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RECOGNITION OF ELECTRONIC SIGNATURES AND EVIDENTIARY POWER OF DIGITAL CONTRACTS IN INDONESIA

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Abstract

This research analyzes the validity of electronic contracts based on the requirements for a valid agreement under the Indonesian Civil Code and examines the evidentiary strength of electronic signatures and legal protection for parties in digital transactions in Indonesia. The research employs normative juridical method with statutory, conceptual, and comparative approaches. The findings indicate that the requirements for a valid agreement remain applicable to electronic contracts, yet the mechanisms for fulfilling these requirements have adapted to digital technology. Certified electronic signatures possess evidentiary strength equivalent to wet signatures, while uncertified electronic signatures have limited evidentiary power. Consumer protection in electronic contracts faces challenges due to the imbalance of bargaining positions and the dominance of standard clauses. This research recommends regulatory reform and jurisprudential development to ensure legal certainty in electronic contracts.

Keywords: electronic contract, validity requirements, electronic signature, consumer protection, legal certainty, evidence, digital technology

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Introduction

The development of digital technology has fundamentally changed the way society conducts legal transactions, including in the field of agreements. Electronic contracts as a form of agreement made through electronic means increasingly dominate various business and consumer activities in Indonesia. The rapid digital transformation also alters the patterns of interaction and relationships between parties across various sectors, thus demanding an adjustment of a more responsive legal framework to these changes (Darmawan, 2024a). This phenomenon presents new challenges for the civil law system, which was historically developed to regulate conventional agreements with physical and face-to-face characteristics. The ability of society to gradually learn and adapt to new interaction patterns also determines the success of adaptation to such technological changes (Kurniawan & Darmawan, 2021). Contract law needs to be interpreted and applied within a digital landscape that has different characteristics, such as transaction speed, the anonymity of the parties, and massive transaction volumes (Utomo & Thukuse, 2025). The changing patterns of increasingly automated activities also demand an increase in knowledge and involvement of the parties so that they are able to keep up with these developments adequately (Darmawan, 2024b). Legal issues that arise include how to determine the moment an agreement is reached, how to verify the capacity and identity of the parties, and how to guarantee the validity of a contract whose formation process takes place in digital space. The shift in activity management patterns due to digitalization also encourages a reorientation toward a more flexible form of regulation that aligns with the demands of the times (Mardikaningsih, 2025).

The requirements for a valid agreement serve as the main benchmark in assessing the validity of electronic contracts. These four requirements, namely the agreement of the parties, the capacity to make an engagement, a specific object, and a lawful cause, are cumulative and must be met in their entirety. The fulfillment of these four requirements electronically becomes an important aspect in realizing fair and accountable electronic transactions for the parties involved (Purnomo et al., 2025). In conventional contracts, the fulfillment of these requirements is relatively easy to verify through wet signatures, direct meetings, and physical documents (Nilamjati et al., 2025). In electronic contracts, the process of fulfillment and proof of these requirements faces challenges of a technical and juridical nature. A more flexible regulatory structure is needed so that the legal system can adapt to these technical dynamics without diminishing the certainty of fulfilling the four requirements for a valid agreement (Darmawan & Mardikaningsih, 2023). The fundamental difference between these two types of contracts lies in the medium used to express intent and create agreement among the parties.

The element of agreement in electronic contracts becomes a critical point because the formation of consent is not carried out through the signing of physical documents, but rather through various digital mechanisms. Click-wrap agreements, electronic signatures, confirmation email transmissions, and active behaviors indicating acceptance of an offer are common forms of expressing consent used in electronic transactions. The ability of users to access and understand these digital consent mechanisms is heavily influenced by their level of technological skills, meaning that accessibility and equality of access also affect the validity of the formed agreement (Ramle & Mardikaningsih, 2022). Contract law doctrine adheres to the receipt theory, which states that an agreement is formed at the moment the acceptance of an offer reaches the offering party (Hosseininasab & Hosseininasab, 2024). Problems arise because digital consent mechanisms are often executed very quickly and without adequate verification by one of the parties. The technological utilization gap among user groups is also a factor that needs to be considered so that digital consent mechanisms do not create disparities in understanding the contents of the agreement (Darmawan, 2024c). The user practice of clicking the agreement button without reading the entire contents of the contract has become a common phenomenon that raises questions regarding the validity of the agreement.

