate Regulations in Banking and Notary Transactions," *Journal of Notary* 8, no. 2 (2022): 112-129.

[9] Takdir Rahmadi and Dimas Kurniawan, "Cyber Resilience in Digital Land Systems: Challenges and Strategies," *Journal of Cybersecurity* 5, no. 1 (2023): 33-51.

land certificates; and (3) strategies for optimizing the electronic land certificate system to improve legal certainty and public services in land registration.

This study uses an empirical juridical approach with qualitative analysis to explore the problem of implementing electronic land certificates comprehensively. In this study, it will be systematically discussed about the legal basis of electronic land certificates, policy implementation at the Pekalongan City Land Office, analysis of implementation effectiveness, factors affecting implementation, and policy recommendations for optimizing the electronic land certificate system.

Method

This research uses an empirical approach conducted at the Pekalongan City Land Office, utilizing three main data collection techniques: in-depth interviews with local Land Office officials to obtain information on policy implementation, direct observation of the process of issuing and managing electronic certificates at the research location, and document analysis of the applicable legal framework, including the Basic Agrarian Law 1960, Government Regulation No. 24/1997, and Minister of ATR/BPN Regulation No. 1/2021. The data collected was then analyzed using content analysis methodology to examine the substance of regulations and interview findings, complemented by normative and contextual interpretations to evaluate the implementation of electronic certificates, resulting in a comprehensive understanding of the phenomenon under study and its legal implications in the context of Pekalongan City's land administration.

Result & Discussion

A. This Comparison of the Effectiveness of Conventional and Electronic Certificates

1. Security Aspects

Conventional land certificates rely on physical security through watermarks, holograms, and wet signatures, but

remain vulnerable to physical damage, theft, and forgery.[10] This system has been implemented for decades in Indonesia, but it has fundamental weaknesses as physical documents can be lost, damaged, or forged.[11]

Electronic systems offer a different security paradigm with data encryption, certified electronic signatures, and blockchain technology to prevent manipulation.[12] This implementation is in line with the regulation of Government Regulation No. 71 of 2019 concerning the Implementation of Electronic Systems and Transactions which regulates electronic information security standards.

While electronic systems offer higher data security, they also present new risks such as cyberattacks and digital infrastructure vulnerabilities.[13] Digital transformation requires not only investment in technology infrastructure but also human resource capacity building and comprehensive cybersecurity governance.

1.2. Ease of Access

From an accessibility perspective, conventional certificates require the owner to physically visit the land office for a verification or transaction process. This procedure requires a lot of time and resources.[14] Meanwhile, electronic certificates offer significant ease of access through digital platforms that can be accessed anytime and anywhere while connected to the internet. The Land Registration Electronic System allows real-time verification of land data.[15]

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[10] Budi Harsono. Indonesian Agrarian Law: History of the Establishment of the Basic Agrarian Law, Its Content and Implementation. Journal of Law & Development. 33. 1. 2022, p. 105.

[11] Fatimah Ismail. Vulnerabilities of Conventional Land Registration Systems in the Digital Era. Land Journal. 5. 2. 2023, p. 45.

[12] Ministry of ATR/BPN. Annual Report on the Implementation of Information Technology in Land Administration. Jakarta: Ministry of ATR/BPN, 2022, p. 78.

[13] Center for Agrarian Law Studies, Gadjah Mada University. Data Security Analysis in Electronic Land Administration System. Yogyakarta Law Review. 8. 1. 2023, p. 121.

[14] Adrian Sutedi. Efficiency of Land Registration System: A Comparative Study of Conventional and Electronic Systems. Journal of the Right Vinding. 10. 3. 2021, p. 312.

[15] Directorate General of Agrarian Infrastructure. Evaluation of the Implementation of the Electronic System of Land Registration in Indonesia. Jakarta: Ministry of ATR/BPN, 2023, p. 112.

