

Legal Certainty and Evidentiary Strength of Digital Signatures in Electronic Contracts under Indonesian Law

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Abstract

The rapid advancement of digital technology has driven the widespread use of electronic contracts in modern business transactions, where digital signatures play an essential role in verifying authenticity, maintaining document integrity, and establishing mutual consent between parties. This study analyzes the legal validity and evidentiary weight of digital signatures under Indonesian law. Using a normative juridical approach, it examines relevant laws, particularly Law No. 11 of 2008 as amended by Law No. 19 of 2016 on Electronic Information and Transactions (ITE Law), along with supporting regulations and legal literature. The research evaluates whether digital signatures meet legal requirements and provide certainty in practice. The findings show that digital signatures are legally valid and binding if they can identify the signer, maintain document integrity, and prevent repudiation. They are also recognized as legitimate evidence in court. However, challenges remain, including limited public understanding, the need for stronger technological security, and the continued use of handwritten signatures for certain documents. Overall, digital signatures enhance the reliability of electronic contracts and support secure digital transactions in Indonesia.

Keywords

Digital Signature; Electronic Contract; Business Law

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1. INTRODUCTION

The rapid advancement of digital technology has fundamentally transformed patterns of human interaction, particularly in economic activities and business transactions (Yufriadi et al., 2024; Van Veldhoven & Vanthienen, 2022). The proliferation of digital platforms, internet-based services, and electronic communication systems has shifted conventional transaction models—once dependent on physical presence and face-to-face interaction—into virtual environments where contractual relations can be established instantaneously across geographical boundaries. (Kellerman, 2022) (Li et al., 2001)



Information and communication technology now functions not merely as a supporting tool but as a core infrastructure that enables the creation, exchange, storage, and validation of transactional data in digital form (Sulaiman et al., 2021; Tektona & Laoly, 2023). This transformation has accelerated the growth of electronic commerce, digital financial services, and online contractual arrangements, positioning electronic contracts as a dominant legal instrument in contemporary business practices.

The increasing reliance on electronic contracts inevitably raises fundamental legal issues, particularly concerning authenticity, validity, and evidentiary strength (Nyangarika, 2013; Awaisheh, 2025). In classical contract law doctrine, the validity of an agreement is closely associated with the presence of a handwritten signature (Kidd Jr & Daughtrey Jr, 1999), which functions as an expression of consent, a means of identifying the contracting parties, and a guarantee of the authenticity of the document (Bix, 2012). The migration of contractual practices into digital environments challenges this traditional paradigm, as physical signatures are no longer feasible in electronic transactions (Wang, 2014; Frosinini & Borra, 2025). Consequently, the legal system must accommodate alternative mechanisms capable of providing equivalent legal certainty. In this context, digital signatures have emerged as a technological and legal solution designed to replace conventional signatures in electronic documents while preserving their essential legal functions.

From a technological standpoint, digital signatures are based on cryptographic mechanisms, particularly public-key cryptography, which was first implemented practically by Ronald Rivest, Adi Shamir, and Leonard Adleman in 1977 (Diffie, 2002; West, 2022). This system provides secure authentication, verification, and integrity protection for electronic documents (Penubadi et al., 2023), thereby ensuring that the identity of the signatory can be verified and that the document's content remains unaltered (Reed, 2001). The signatory cannot later deny their involvement in the transaction (Noor, 2021). The implementation of digital signatures has become increasingly relevant in the context of paperless transactions, offering efficiency, cost reduction, and speed in business processes, while also supporting environmental sustainability and administrative simplification. (Dahlia & Susetio, 2023)

Empirical and doctrinal studies have demonstrated that digital signatures play a crucial role in fostering trust in electronic transactions. Nasution et al. (2020) argue that the growth of e-commerce in Indonesia is closely linked to the availability of reliable digital authentication mechanisms that can protect both consumers and business actors (I. Nasution, 2022) (E. Y. Nasution et al., 2020). Similarly, Widya Astuti et al. (2023) emphasize that digital trust infrastructure, including electronic signatures, is essential for sustaining competitiveness in the digital economy (Widya Astuti et al., 2023). In the financial sector, Dermawan (2021) finds that certified digital signatures significantly enhance transactional security and legal certainty, particularly during periods of restricted physical interaction such as the COVID-19 pandemic (Dermawan, 2021). These findings suggest that digital signatures are

not merely technical tools but integral components of modern legal and economic systems.