The verification of the capacity of the parties in electronic contracts faces more complex challenges compared to conventional contracts due to the anonymity and ease of access that characterize the digital world. Everyone is legally presumed capable of making engagements unless declared incapable by law; however, in electronic contract practices, the identity and legal status of the parties are often difficult to ascertain. This obscurity of identity is closely related to the issue of personal data protection, because the process of verifying capacity essentially also relies on the management of valid and accountable identity data (Lutrianto & Al-Qasimi, 2025). Minors or persons declared legally incapable can easily create accounts and enter into electronic contracts without the knowledge of their contracting partners (Tudose, 2025). The lack of identity verification in the digital space also opens up opportunities for the exploitation of parties who are legally or socially in vulnerable positions (Lukmantara et al., 2022). This poses significant legal risks because contracts made by incapable parties can be annulled, thereby disrupting legal certainty in electronic transactions. Such conditions emphasize the need for strategic reorientation in designing protection mechanisms for vulnerable parties so that they are not disadvantaged due to undetected legal incapacity (Issalillah & Khayru, 2025). The development of digital verification technologies such as electronic identities, authentication codes, and biometric recognition provides technical solutions, but has not yet fully resolved the underlying legal problems.

The object of the agreement in electronic contracts is frequently in the form of immaterial digital goods or services, such as software licenses, digital content, and subscription-based services. The development of the utilization of digital means as business promotion media also broadens the variety of digital objects that become part of electronic agreements in Indonesia (Infante & Mardikaningsih, 2022). Legal construction regarding the object of the agreement, which historically has been oriented toward physical objects, needs to be interpreted broadly to accommodate digital agreement objects. The provision concerning a specific object requires that the object of the agreement must be clear and determinable, which in the digital realm can be fulfilled because such objects are typically explicitly stated in electronic documents. The clarity of the transaction object becomes increasingly important given the ongoing circulation of non-standard products, so that provisions concerning specific objects also serve to prevent the circulation of objects whose legality is unclear (Purwanto et al., 2025). Lawful cause as the fourth requirement must still be fulfilled under the condition that the content and purpose of the agreement do not conflict with the law, morality, or public order (Elyviatino & Nugroho, 2025). A fair legal framework for all business actors, including small and medium-scale business actors, is also necessary so that the determination of digital agreement objects is not unilaterally dominated by parties holding a stronger position (Indarto et al., 2023). In the digital realm, there are transactions which, although conducted electronically, substantially contain prohibited causes, such as the buying and selling of illegal content or the financing of cybercrime activities.

Electronic signatures hold a central position in electronic contracts because they function as proof of consent and identification of the involved parties. The legal system recognizes two types of electronic signatures, namely certified electronic signatures and uncertified electronic signatures, with differing evidentiary strengths. Certified electronic signatures created using electronic certificates from electronic certification providers possess legal force equivalent to wet signatures. The execution of contracts that have been agreed upon through electronic signatures must still be grounded in the principle of good faith so that the rights and obligations of the parties are fulfilled as appropriate (Irfansyah et al., 2024). Uncertified electronic signatures in the form of scanned images of wet signatures or consent via instant messaging applications possess more limited evidentiary strength (Dahlan et al., 2025). In daily practice, the use of uncertified electronic signatures is highly dominant, particularly in simple digital transactions and business communications. Law enforcement is also demanded to continuously adapt to various new forms of violations arising from the development of digital means, including those related to the validity and misuse of electronic signatures (Mahmud et al., 2023). The gap between normative regulation and digital community practice creates legal uncertainty that requires serious attention. The resolution of issues arising from the misuse of digital space, including content contrary to the law, requires an approach oriented toward the restoration of the rights of the aggrieved parties (Rianto et al., 2023).

The legal protection of the parties in electronic contracts faces special challenges due to the imbalance of positions between business actors as platform or service providers and consumers as end-users. This imbalance is manifested in the use of standard agreements or adhesion contracts whose entire contents are determined unilaterally by the business actor. The regulatory uncertainty accompanying the development of electronic transactions also poses a distinct challenge to the business continuity of digital business actors in carrying out their activities (Mardikaningsih & Darmawan, 2021). The principle of good faith serves as the foundation to assess whether the clauses in electronic contracts have been made with due regard to the interests of the parties fairly (Rahma & Sulastri, 2025). The commitment of the parties in carrying out contractual obligations is also influenced by psychological factors that foster trust and active involvement in the contractual relationship (Darmawan & Mardikaningsih, 2022). Provisions regarding consumer protection provide additional protection through the prohibition of standard clauses that disadvantage consumers, as well as the obligation for business actors to provide clear and non-misleading information. The ability of both business actors and consumers to adapt to regulatory and technological changes also determines the effectiveness of protection that can be obtained in electronic transaction practices (Mardikaningsih & Darmawan, 2022). Personal data protection also becomes an important dimension because the collection and processing of personal data in electronic contracts is unavoidable and requires a valid legal basis. The role of the legal profession is likewise necessary in strengthening protection and dispute resolution efforts for parties disadvantaged in electronic contract practices (Jayadi et al., 2025).