The main challenge in digital transformation is the digital divide. BPS data (2023) shows that internet penetration in Indonesia is still uneven, with significant disparities between urban (87%) and rural (59%) areas. This condition has implications for the potential for social exclusion in the electronic land registration system.[16]

1.3. Administration Fees

The implementation of electronic certificates offers long-term cost efficiencies even though it requires substantial initial investment. A comparative study revealed that the operational costs of conventional certificate management reached Rp 1.2 trillion per year, including the cost of printing, storage, and maintenance of physical archives. On the other hand, the implementation of electronic systems requires an initial investment of around Rp 3.5 trillion, but the projected annual operational costs are only around Rp 400 billion.[17]

For the public, the transition to electronic certificates has the potential to lower overall transaction costs. Research estimates that the implementation of electronic certificates can reduce costs borne by the public by up to 35%, especially from savings in transportation, photocopying, and document legalization costs.[18]

However, the transition period from conventional to electronic systems has the potential to create a double cost burden because business actors must adapt to both systems in parallel. This situation creates temporary inefficiencies that need to be anticipated through planned transition policies.[19]

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[16] Rahma Windari et al. Digital Divide and Social Exclusion in Electronic Land Certification. Journal of Rural Sociology. 11. 2. 2023, p. 182.

[17] Ministry of ATR/BPN. Analysis of the Cost-Benefits of Transitioning the Land Registration System. Jakarta: Ministry of ATR/BPN, 2023, p. 45.

[18] ICECRD of the Ministry of ATR/BPN. Economic Impact Study of the Implementation of the Land Registration Electronic System. Jakarta: Ministry of ATR/BPN, 2022, p. 92.

[19] Indonesian Property Developers Association. Analysis of the Economic Impact of the Land Certification System Transition on the Property Industry. Jakarta: APPI, 2023, p. 57.

1.4. Legality

The legality aspect is a crucial consideration in the adoption of electronic certificates. Law Number 11 of 2008 concerning Information and Electronic Transactions in conjunction with Law Number 19 of 2016 has provided a legal basis for the validity of electronic documents. Article 5 paragraph (1) of the ITE Law explicitly states that "Electronic Information and/or Electronic Documents and/or their printed results are valid legal evidence."

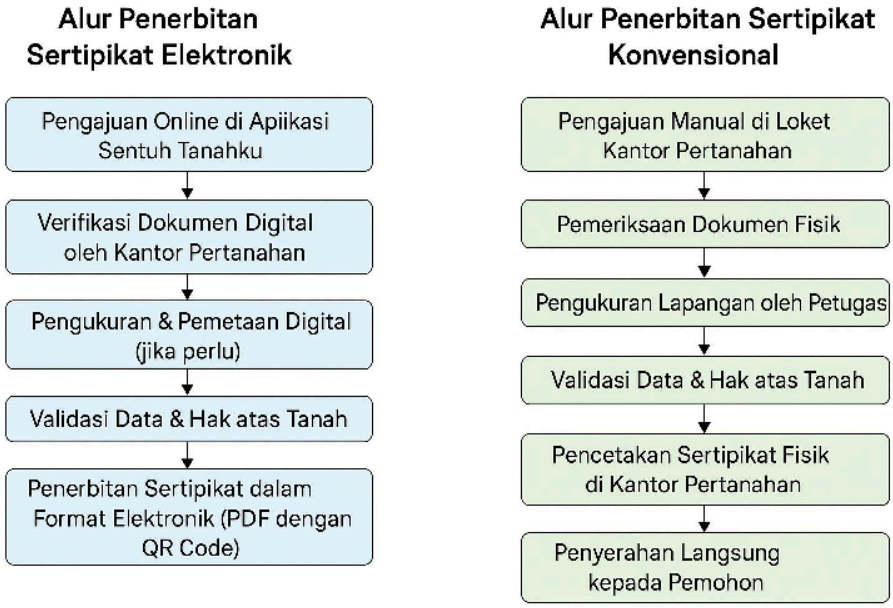
The Regulation of the Minister of ATR/BPN Number 1 of 2021 concerning Electronic Certificates strengthens this aspect by regulating the equality of legal status between conventional and electronic land certificates. Article 3 of the Ministerial Regulation emphasizes that "Electronic Certificates have the same legal force and legal consequences as [conventional] Certificates".