In the Indonesian legal framework, the recognition of electronic signatures is primarily regulated by Law Number 19 of 2016, which amends Law Number 11 of 2008 on Electronic Information and Transactions (ITE Law). Article 1, paragraph (5) of the ITE Law defines an electronic system as an integrated set of hardware, software, and procedures used to prepare, process, store, and disseminate electronic information (Amajihono, 2022). Articles 5, 7, and 11 of the ITE Law affirm that electronic information, electronic documents, and electronic signatures possess legal force and evidentiary value, provided that they meet statutory requirements relating to authentication, integrity, and non-repudiation. Article 18 further reinforces the validity of electronic contracts formed through electronic systems, thereby establishing a normative foundation for digital business transactions in Indonesia.

Several legal scholars have examined the implications of these provisions. Amajihono (2022) concludes that electronic contracts bearing valid digital signatures are legally binding and enforceable, as they satisfy the essential elements of an agreement under the Civil Code (Amajihono, 2022). Daffa et al. (2023) further argue that electronic signatures constitute admissible evidence in civil proceedings, provided that their authenticity can be technically and legally verified (Daffa et al., 2023). Noor (2021) highlights the importance of electronic certificates issued by trusted certification authorities in strengthening the evidentiary value of digital signatures. These studies collectively affirm the normative legitimacy of digital signatures within Indonesian positive law.

However, despite this normative recognition, significant legal uncertainty persists regarding the validity of digital signatures, particularly in litigation involving electronic contracts. Dewi and Sukardi (2023) observe that Indonesian legislation has yet to comprehensively regulate the hierarchy of electronic evidence vis-à-vis conventional written evidence, leading to inconsistent judicial interpretations (N. M. T. Dewi & Sukardi, 2023). Anggraini et al. (2020) similarly note that judges often exhibit caution in accepting electronic evidence, especially when it involves complex technical verification processes. This uncertainty is exacerbated by varying levels of technological literacy among legal practitioners and law enforcement officials, which may affect the assessment of digital evidence in practice.

The complexity of this issue becomes more pronounced when the ITE Law is juxtaposed with Law Number 2 of 2014 concerning Amendments to Law Number 30 of 2004 on the Position of Notary. Article 1, paragraph (7) of the Notary Law defines an authentic deed as a deed made by or before a notary in accordance with statutory provisions. In civil law tradition, authentic deeds occupy the highest position in the hierarchy of evidence, possessing perfect evidentiary power unless proven otherwise. This doctrinal position reinforces the exclusivity of notarial authority in producing documents with the highest level of legal certainty.

Several scholars have critically examined this normative tension. Hudzaifah (n.d.) argues that while electronic signatures may fulfill the functional requirements of consent and authentication, they cannot automatically be equated with notarial deeds due to the absence of direct notarial involvement (Hudzaifah, n.d.). Sihombing (2020) contends that the Notary Law reflects a conservative approach that prioritizes formal authenticity over technological innovation, thereby limiting the potential expansion of electronic deeds (Sihombing, 2020). Conversely, Amajihono (2022) suggests adopting a functional equivalence approach, whereby electronic documents with certified digital signatures are recognized based on their legal function rather than their physical form.

Comparative studies further enrich this debate. Tektona and Laoly (2023), in their comparative analysis of electronic signature regulation in Southeast Asia, find that several jurisdictions have begun to harmonize electronic transaction law with notarial practices through hybrid models, such as remote online notarization (Tektona & Laoly, 2023). Dewi (2021) similarly emphasizes the urgency of legal reform to accommodate digitalization while maintaining legal certainty. These studies indicate that Indonesia's current regulatory framework may need to be harmonized to address the evolving realities of digital business transactions (P. E. T. Dewi, 2021).

Beyond normative inconsistencies, electronic transactions are conducted within open digital networks that expose contracting parties to various risks, including data manipulation, identity theft, and contractual default. Najib et al. (2024) highlight that small and medium enterprises often face difficulties in protecting their contractual rights due to limited access to legal and technological resources (Najib et al., 2024). Usman (2020) observes that negligence or breach of electronic contracts can result in substantial economic losses, particularly in online sales of goods and services. In such circumstances, the availability of strong, reliable, and legally recognized digital evidence becomes essential for effective legal protection (Usman, 2020).