This study aims to analyze the validity of electronic contracts based on the legal requirements of an agreement. This study also aims to examine the legal strength of electronic signatures in proving electronic contracts and to analyze legal protection for the parties involved in electronic contracts. Furthermore, this study aims to identify challenges in the development of electronic contract law in Indonesia. Thus, this study is expected to contribute to the development of contract law that is responsive to the development of digital technology.

Method

This research is conducted by applying normative legal research methods complemented by a statutory approach, a conceptual approach, and a comparative approach. The examination of provisions in the Indonesian Civil Code, Law Number 1 of 2024 concerning the Second Amendment to Law Number 11 of 2008 concerning Information and Electronic Transactions, Law Number 8 of 1999 concerning Consumer Protection, Law Number 27 of 2022 concerning Personal Data Protection, and Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions is carried out through the statutory approach. The analysis of legal concepts related to agreements, electronic signatures, and consumer protection in electronic transactions is carried out using the conceptual approach.

The legal materials used in this research consist of three types, namely primary legal materials, secondary legal materials, and tertiary legal materials. Primary legal materials encompass laws and regulations in the fields of civil law, information and electronic transactions, consumer protection, and personal data protection. Secondary legal materials in the form of literature, journal articles, and legal doctrines relevant to electronic contracts are used as supporting sources. Tertiary legal materials such as legal dictionaries and encyclopedias are also utilized to enrich the analysis. Data collection is carried out through library research, the implementation of which includes inventorying, classification, and systematic analysis of the legal materials that have been gathered (Jorovlea & Tudor, 2023). Data analysis is conducted qualitatively using grammatical interpretation and systematic interpretation methods to capture the meaning and purpose of electronic contract regulations in laws and regulations. The analysis results are presented in the form of descriptive-analytical narratives detailing the validity of electronic contracts, the legal force of electronic signatures, the legal protection of the parties, as well as the challenges and recommendations for the development of electronic contract law in Indonesia.

Result and Discussion

The Application of the Requirements for a Valid Agreement in Electronic Contracts According to the Civil Code

The validity of electronic contracts must be measured based on the requirements for a valid agreement as stipulated in Article 1320 of the Civil Code. This article determines that for the validity of an agreement, four conditions are required, namely the agreement of those who bind themselves, the capacity to make an engagement, a specific matter, and a lawful cause. These four requirements are cumulative, meaning that all of them must be fulfilled for an agreement to be declared valid and legally binding (Firmanto, 2025). The same principle of legal certainty also serves as the basis for the regulation of various other technology-based transaction forms, including the regulation of digital credit which is now specifically regulated in business law and financial markets (Yuristiawan et al., 2024).

The sociological and juridical legitimation of the application of Article 1320 of the Civil Code in the cyber realm is explicitly recognized by the state through Article 18 paragraph (1) of Law Number 11 of 2008 concerning Information and Electronic Transactions, which states that electronic transactions set forth in electronic contracts bind the parties (Permatasari & Silalahi, 2025). Furthermore, the synchronization bridge between conventional and digital validity requirements is locked by Article 46 paragraph (2) of Government Regulation Number 71 of 2019 (PP PSTE), which asserts that an electronic contract is deemed valid if it fulfills the elements of agreement, is conducted by capable legal subjects, contains a specific matter, and has a lawful cause. Such legal recognition also reinforces certainty for business actors in conducting electronic commerce transactions, including in fulfilling tax obligations for such transactions as regulated in value-added tax provisions for e-commerce transactions (Wibowo et al., 2023).

The application of these four requirements in electronic contracts faces distinct challenges due to the characteristics of digital transactions, which differ from conventional agreements. The fundamental difference lies in the medium used to express intent and create agreement among the parties, which in electronic contracts takes place through digital means. The flexibility of this digital medium is accommodated by Article 1 number 17 of the ITE Law, which defines an electronic contract as an agreement of the parties made through an electronic system, so that the transition from a physical medium to cyberspace remains within the corridor of legal certainty. The role of technology in changing business transaction patterns is increasingly evident along with the growing utilization of electronic systems by business actors to increase their business revenue (Sinambela et al., 2021).