However, there are juridical challenges in the implementation of electronic certificates, especially related to proof in court and harmonization with other sectoral laws and regulations. One crucial issue is the absence of established jurisprudence on land disputes involving electronic certificates.[20]

The fundamental difference between the conventional system and the digital system can be seen in the flow of land certificate issuance applied at the Pekalongan City Land Office. This flow comparison provides an overview of the change in administrative processes from conventional to electronic:

Figure 1 Certificate Issuance Flow

[20] Maria S.W. Sumardjono et al. Juridical Challenges in the Implementation of Electronic Certificates in the Indonesian Legal System. Journal of the Legal Pulpit. 35. 1. 2023, p. 67.



(Source: Results of ATR/BPN interviews, 2025)

To find out the extent of the implementation of electronic certificates in Pekalongan City, a quantity of data is needed that describes the comparison between the number of conventional certificates and electronic certificates. Based on data from the Central Java Province BPN Regional Office as of May 2025, the following are statistics on the progress of land certificate digitization based on the type of land rights in the Pekalongan City area: (Source: Results of ATR/BPN interviews, 2025) (Source: Results of ATR/BPN interviews, 2025)

Tabel 1 Certificate Statistical Date

Jenis Hak	BTEL	STEL	Jumlah Total	Presentase Digitalisasi
Hak Milik	4.555	2.732	7.287	37.49%
Hak Guna Usaha	0	0	0	-
Hak Guna Bangunan	641	428	1.069	40.02%
Hak Pakai	154	147	301	48,84%

Hak Pengelolaan	0	0	0	-
Hak Milik Satuan Rumah Susun	36	20	56	35,71%
Hak Wakaf	0	0	0	-
Total Keseluruhan	5.386	3.327	8.713	38,18%

(Source: Electronic certificate data of the BPN Regional Office of Central Java Province)

The theory of social construction law proposed by Eugen Ehrlich and developed in the school of legal sociology states that law is not merely born from formal legislation, but is also formed by social norms that live and develop in society. In this view, law functions not only as a normative rule of the state, but also as a result of social interaction that reflects the values and customs of society.

The application of this theory is very relevant in discussing the transition from conventional to electronic land certificates in Indonesia. Land certificates, both in physical and digital form, are legal products that not only require a formal legal basis, but also social recognition in order to be recognized and function effectively. In the context of electronic certificates, their validity is not sufficient if only supported by regulations such as the Electronic Information and Transactions Law or the Regulation of the Minister of ATR/BPN, but must also be accepted and trusted by the community and law enforcement officers as valid and reliable evidence.

Based on an interview with Mrs. Fery Megawati, as Head of the Rights Determination and Registration Section at the Pekalongan City Land Office on April 16, 2024, she explained that the implementation of electronic certificates in Pekalongan is still in the transition stage, with a focus on the renewal system and officer training. The e-certificate issuance procedure has undergone adjustments, especially at the document verification stage which is now carried out digitally through the

official platform of the Ministry of ATR/BPN. Although the process is considered faster and more efficient, she also highlighted the challenges in the form of network infrastructure readiness and increasing digital community literacy as key factors for the success of this system transformation.

B. Obstacles in the Implementation of Electronic Certificates in Pekalongan City

The implementation of Electronic Land Certificates at the Pekalongan City Land Office faces several significant obstacles that need serious attention to ensure the effectiveness of this program. Although the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency has successfully declared 117 e-land offices in 33 Indonesian provinces as part of its vision to become a world -standard institution and improve the quality of public services, implementation at the local level still faces various obstacles.[21]

In analyzing the obstacles to the implementation of Electronic Certificates in Pekalongan City, this study uses the Responsive Legal Theory approach developed by Nonet and Selznick. This theory emphasizes that law must not only be written and normative, but also be able to respond to the needs of society and developing social conditions. In this context, the implementation of electronic certificates must be able to adapt to real challenges in the field, such as limited infrastructure, internal resistance, and low digital literacy of the community. Effective regulation must be adaptive, participatory, and support changes towards a more inclusive and sustainable public service system.