Despite the growing body of literature on electronic signatures, many previous studies focus primarily on technical implementation, general legality, or sector-specific applications. Few studies have systematically analyzed the normative conflict between electronic transaction law and notarial law in Indonesia, particularly regarding evidentiary hierarchy and legal certainty. This gap suggests the need for a more comprehensive normative juridical analysis that integrates statutory interpretation, legal doctrine, and technological considerations.

Based on these considerations, this research seeks to address the following research problem: how is the legal power of digital signatures in electronic contracts regulated under Indonesian law, and what are the implications of this regulation for legal certainty in digital business transactions? By examining the statutory framework governing electronic signatures, analyzing the interaction between the ITE Law and the Notary Law, and evaluating doctrinal perspectives, this study aims to clarify the legal

positioning of digital signatures within Indonesia's evidentiary system.

The novelty of this research lies in its integrative approach, which bridges electronic transaction law and notarial law within a single analytical framework. Unlike previous studies that emphasize either technical or normative aspects in isolation, this research highlights the normative inconsistencies between statutory regimes and their practical implications for evidentiary strength. By doing so, the study contributes to legal scholarship by offering a more nuanced understanding of the legal status of digital signatures and by proposing a conceptual basis for future regulatory harmonization.

Ultimately, this research is expected to contribute both theoretically and practically. Theoretically, it enriches the discourse on legal adaptation to digital transformation within civil law systems. In practice, it provides guidance to judges, legal practitioners, business actors, and policymakers on understanding and strengthening the legal framework governing digital signatures in electronic contracts. Through this contribution, the study supports the development of a secure, trustworthy, and legally certain digital business environment in Indonesia.

2. METHOD

This research employs a normative juridical research method (Budianto, 2020), which is a legal research approach that focuses on the analysis of legal norms as contained in statutory regulations, legal doctrines, and judicial decisions (Behbudov et al., n.d.). The normative juridical method is particularly suitable for this study because the main issue examined concerns the legal power and evidentiary status of digital signatures in electronic contracts, which fundamentally involves the interpretation, consistency, and hierarchy of legal norms rather than empirical behavior or statistical data.

Unlike empirical legal research, which examines law in action through social facts and field data, normative legal research conceptualizes law as a system of norms that prescribes how legal subjects ought to behave. This approach is therefore most appropriate for addressing questions of legal validity, legal certainty, and normative coherence, especially in the context of regulatory frameworks governing electronic transactions and notarial authority. Since this research aims to analyze statutory provisions and identify normative tensions between the ITE Law and the Notary Law, an empirical or sociological approach would not adequately capture the doctrinal and conceptual issues at stake.

The research adopts several complementary approaches within the normative juridical framework. First, the statutory approach (statute approach) is used to examine relevant laws and regulations governing electronic signatures and electronic contracts, particularly Law Number 19 of 2016 (Feldman, 2016) concerning Amendments to Law Number 11 of 2008 (Hayek, 2022) on Electronic Information and Transactions and Law Number 2 of 2014 concerning Amendments to Law Number 30 of 2004 on the Position of Notary. This approach allows for a systematic analysis of normative provisions, their scope,

and their legal implications.

Second, a conceptual approach is employed to analyze legal doctrines, principles, and theoretical concepts related to digital signatures, authenticity, evidentiary power, and electronic contracts. Through this approach, the research examines scholarly opinions and legal theories to clarify the conceptual position of digital signatures within Indonesia’s civil law and evidentiary system.

Third, a historical approach is applied to understand the development of digital signature regulation and the evolution of legal concepts related to signatures and authentic deeds. This approach helps explain the rationale behind existing legal norms and highlights how traditional technological developments have challenged legal doctrines.

The legal materials used in this research consist of primary and secondary legal materials. Primary legal materials include statutory regulations, official legislative documents, and relevant court decisions that directly regulate or relate to electronic signatures and electronic contracts. Secondary legal materials comprise legal textbooks, academic journals, scholarly articles, and expert opinions that provide interpretation, critique, and analysis of the primary legal materials.