The first requirement, namely the existence of an agreement, is a critical point in electronic contracts. Agreement in conventional agreements is usually manifested through the signing of a contract document by the parties. In electronic contracts, agreement can be expressed through various mechanisms, including clicking an agree button known as a click-wrap agreement, signing with an electronic signature, sending a confirmation email, or active behavior indicating acceptance of the given offer. Contract law doctrine adheres to the view that an agreement is formed at the moment the acceptance of an offer reaches the offering party based on the receipt theory (Hosseininasab & Hosseininasab, 2024). Legal issues arise when agreements in electronic contracts are formed through mechanisms that are very rapid and frequently without careful verification by one of the parties. Changes in work patterns and business interactions in the digital era also drive a shift in how parties express consent, along with demands for efficiency that increasingly rely on creativity and innovati

The practice of click-wrap agreements, where users click the consent button without reading the entire contents of the contract, is a very common phenomenon in digital transactions. The Supreme Court in several of its rulings has recognized the validity of click-wrap agreements provided that the bound party has adequate access to read and understand the contents of the agreement before giving consent. This recognition indicates that agreements in electronic contracts remain legally valid if the parties are given a reasonable opportunity to know and understand the contents of the agreement (Martinelli et al., 2024). The validity of agreements in electronic contracts heavily depends on the availability of mechanisms that allow the party giving consent to access and understand the entire contents of the contract.

The second requirement, namely the capacity of the parties, is essentially no different between conventional contracts and electronic contracts. Article 1329 of the Civil Code states that every person is capable of making engagements, unless declared incapable by law. The challenge in electronic contracts is the verification of the capacity of the parties, particularly considering the anonymity and ease of access that characterize the digital world. A minor or a person declared legally incapable can easily create accounts and enter into electronic contracts without the knowledge of their contracting partner (AV & Yustiawan, 2023). The protection of vulnerable legal subjects is a special concern in the judicial system, as seen in the efforts to provide legal protection for children in conflict with the law through diversion and guidance mechanisms (Utama et al., 2024). The development of digital verification technologies such as electronic ID cards (e-KTP), one-time passwords, and biometric authentication provides technical solutions, but has not fully resolved the fundamental legal issues regarding the certainty of identity and legal status of the parties. The gap in the ability to adopt this digital verification technology is also felt by various user groups, including older workers who face distinct challenges in implementing digital technology within organizational environments (Darmawan, 2023).

The third requirement, namely the existence of a specific subject matter or *een bepaald onderwerp*, in electronic contracts can generally be fulfilled because the object of the agreement is usually stated explicitly in electronic documents. The objects of agreements in electronic transactions are frequently in the form of immaterial digital goods or services, such as software licenses, digital content, or subscription-based services. The legal construction regarding the object of agreement in the Civil Code, which historically has been more oriented toward physical objects, needs to be interpreted broadly to accommodate digital agreement objects (Elyviatino & Nugroho, 2025). The development of the digital economy has broadened the scope of agreement objects without altering the basic principles concerning object certainty as regulated in contract law. The object of the agreement must remain clear, determinable, and not contrary to the law. The expansion of such digital objects also opens up financing opportunities for micro and small businesses through cooperative-based institutional financing schemes that leverage the development of the digital economy (Wiyandarini et al., 2021).

The fourth requirement, namely a lawful cause or permitted *causa*, in electronic contracts is in principle the same as in conventional contracts. Article 1337 of the Civil Code determines that a cause is prohibited if it is prohibited by law, contrary to morality, or contrary to public order. In the digital realm, there are several types of transactions which, although conducted electronically, substantially contain prohibited causes, such as contracts for the sale and purchase of illegal content, the financing of cybercrime activities, or the distribution of malware (Firmanto, 2025). Such contracts remain null and void by law even if they fulfill other formal requirements. Furthermore, electronic contracts must also comply with the provisions of the Information and Electronic Transactions Law and its derivative regulations. Law enforcement against such prohibited causes needs to be supported by effective criminal sanctions to be able to prevent the misuse of electronic means for criminal purposes, including criminal acts of corruption that utilize electronic systems (Suhartono et al., 2024).

In addition to such repressive approaches, resolutions for violators can also consider a restorative justice approach oriented toward restoring the legal relationship between the parties (Udjari et al., 2022).