Uneven technological infrastructure is the first significant obstacle in the implementation of Electronic Certificates at the Pekalongan City Land Office. Based on research data, the land office faces limitations in supporting

[21] Interview with Resource Persons

devices such as special printers for printing Electronic Certificates. As recorded in the research data, "Printers that need service because printers are used specifically so that the Pekalongan City Land Office in particular does not provide many printers."[22] This limitation has a direct impact on the smooth issuance of certificates and has the potential to cause delays in services to the community. In addition, electronic systems also often experience disruptions during maintenance, especially "because there are application changes by adding features contained in the KKP (Computerized Land Office) system."[23]

This issue reflects a broader challenge in providing adequate information technology infrastructure to support the digitalization of land services in Indonesia. As stated by Rahmadian in his study, the uneven availability of information technology infrastructure between regions is one of the main inhibiting factors in the modernization of the land administration system.[24] This inequality includes not only hardware such as computers and printers, but also stable internet connectivity, cybersecurity systems, and the availability of technical personnel capable of quickly addressing system outages. In the context of Pekalongan City, this infrastructure limitation is more pronounced considering its status as a medium city that may not get the priority of allocating information technology resources as much as big cities.

The second obstacle is related to the lack of public understanding of digital documents. The transition from a conventional to electronic certificate system requires adaptation from a society that has become accustomed to proof of land ownership in physical form. Although Electronic Certificates offer various advantages such as "guaranteed security because only rights holders have access to open electronic documents" and the ease of

[22] Ibid
[23] Ibid
[24] Dicky Rahmadian, "Analysis of the Implementation of Electronic Systems in Land Administration in Indonesia," Journal of Land Law and Policy 8, no. 2 (2021): 145-163.

checking authenticity through QR Codes that are "directly connected to the last status link",[25] there is still a gap in understanding among the public regarding the value and validity of these electronic documents. Rahmi and Wiriardi in their research on the digitization of land services identified that the level of public acceptance of digital documents is greatly influenced by their digital literacy level.[26]

In areas with low digital literacy, resistance to electronic certificates tends to be higher due to concerns about data security and its legal validity. Although legally the validity of electronic documents has been guaranteed by Article 5 paragraph (1) of Law Number 11 of 2008 concerning Electronic Information and Transactions which states that "electronic information, electronic documents and/or their printed results are legal evidence",[27] public trust is not always in line with these legal guarantees. This lack of understanding can be exacerbated by limited socialization and public education programs on electronic certificates, especially for community groups that have limited access to digital information. Sutrisno and Hendrawati in their study found that public perception of land electronic documents was greatly influenced by the intensity and quality of socialization programs carried out by the government.[28] Without a comprehensive and inclusive socialization program, people's adaptation to electronic certificates will remain a significant challenge.

The internal resistance of BPN employees to changes in the work process is a third obstacle that is no less important. The transformation from conventional to electronic systems requires fundamental changes in organizational procedures,

[25] Interview with Resource Persons

[26] Elita Rahmi and Melinda Wiriardi, "The Challenges of Land Service Digitalization in the Era of the Industrial Revolution 4.0," Journal of State Administrative Law 6, no. 1 (2020): 78.

[27] Article 5 paragraph (1) of Law Number 11 of 2008 concerning Information and Electronic Transactions and its amendments.

[28] Bambang Sutrisno and Dewi Hendrawati, "The Effectiveness of Digital Land Policy Socialization Programs in Indonesia," Journal of Public Policy and Government Analysis 7, no. 3 (2022): 255.

working methods, and culture. Nugroho and Sutaryono in their research on the digital transformation of land administration identified that employees' resistance to change often arises due to fear of inability to adapt to new technologies, fears of reduced roles or authority, and attachment to established work routines.[29] At the Pekalongan City Land Office, this resistance can be seen from the difficulty of adapting employees to changes in the MPA system, especially when there is the addition of new features that require relearning work procedures.