The research process follows a structured analytical flow (Khedker et al., 2017; Trojanowicz, 2008). Initially, relevant legal norms concerning electronic signatures and electronic contracts are identified and classified. Subsequently, these norms are interpreted using doctrinal and conceptual analysis to assess their legal meaning and scope. The findings are then evaluated by comparing provisions across different statutes to identify normative inconsistencies or overlaps. Finally, conclusions are drawn through legal reasoning to determine the legal power of digital signatures in electronic contracts and their implications for legal certainty in digital business transactions.

3. FINDINGS AND DISCUSSION

3.1. Results

Table 1. Summary of Normative Findings on the Legal Power of Digital Signatures in Indonesia

No	Aspect Analyzed	Legal Basis	Research Findings	Legal Implication
1	Transformation of Digital Transactions	Civil Code (Art. 1320); ITE Law	Electronic contracts have become primary legal instruments in digital business transactions	Law must ensure transactional certainty and reliable authentication mechanisms
2	Legal Recognition	ITE Law Art.	Electronic information,	Paradigm shift from

	of Electronic Documents	5(1)	documents, and their printouts are recognized as valid legal evidence	paper-based to an electronic evidentiary system
3	Validity of Digital Signatures	ITE Law Art. 11; GR 82/2012 Art. 59(3)	Digital signatures are legally valid if they ensure authenticity, integrity, and non-repudiation	The functional-equivalence approach adopted in Indonesian law
4	Contractual Validity Requirements	Civil Code Art. 1320 & 1333	Electronic signatures fulfill the consent requirement if identity and agreement can be verified	Form does not invalidate a contract if the substantive elements are satisfied
5	Evidentiary Status in Court	ITE Law Art. 5 & 11	Digitally signed electronic contracts are admissible as legal evidence	Digital signatures possess binding evidentiary force in private agreements
6	Limitation Regarding Authentic Deeds	Notary Law Art. 1(7)	Digital signatures cannot replace authentic deeds made by or before a notary	Notarial deeds retain a superior evidentiary hierarchy
7	Evidentiary Hierarchy Distinction	Civil Law Evidentiary Doctrine	Electronic contracts differ from authentic deeds in hierarchical evidentiary strength	Structural asymmetry between electronic and notarial instruments
8	Overall Legal Position	ITE Law & Notary Law	Digital signatures are legally valid but hierarchically limited	Normative tension requires regulatory harmonization

Table 1 above summarizes the principal normative findings of this research regarding the legal power of digital signatures in Indonesia. It systematically maps the relationship between the relevant statutory provisions, doctrinal foundations, and their legal implications within the Indonesian evidentiary system. The findings demonstrate that digital signatures are normatively recognized under the ITE Law as legally valid and binding instruments in electronic contracts, fulfilling the functional requirements of authentication, integrity, and non-repudiation.

However, the table also highlights a structural distinction in evidentiary hierarchy. While digitally signed electronic contracts are admissible as legal evidence, they do not attain the same evidentiary status as authentic deeds regulated under the Notary Law. This distinction reveals a normative asymmetry between electronic transaction law and notarial law, which has direct implications for legal certainty in digital business transactions. The summary, therefore, reinforces the central argument of this research: digital signatures possess binding legal force but remain hierarchically limited within Indonesia's civil law evidentiary framework.

3.2. Development of Transactions in the Digital Era

The development of digital technology has fundamentally transformed transaction patterns in Indonesia, particularly in the business sector. The expansion of digital information technology has enabled rapid growth in electronic commerce, allowing transactions to be conducted without physical interaction or geographical limitations (I. Nasution, 2022; Agit et al., 2023). This transformation constitutes a normative fact indicating that electronic contracts have become a primary legal instrument in modern business activities.

The main finding of this research is that digital transactions are no longer peripheral but are structurally embedded in Indonesia's economic system. The widespread adoption of e-commerce platforms provides equal market access for both urban and rural communities, thereby supporting inclusive economic participation (P. E. T. Dewi, 2021). From a legal perspective, this condition requires the law to ensure transactional certainty, especially regarding the validity of agreements and the protection of parties involved.