Based on the comparison between conventional contracts and electronic contracts, it can be understood that the requirements for the validity of electronic contracts still refer to the provisions of Article 1320 of the Civil Code. The main difference lies in the mechanism of fulfilling each requirement, which has adapted to the development of information technology. Regarding the element of agreement, conventional contracts are generally evidenced through wet signatures, oral statements, or the behavior of the parties indicating consent. In electronic contracts, agreement is manifested through digital media such as clicking consent, the use of electronic signatures, or confirmation via electronic mail. Such forms of consent legally retain binding force as long as they comply with the provisions stipulated in the Information and Electronic Transactions Law. The shift in work patterns toward remote working systems also influences how agreements are formed in business relationships, as the parties increasingly become accustomed to interacting and approving agreements without physical meetings (Darmawan, 2023). If a dispute arises due to mismatched understandings between the parties during the agreement process, its resolution may also consider a restorative justice approach as an alternative dispute resolution option (Wijaya et al., 2022).

Regarding the element of the capacity of the parties, conventional contracts generally utilize direct identity verification through the examination of identity cards or other physical documents. In electronic contracts, the verification process is carried out digitally through the use of e-KTP, one-time passwords, biometric authentication, or other electronic identity verification systems. These technological developments enhance the efficiency of the contract formation process, while simultaneously posing new challenges in the form of risks of identity misuse, personal data theft, or authentication failures that can affect the validity of a contract if not supported by a reliable and secure electronic system (Martam, 2024). Regarding the element of a specific matter, both conventional contracts and electronic contracts equally require the presence of an object that is clear and determinable.

Regarding the element of a lawful cause, both conventional contracts and electronic contracts must still fulfill the requirement that the content and purpose of the agreement must not conflict with laws and regulations, morality, or public order. In electronic contracts, there are additional requirements in the form of compliance with the provisions of the Information and Electronic Transactions Law and its derivative regulations, particularly those related to the validity of electronic documents, the use of electronic signatures, the operation of electronic systems, information security, and personal data protection. Compliance with the principles of fair business competition also constitutes an important part of a lawful cause in electronic transactions, as regulated through the supervision of the Business Competition Supervisory Commission in the digital economy era (Wibowo et al., 2023a). Digitalization does not alter the requirements for a valid agreement as stipulated in the Civil Code, but rather transforms the mechanisms of proof and execution through the utilization of information technology, which must still adhere to the principles of legal certainty, electronic system reliability, and legal protection for the parties.

The Evidentiary Strength of Certified and Uncertified Electronic Signatures in Electronic Contracts According to the ITE Law

The rapid development of information technology demands a balance between the speed of innovation and considerations of humanitarian values so that the resulting regulations remain relevant and side with the interests of the public (Darmawan, 2023). A signature is one of the most important elements in a contract, serving as proof of consent and identification of the involved parties. In the Indonesian legal system, electronic signatures are regulated in Article 11 of the Information and Electronic Transactions Law, which states that electronic signatures possess legal force and valid legal consequences as long as they fulfill the prescribed requirements (Utomo & Thukuse, 2025). Electronic signatures that fulfill the statutory requirements are categorized as certified electronic signatures, whereas those that do not fulfill these requirements are categorized as uncertified electronic signatures. The difference between these two types of electronic signatures lies in the certification mechanism and their evidentiary strength in legal proceedings.

Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions provides more detailed regulations regarding electronic signatures. Based on this government regulation, certified electronic signatures must be created using electronic certificates issued by an Electronic Certification Provider that has obtained recognition from the government. This provision creates the ecosystem of trust necessary to ensure the authenticity and integrity of the signed electronic documents (Hasan & Putra, 2025). Electronic Certification Providers are tasked with conducting identity verification, authentication, and the issuance of electronic certificates that meet specific security standards. Consequently, certified electronic signatures possess a high level of reliability because they are supported by a public key infrastructure that guarantees the validity of the signer's identity. Such diligence in managing identity data and electronic documents aligns with the optimal data management principles that can support precise and accurate decision-making processes (Ali & Darmawan, 2023).

The evidentiary strength of certified electronic signatures in trial proceedings is equivalent to wet signatures. This is affirmed in Article 5 paragraph (1) of the Information and Electronic Transactions Law, which states that electronic information and electronic documents, along with their printed outputs, constitute valid legal evidence. The Supreme Court, through Supreme Court Regulation Number 1 of 2019 concerning Case Administration and Electronic Court Proceedings, has also recognized and regulated the use of electronic documents in trial processes, which further strengthens the position of electronic contracts within the Indonesian legal system (Dahlan et al., 2025). In judicial practice, certified electronic signatures are more readily accepted as electronic evidence because they are capable of guaranteeing the authenticity of the signer's identity, the integrity of the electronic document, and preventing repudiation. The principle of protection for interested parties in an electronic transaction is actually not new in legal studies, as seen in the issue of business actors' responsibilities in ensuring the smooth process of digital transactions for consumers (Anugroh et al., 2023).