Continuous changes in the application system require employees to constantly update their knowledge and skills, which can lead to stress and inconvenience. According to Prihatini, this kind of resistance is common in the digital transformation process of government organizations and requires a comprehensive change management approach.[30] Therefore, efficient and quality land administration management is required. [31]Recommended strategies include ongoing training programs, mentoring systems, incentives for the adoption of new technologies, and the creation of a work environment that supports innovation and learning. In the context of the Pekalongan City Land Office, the lack of adequate capacity building programs for employees can slow down the adoption process of electronic certificates.

The obstacles in the implementation of Electronic Certificates at the Pekalongan City Land Office reflect the broader challenges in the digitalization of public services in Indonesia. According to a study by Wijaya and Nurmalasari, digital transformation in public services always involves three important dimensions: technological infrastructure, user readiness (both internal and external), and a supportive

[29] Adi Nugroho and Sutaryono, "Digital Transformation in Land Administration: Opportunities and Challenges," Indonesian Land Policy Journal 12, no. 3 (2022): 211-230.
[30] Diana Prihatini, "Strategies for Dealing with Employee Resistance in the Implementation of Electronic Systems in Government Institutions," Journal of Public Administration 9, no. 2 (2023): 167-189.
[31] Ramli, A. (2024). Embracing Social Justice: Exploring The Journey From Land Reform to Agrarian Reform. The 4th International Conference on Innovations in Social Sciences Education and Engineering (ICoISSEE-4), July, 20th, 2024. hal. 1-18.

governance framework.[32] These three dimensions must be developed in a balanced manner to ensure the success of the digitalization program. In the context of Electronic Certificates, the improvement of technological infrastructure needs to be balanced with increasing the capacity of BPN employees and digital literacy programs for the community. In addition, a comprehensive regulatory framework is also needed to regulate various aspects of electronic certificates, including data security, renewal procedures, and dispute resolution mechanisms related to electronic documents.

Martono in his research on the implementation of *e-government* in Indonesia found that the *incremental approach* is often more effective in overcoming resistance to change.[33] This approach involves the gradual implementation of new systems, starting with basic features and slowly adding complexity as user adaptability increases. In the context of Electronic Certificates at the Pekalongan City Land Office, a similar approach may help reduce employee resistance and increase public acceptance of this new system.

To overcome the uneven barriers of technological infrastructure, greater investment in the procurement and maintenance of supporting hardware and software is required. As recommended by Handayani and Purwanto in their study on the readiness of e-government infrastructure in Indonesia, the development of information technology infrastructure for public services should consider not only short-term needs but also scalability and long-term sustainability.[34] This includes investments in data backup systems, disaster recovery mechanisms, and supporting infrastructure such as stable power supply and redundant

[32] Budi Wijaya and Rika Nurmalasari, "Three Important Dimensions in the Digitalization of Public Services in Indonesia," Journal of State Administration 11, no. 1 (2021): 45-62.
[33] Hendri Martono, "A Phased Approach in the Implementation of E-Government in Indonesia: A Case Study of Three Cities," Journal of Government Science and Public Policy 8, no. 2 (2020): 123-142.
[34] Siti Handayani and Agus Purwanto, "Information Technology Infrastructure Readiness for E-Government in Indonesia," Journal of Information and Communication Technology 10, no. 3 (2023): 215.

internet connectivity.

In overcoming the lack of public understanding of digital documents, a comprehensive socialization and public education program is very important. The program should not only focus on the technical aspects of electronic certificates but also emphasize the practical advantages and security guarantees it offers. Putri and Santoso in their research on the adoption of digital public services found that perceived *usefulness* and perceived ease of use are the main factors influencing public acceptance of public service innovation.[35] Information regarding various obstacles in the implementation of Electronic Certificates at the Pekalongan City Land Office was obtained through an in-depth interview with Mr. Setiaman as Head of the Rights Determination and Registration Section at the Pekalongan City Land Office, which was conducted on April 16, 2024. Thus, the socialization program should emphasize how electronic certificates can simplify the process of land ownership verification, improve document security, and speed up the land transaction process.