Theoretically, electronic contracts remain subject to classical contract law principles, particularly the principle of consensualism. Article 1320 of the Civil Code stipulates that consent constitutes a fundamental requirement for contract validity. In digital transactions, consent is expressed electronically, which necessitates a legally reliable mechanism to authenticate the parties and confirm their agreement. This is where digital signatures become a crucial legal instrument.

Previous studies emphasize that the digital economy promotes efficiency and innovation but simultaneously increases legal risks due to information asymmetry and limited consumer awareness (Widya Astuti et al., 2023; Prasetya et al., 2021). This research affirms those findings by demonstrating that despite the availability of consumer protection mechanisms under Indonesian law, there remains a gap between normative regulation and practical implementation. Business actors often prioritize profit maximization, while consumers may lack sufficient understanding of their legal rights. (Anggraini et al., 2020) (M. H. H. Dewi & Diana, 2024)

Thus, the development of digital transactions underscores the need for a robust legal framework governing electronic evidence, particularly digital signatures, to ensure legal certainty, accountability, and consumer protection in electronic business transactions.

This structural transformation not only reflects economic modernization but also challenges the classical assumptions of contract formation embedded in the Civil Code. The transition from face-to-face transactions to digitally mediated agreements necessitates a reinterpretation of consent, proof, and accountability. In this context, legal certainty can no longer be understood solely through traditional documentary evidence but must accommodate technological authentication mechanisms capable of ensuring reliability and trust in virtual environments.

3.3. Legal Power of Digital Signatures in Electronic Contracts

The legal recognition of digital signatures represents one of the most significant normative developments in Indonesia's electronic transaction law. The concept of digital signatures originated in public-key cryptography, developed by Rivest, Shamir, and Adleman in 1977, which enables authentication, integrity, and non-repudiation of electronic documents (Noor, 2021). The findings of this research indicate that digital signatures are not merely technological tools but also legal instruments that serve as substitutes for handwritten signatures in electronic agreements.

Under Indonesian law, electronic signatures are regulated primarily by Law Number 11 of 2008 on Electronic Information and Transactions, as amended by Law Number 19 of 2016. Article 5, paragraph (1) of the ITE Law recognizes electronic information, electronic documents, and their printouts as valid legal evidence. This provision marks a paradigmatic shift from traditional evidentiary systems that relied exclusively on written documents and handwritten signatures.

From a doctrinal perspective, electronic signatures fulfill the requirements of contractual validity under the Civil Code. Since electronic contracts constitute agreements, they remain subject to Article 1320 and Article 1333 of the Civil Code, which regulate consent and object certainty. As long as the electronic signature authenticates the signatory and ensures document integrity, uncertainty about the object or medium does not invalidate the agreement (Hudzaifah, n.d.). This finding aligns with the

principle that form should not override substance in contractual relations.

Further analysis shows that Indonesian regulations adopt a functional-equivalence approach. Article 11, paragraph (1), of the ITE Law and Article 59, paragraph (3), of Government Regulation Number 82 of 2012 stipulate that electronic signatures are legally valid if they meet the elements of authenticity, integrity, and non-repudiation, regardless of the signatory's profession or position (Dermawan, 2021). This indicates that the law prioritizes the function of signatures rather than their physical form.

Several previous studies support this interpretation, arguing that digital signatures possess evidentiary power equivalent to handwritten signatures when statutory requirements are fulfilled (Daffa et al., 2023) (Amajihono, 2022). This research affirms those conclusions by demonstrating that electronic signatures are legally binding and admissible as evidence in court proceedings.

However, this study also identifies a normative limitation that distinguishes it from earlier research. While electronic signatures are valid for electronic contracts, their use in authentic deeds remains legally restricted. Article 1, paragraph (7) of Law Number 2 of 2014 on the Position of Notary defines authentic deeds as deeds made by or before a notary. Government Regulation Number 82 of 2012 further clarifies that electronic signatures function as authentication and verification tools but do not replace notarial formalities.

This finding runs counter to studies that implicitly equate digital signatures with authentic deeds. The research argues that although electronic signatures have strong evidentiary value, they cannot be positioned at the same hierarchical level as notarial deeds within Indonesia's evidentiary system. The prohibition on the use of electronic signatures for official deeds reflects the persistence of traditional legal doctrines that emphasize physical presence and formal procedures in notarial practice.