The issue that remains a subject of debate concerns uncertified electronic signatures, which are widely used in practice. Signatures in the form of images or image scans of wet signatures affixed to PDF documents, or consent via instant messaging applications, technically do not fulfill the requirements of certified electronic signatures, yet factually they are very common in daily transactions. The approach developing in legal practice is to recognize the validity of uncertified electronic signatures as long as the existence of consent can be proven and no legally proven repudiation exists (Perdana et al., 2025). This means that uncertified electronic signatures continue to be recognized based on Article 11 paragraph (2) of the Information and Electronic Transactions Law, but their evidentiary strength is relatively more limited. Such issues are fundamentally closely related to public legal awareness and prevailing social norms, as the level of compliance with a rule is frequently influenced by the extent to which the public understands and accepts that rule as part of existing customs (Da Silva & Khayru, 2025).

Uncertified electronic signatures do not undergo the certification process by an Electronic Certification Provider, meaning their validity relies more heavily on the ability of the parties to prove the authenticity of the signer's identity, the integrity of the electronic document, and the existence of valid consent. In the event of a dispute, the party presenting an uncertified electronic signature generally must introduce additional evidence, such as transaction audit trails, IP addresses, account authentication proofs, system logs, electronic correspondence, or other digital evidence to strengthen proof (Ningrum & Dalimunthe, 2022). Although both types of electronic signatures equally obtain legal recognition in the Indonesian legal system, the use of certified electronic signatures provides a higher level of legal certainty and protection, particularly in business transactions of high economic value or electronic contracts with the potential to cause disputes in the future. The need for a reliable verification system free from discriminatory elements is actually also a concern in other sectors, such as in the utilization of data for business interests which must still pay attention to aspects of protecting the subjects of that data (Bashori et al., 2024).

Electronic signatures have gained strong legal recognition in the Indonesian legal system through the Information and Electronic Transactions Law and Government Regulation Number 71 of 2019. Certified electronic signatures possess an equivalent legal standing to wet signatures because they are supported by electronic certificates and verification systems that guarantee the authenticity and integrity of electronic documents. This regulation provides legal certainty and strengthens the evidentiary function in electronic transactions as well as trial proceedings. The practice of using uncertified electronic signatures remains highly dominant in daily life, particularly in simple digital transactions and business communication via electronic applications, which indicates a gap between normative regulations and digital community practices. The validity of uncertified electronic signatures ultimately depends heavily on the ability of the parties to prove the existence of consent, the identity of the involved parties, and the absence of legally valid repudiation. Thus, the dynamics of electronic signature regulation demonstrate that legal development in the digital era consistently runs parallel to the demands for certainty, protection, and trust in every form of interaction conducted electronically.

Legal Protection for Consumers in Electronic Contracts: Imbalanced Positions and Regulation of Standard Clauses

Legal protection is one of the primary functions of the legal system in ensuring that every legal subject obtains their rights and is not arbitrarily disadvantaged. In electronic contracts, there is an inherent imbalance of positions between business actors as platform or service providers and consumers as end-users. This imbalance manifests itself in the use of standard agreements or adhesion contracts whose entire contents are determined unilaterally by the business actor. Consumers frequently have no room to negotiate the contents of the agreement and can only accept or reject the offered contract (Rahma & Sulastri, 2025). This condition places consumers in a weak position and vulnerable to exploitation through unfair clauses in electronic contracts. Such imbalance becomes even more evident when linked to the prevalence of fraud cases in online transactions, which indicates that consumers are frequently in the most vulnerable position to experience losses (Ali, Dirgantara, & Darmawan, 2024). A similar phenomenon is also seen in the misuse of cryptocurrency-based digital assets as traded commodities, where legal loopholes further magnify the risk of loss for parties in a weak position (Balkista, Hardyansah, Darmawan, Saktiawan, & Saputra, 2024). Such inequality is fundamentally a reflection of broader inequality in social interaction, much like how social stereotypes can influence opportunities and treatment received by certain groups (Sajjapong, Darmawan, & Marsal, 2022).