C. Impact on Legal Certainty and Protection of Land Rights

The implementation of Electronic Land Certificates as part of the modernization of the land registration system in Indonesia has brought significant changes in the aspects of legal certainty and protection of land rights. The transformation from a conventional to an electronic certificate system not only changes the physical form of the document, but also has an impact on legal protection mechanisms, the risk of data duplication, and the efficiency of public services in the land sector. Based on the results of the interview with Mrs. Fery Megawati, an employee of the rights determination and registration section on May 16, 2025, the Pekalongan City Land Office has started implementing Electronic Land Certificates since June 14, 2024, as part of the commitment of the Ministry of Agrarian

[35] Anastasia Putri and Heru Santoso, "Factors Influencing the Adoption of Digital Public Services in Indonesia," Journal of Economics and Public Policy 8, no. 1 (2020): 95.

Affairs and Spatial Planning/National Land Agency to improve the quality of public services and provide protection and security guarantees of land data.[36]

Legal protection for land rights holders has increased significantly with the implementation of Electronic Land Certificates. In contrast to conventional certificates that are vulnerable to physical damage, loss, or forgery, Electronic Land Certificates offer a higher level of security. Based on the results of the interview with Mr. Setiaman on April 16 as Head of the Rights Determination and Registration Section, "The security of the Electronic Certificate is guaranteed because only the right holder has access to open electronic documents."[37] This level of security not only protects documents from damage or loss, but also prevents counterfeiting due to the presence of a digital verification feature through a QR Code that is "directly linked to the last status link."[38] This verification feature allows third parties to easily check the authenticity and current status of land certificates, thereby significantly reducing the risk of fraud in property transactions.

Yudhanto in his research emphasized that the validity of the Electronic Land Certificate as evidence of land ownership has been guaranteed by Article 5 paragraph (1) of Law Number 11 of 2008 concerning Information and Electronic Transactions which states that "electronic information, electronic documents and/or printed results are valid legal evidence."[39] This legal guarantee strengthens the position of rights holders in the litigation or land dispute settlement process. According to Wulandari and Sumardjono, the use of electronic signatures and encryption technology in Electronic Land Certificates provides a much higher level of security and authentication than manual signatures on conventional certificates.[40]

[36] Interviews with resource persons
[37] Ibid
[38] Ibid
[39] Aris Yudhanto, "Legal Aspects of Electronic Documents in the Indonesian Land System," Journal of Technology and Information Law 9, no. 2 (2022): 135.
[40] Fitri Wulandari and Maria S.W. Sumardjono, "Electronic Signatures in Land Certificates: A Juridical and Technical Review," Journal of Agrarian and Land Law 7, no. 1 (2021): 67.

However, behind this increase in legal protection, Electronic Land Certificates also pose new challenges in terms of regulating legal liability in the event of a data leak or system hack. Hamdani in his analysis identified that there is no comprehensive legal framework to regulate liability in the event of a data security breach that causes losses for landowners.[41] This ambiguity has the potential to create legal uncertainty, especially in cases where sensitive information in an Electronic Land Certificate is accessed by an unauthorized party.