Therefore, digital signatures in Indonesia are legally valid and binding for electronic contracts, yet limited in scope compared to authentic deeds. This distinction is crucial for legal certainty, as misinterpretation may lead to flawed expectations regarding the evidentiary strength of electronically signed documents.

Overall, the discussion demonstrates that digital signatures have been normatively recognized as essential legal instruments in electronic contracts, reinforcing legal certainty in digital business transactions. At the same time, the coexistence of electronic transaction law and notarial law reveals an unresolved normative tension that necessitates further regulatory harmonization to accommodate technological innovation without undermining foundational legal principles.

The adoption of a functional-equivalence principle reflects Indonesia's alignment with global developments in electronic commerce law. However, the implementation remains partially fragmented due to the persistence of formalistic evidentiary doctrines in other sectors of law, particularly notarial

regulation. This fragmentation creates a layered evidentiary hierarchy that may generate interpretative inconsistencies in judicial practice.

3.4. Normative Implications and Regulatory Harmonization

The coexistence of electronic transaction law and notarial law reveals a structural asymmetry within Indonesia's evidentiary system. While the ITE Law adopts a functional-equivalence approach that prioritizes technological neutrality and substantive authentication, the Notary Law maintains a formalistic doctrine rooted in physical presence and traditional deed formalities. This dualism may undermine full legal certainty in digital business transactions, particularly when parties mistakenly assume that electronically signed documents have the same evidentiary weight as authentic deeds.

From a doctrinal standpoint, this normative divergence raises fundamental questions concerning the adaptability of civil law evidentiary principles in the digital era. If technological development continues to advance transactional practices, maintaining rigid formal hierarchies without regulatory harmonization may hinder the progressive realization of legal certainty. Therefore, future regulatory reform or judicial interpretation is required to reconcile technological innovation with foundational evidentiary doctrines, ensuring coherence, proportionality, and systemic consistency within Indonesia's legal framework.

4. CONCLUSION

Based on the analysis and discussion, several important conclusions can be drawn regarding the legal power of digital signatures in electronic contracts within digital business transactions in Indonesia. First, digital signatures are an essential component of modern electronic transactions. They are legally recognized under Indonesian law, particularly under Law Number 11 of 2008 on Electronic Information and Transactions, as amended by Law Number 19 of 2016, along with its implementing regulations. When digital signatures meet the requirements of authentication, integrity, and non-repudiation, they possess the same legal force as handwritten signatures in the context of electronic contracts. Second, in terms of function and evidentiary value, digital signatures play a crucial role in verifying signatories' identities, ensuring the authenticity and integrity of electronic documents, and demonstrating the parties' consent to contractual obligations. Electronic documents properly signed with valid digital signatures, including their printed versions, are admissible as legal evidence in court, thereby strengthening legal certainty in digital business transactions.

However, despite their legal recognition, digital signatures still face several normative limitations and practical challenges. These include limited public understanding, potential cybersecurity risks, and regulatory constraints. Notably, digital signatures cannot substitute handwritten signatures in authentic deeds, which remain under the exclusive authority of notaries. This condition reflects an ongoing

normative tension between electronic transaction law and traditional evidentiary doctrines in Indonesian legal practice.

To enhance the effectiveness and legal certainty of digital signatures in electronic contracts, several practical recommendations can be proposed. For policymakers, it is necessary to harmonize regulations governing electronic transactions and notarial authority to minimize normative inconsistencies and provide clearer guidance on the evidentiary status of electronically signed documents. For business actors, adopting certified electronic signature providers and complying with applicable legal requirements are essential to ensure the enforceability of electronic contracts. Meanwhile, for the general public, increasing legal literacy and awareness regarding the proper use and legal implications of digital signatures is crucial to prevent disputes and misuse.

Finally, future research is encouraged to explore the empirical implementation of digital signatures in judicial practice, conduct comparative studies with other jurisdictions, and examine the integration of emerging technologies, such as blockchain-based signatures, into Indonesia's legal framework. Such efforts would contribute to a more comprehensive understanding of how the law can adapt to the ongoing process of digital transformation.

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