The Civil Code contains a protection mechanism against the misuse of standard clauses in contracts, namely through the principle of good faith stipulated in Article 1338 paragraph (3). This article states that an agreement must be performed in good faith. Contract law doctrine interprets good faith as applying during the stage of contract performance, the formation stage, and the post-performance stage. In the formation stage of electronic contracts, good faith requires business actors to provide clear, honest, and non-misleading information to their prospective contracting partners. This obligation includes the disclosure of all applicable terms and conditions, including technical matters that have the potential to disadvantage consumers if not well understood (Rahma & Sulastri, 2025). This moral obligation transforms into a positive cyber legal obligation through Article 9 of Law Number 11 of 2008 concerning Information and Electronic Transactions (ITE Law), which obligates business actors offering products through electronic systems to provide complete and correct information regarding contract terms, producers, and the products offered. The principle of good faith is fundamentally closely related to the professional integrity values upheld in various fields, including legal advocacy practices that demand justice to be carried out ethically (Saktiawan, Hardyansah, Darmawan, & Putra, 2021). The application of good faith by business actors also reflects ethical leadership, which plays a crucial role in building a positive and sustainable organizational culture (Mardikaningsih, Halizah, Nuraini, & Darmawan, 2022). This attitude is similarly related to an authentic leadership style capable of creating a positive work climate and encouraging responsible organizational behavior (Mardikaningsih et al., 2022)

As a material protective instrument, Law Number 8 of 1999 concerning Consumer Protection (Consumer Protection Law) provides an additional layer of protection that is highly relevant in electronic contracts. Article 18 of the Consumer Protection Law explicitly prohibits business actors from including standard clauses which, among other things, state the transfer of responsibility of the business actor, grant the right to the business actor to reduce service benefits or reduce the assets of the consumer which form the object of the service sale and purchase, or state that the consumer is subject to regulations in the form of new, additional, supplementary, or subsequent modification rules. Standard clauses that contradict Article 18 of the Consumer Protection Law are declared null and void by law. This provision provides strong protection for consumers against unfair business practices in electronic transactions. The legal force of this prohibition is locked back into the corridor of cyber law by Article 47 paragraph (2) of Government Regulation Number 71 of 2019 (PP PSTE), which asserts that electronic contracts are prohibited from harming consumers and the inclusion of their standard clauses must comply with regulations in the field of consumer protection. The spirit of such protection fundamentally stems from principles also applied in other fields of law, such as the restorative principle that prioritizes the recovery and protection of parties in a weak position (Al Haibah et al., 2024). The protection against such disadvantageous clauses becomes crucial especially for small and medium-scale business actors, whose business continuity heavily relies on competence in conducting transactions fairly (Mardikaningsih et al., 2022). The ability of business actors to innovate and compete healthily should still be balanced with compliance with provisions protecting consumer rights (Abdullah et al., 2021).

In the realm of digital law, consumer protection in electronic contracts is regulated more operationally through Article 47 and Article 48 of Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions. These provisions obligate business actors using electronic contracts to fulfill minimum information standards that must be disclosed, including the identities of the parties, the object and specifications of goods/services, transaction requirements, prices and costs, up to contract cancellation procedures. This obligation to disclose information is an implementation of the principles of transparency and honesty in contract law. Business actors who fail to fulfill the obligation of information disclosure can be subjected to administrative sanctions in accordance with the provisions of prevailing laws and regulations. The obligation to convey correct information relates to the importance of professional honesty in every document submitted to other parties, just as the issue of document forgery demonstrates the potential losses arising from inaccurate information (Hartika et al., 2023). The firmness of sanctions against violations of this obligation is important to note, because the effectiveness of a sanction also determines the success of law enforcement efforts against occurring violations (Ferdinanta, Saputra,

& Darmawan, 2024). Clear operational standards in the provision of goods and services also play an important role in supporting business performance that is responsible toward consumers and the surrounding environment (Barzani et al., 2022). Good information management by business actors additionally serves as a source of competitive advantage, particularly for companies operating in the information technology sector (Darmawan, 2023). Adequate digital marketing competence and digital literacy constitute important factors for business actors in fulfilling these information obligations accurately (Halizah & Darmawan, 2025).