The second aspect to consider is the risk of duplicate certificates and overlapping data. Although electronic systems are designed to minimize errors in certificate generation, the [42] potential for duplication and overlap of data remains, especially during the transition period from conventional to electronic systems. This risk arises when data from conventional certificates is migrated to electronic systems without adequate verification, or when there is a technical error in the process of issuing Electronic Certificates. According to Santoso and Widodo, inconsistencies in data formats and input procedures between the old and new systems are one of the main causes of data overlap in electronic land systems.[43]

Based on the results of the interviews Mr. Setiaman as the chief witness for the determination of rights and registration on April 16 2025 , it shows that one of the advantages of the Electronic Land Certificate is its ability to "facilitate access to credible information."[44] However, to maximize these advantages, a strict data verification and validation system is needed to prevent data duplication or inconsistencies. Hartanto's study found that the integration of land databases with other information systems such as population and tax systems can significantly reduce the risk

[41] Ahmad Hamdani, "Legal Responsibility in Land Information System Security," Journal of Legal Policy 12, no. 3 (2023): 218.
[42] Interviews with resource persons
[43] Budi Santoso and Pramono Widodo, "Data Interoperability in Indonesia's Land Information System," Journal of Computer and Information Science 11, no. 2 (2020): 183
[44] Interviews with resource persons

of duplication and improve the accuracy of land data.[45] In the context of the Pekalongan City Land Office, the implementation of Electronic Land Certificates needs to be supported by a comprehensive data integration system to minimize the risk of overlapping and duplication of certificates.

In addition, the transformation from physical to digital archives has also raised concerns about potential data loss or damage during the migration process. As stated by Kurniawan in his research, migrating data from conventional to electronic systems requires a strict methodology and a reliable backup system to prevent data loss or corruption.[46] Without a systematic approach, the risk of overlapping or duplication of data can increase, which in turn can threaten legal certainty for landowners.

The third aspect relates to the potential to increase the efficiency and transparency of public services. Based on the results of the interview Mr. Setiaman as the chief witness for the determination of rights and registration on April 16 2025, it was shown that the implementation of the Electronic Land Certificate had "accelerated the land registration process" because "the file was no longer recorded manually, further shortening the period of issuance of certificates."[47] This efficiency not only benefits communities in need of land services, but also allows the Land Office to allocate their resources more effectively. According to Pratama and Wijaya, digitizing the land registration process can reduce processing time by up to 40% and reduce land agency operational costs by up to 30% in the long run.[48]

Increasing transparency is also one of the positive impacts of the implementation of Electronic Land Certificates. With an electronic system, all stages in the land

[45] Andy Hartanto, "Land Database Integration: Efforts to Prevent Duplication of Land Certificates," Journal of Information and Communication Technology 8, no. 3 (2021): 245.
[46] Rudi Kurniawan, "Land Data Management in the Digital Era: Migration and Preservation Strategies," Journal of Administrative and Public Policy Sciences 9, no. 1 (2022): 110.
[47] Interviews with resource persons
[48] Aditya Pratama and Candra Wijaya, "Cost and Time Efficiency Analysis in Land Services Digitalization," Journal of Economics and Public Policy 10, no. 2 (2023): 172

registration process can be tracked in real-time, reducing uncertainty and potential for corrupt practices. According to Rahman, electronic systems in land administration can significantly reduce the practice of bribery and illegal levies because all transactions are recorded in the system and can be audited.[49] This is in line with one of the advantages of the Electronic Land Certificate recorded in the interview results, namely "improving the accountability of document issuance while making document authentication easier."[50]

This transparency also supports law enforcement and more effective resolution of land disputes. With comprehensive electronic records that can be accessed quickly, the evidentiary process in land disputes can be carried out more efficiently. As stated by Subekti and Harjono, the availability of accurate and easily accessible land data through electronic systems can speed up the dispute resolution process and reduce the burden on the courts.[51]

However, this increase in efficiency and transparency also raises concerns about the accessibility of services, especially for communities with low digital literacy or limited access to technology infrastructure. As discovered by Nurfaizah, the digitization of government services without considering the digital divide can create new marginalization in access to public services.[52] In the context of Electronic Land Certificates, it is important to ensure that increased efficiency and transparency do not come at the expense of accessibility, especially for communities in rural or low-income areas who may have limitations in access to technology.

To maximize the positive impact of Electronic Land Certificates on legal certainty and protection of land rights, a comprehensive approach is needed that involves not only

[49] Anwar Rahman, "The Influence of Digitalization on Transparency and Accountability of Public Services in Indonesia," Journal of Public Administration 11, no. 3 (2022): 320
[50] Interviews with resource persons
[51] Rini Subekti and Dwi Harjono, "Land Electronic System and the Effectiveness of Land Dispute Resolution in Indonesia," Journal of Law and Judiciary 9, no. 2 (2020): 215.
[52] Siti Nurfaizah, "Digital Inclusion in Public Services: Challenges and Strategies," Journal of Policy Innovation 8, no. 1 (2023): 78.

technological aspects, but also legal, social, and institutional aspects. As recommended by Prasetyo and Hariyanti, the implementation of the electronic land system needs to be supported by a strong legal framework, inclusive capacity building programs, and effective oversight mechanisms.[53] With this approach, the Electronic Land Certificate can truly become an instrument to increase legal certainty and protection of land rights in Indonesia.

In analyzing the impact of the implementation of Electronic Land Certificates on legal certainty and protection of land rights, several relevant theoretical approaches are used.

First, the theory of legal certainty states that the law must provide clarity and certain protection for the community. With a secure and verifiable electronic system, landowners get stronger protection because documents are not easily damaged, lost, or falsified. Second, based on the theory of legal protection, the digital system provides a form of preventive protection by preventing disputes, as well as repressive protection because electronic documents can be used as valid evidence in court. Third, the good governance approach emphasizes the importance of transparency, accountability, and efficiency in public services. This is reflected in the implementation of Electronic Certificates which accelerate the service process, clarify procedures, and reduce the potential for abuse of authority. Fourth, from a technological perspective, the information system theory is used which explains that the use of information technology in public institutions aims to improve the quality of service, minimize errors, and strengthen data reliability.

This article is based on the results of interviews with officials from the Rights Determination and Registration Section at the Pekalongan City Land Office. This interview aims to explore the impact of the implementation of Electronic Land Certificates on legal certainty and protection of land rights in the context of modernizing the land

[53] Bambang Prasetyo and Nina Hariyanti, "Digital Agrarian Reform: Conceptual Framework and Implementation in Indonesia," Journal of Rural Sociology 10, no. 2 (2021): 145.

registration system in Indonesia.

Conclusion

1. The transformation of the land registration system from conventional to electronic offers increased security through digital technology, real-time access, and cost efficiency of up to 35% for the community with operational savings of Rp 800 billion per year. Although it has been supported by the ITE Law and the Ministerial Regulation of ATR/BPN 1/2021, its implementation faces obstacles in the form of digital divides, cyber vulnerabilities, and variations in stakeholder acceptance. The case of counterfeiting in Semarang and data manipulation in Surakarta underscore the urgency of digitalization while revealing the paradox of the transition period that requires a comprehensive strategy to maximize the benefits and minimize the risks of implementing electronic certificates.
2. The implementation of Electronic Land Certificates at the Pekalongan City Land Office faces three main obstacles: uneven technological infrastructure (including limited special printers and system disruptions during maintenance), lack of public understanding of digital documents (even though it offers security and ease of verification through QR Codes), and internal resistance of BPN employees to changes in work processes. To overcome these challenges, increased investment in technology infrastructure, comprehensive public socialization and education programs on the benefits of electronic certificates, and a phased approach in the implementation of new systems to reduce resistance and increase adaptation of both employees and the public.
3. The implementation of Electronic Land Certificates at the Pekalongan City Land Office since June 14, 2024 has had a significant impact on the aspects of legal certainty and protection of land rights. Electronic certificates offer better security than conventional certificates through digital verification features with QR Codes and access protection

that only rights holders have. While it provides stronger legal protections and improves the efficiency and transparency of land services, this implementation still faces challenges in the form of potential data leaks, the risk of duplication and overlapping data during the transition period, and accessibility gaps for communities with low digital literacy. To maximize the benefits of electronic certificates, a comprehensive approach is needed that involves technological, legal, social, and institutional aspects.

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