The aspect of personal data protection also constitutes an important dimension in the legal protection of the parties in electronic contracts. Law Number 27 of 2022 concerning Personal Data Protection provides a comprehensive legal framework regarding the rights of data subjects and the obligations of data controllers (Wijayanto et al., 2025). In electronic contracts, the collection of personal data of the parties is unavoidable, and the Personal Data Protection Law mandates a valid legal basis for processing, including through explicit consent mechanisms from data subjects. Data controllers are obligated to ensure that the processing of personal data is carried out in accordance with agreed-upon purposes, as well as to guarantee the security and confidentiality of personal data collected through electronic contracts. Regulations concerning electronic data and personal data also receive special attention in criminal procedural law, given the importance of data protection in the law enforcement process within the cyber realm (Budiman et al., 2026). The effectiveness of personal data protection regulations is also heavily tested in the financial technology sector, whose data management is closely linked to the trust of service users (Aziz et al., 2023). The issue of data protection is similarly relevant to the mitigation of investment risks on technology-based lending platforms, the management of whose user data requires adequate legal arrangement (Sahid et al., 2023).

The dispute resolution mechanism in electronic contracts also serves as an important component in the legal protection system. Article 38 of the Information and Electronic Transactions Law grants the right to anyone who can prove the existence of losses resulting from unlawful acts utilizing electronic systems to file a civil lawsuit. Alternative dispute resolution mechanisms are also available through Consumer Dispute Resolution

Bodies and Alternative Dispute Resolution Institutions, which increasingly develop capacities to handle disputes originating from electronic transactions. These mechanisms provide options for the parties to resolve disputes without having to go through time-consuming and costly judicial processes. Technological developments also play a role in driving digital innovation that influences dispute resolution patterns across various business sectors (Mardikaningsih & Wardoyo, 2024). The use of electronic money as an alternative cash payment tool also has the potential to generate distinct disputes that need to be resolved through available mechanisms (Sinambela & Darmawan, 2022). The advantages and disadvantages of using such electronic money need to be continuously studied so that dispute resolution mechanisms can accommodate the continuously evolving characteristics of electronic transactions (Sinambela & Darmawan, 2022).

The Urgency of Updating Electronic Contract Law Amidst Digital Technology Development and the Speed of Cross-Border Transactions

Although the regulatory framework for electronic contracts in Indonesia has experienced significant development, there remain several challenges that require serious attention from lawmakers and practitioners. First, there are inconsistencies in the application and enforcement of laws regarding electronic contracts among different judicial institutions. Dispute resolution approaches oriented toward the restoration of rights, as applied in handling cases in digital spaces based on the Information and Electronic Transactions Law and the Criminal Code, can serve as a reference in formulating more consistent electronic contract dispute handling standards (Darmawan & Negara, 2023). There is yet no established jurisprudence regarding the standards of validity for electronic contracts, particularly for types of contracts made under conditions of significant bargaining position imbalance (Salsabila & Ispriyarso, 2023). This uncertainty creates legal risks for parties conducting electronic transactions because they cannot predict with certainty how courts will assess the validity of the contracts they create.

Second, jurisdictional issues in cross-border electronic contracts remain a problem that has not been comprehensively resolved. Electronic contracts involving parties from different countries raise complex legal questions regarding applicable law and competent courts. Choice of law clauses in standard agreements that frequently refer to the law of the business actor's home country can disadvantage Indonesian consumers who are forced to submit to a foreign legal system with which they are unfamiliar (Herry & Fajarani, 2022). Provisions regarding the choice of law and choice of forum ought to be formulated with consideration for the balance of interests between business actors and consumers, in line with the notion that good policy must balance various interests involved within it (Mardikaningsih & Hariani, 2021). Indonesian consumers frequently lack sufficient bargaining power to negotiate choice of law and choice of forum clauses, thereby being forced to accept provisions that favor business actors. This problem becomes increasingly complex with the existence of digital transactions involving multiple jurisdictions simultaneously.

Third, the extremely rapid development of technology, including the emergence of blockchain-based smart contracts, contracts created by artificial intelligence, and transactions within metaverse environments, creates new challenges that have not been anticipated by existing regulations. Smart contracts are computer programs that automatically execute instructions based on pre-determined conditions without requiring human intervention. The entry of new technology into the management system of a field typically demands adjustments to the regulatory framework so that its implementation remains directed and does not cause new problems in the future (Mardikaningsih & Wardoyo, 2024). Contracts created by artificial intelligence raise questions regarding who is legally responsible if errors or losses occur as a result of such contracts (Moro, 2024). Transactions within metaverse environments that involve virtual assets and digital identities also require special legal arrangements due to their characteristics differing from conventional transactions.

Traditional civil law concepts such as parties to an agreement, free will, and legal liability need to be redefined in the face of these technologies to ensure the relevance and effectiveness of the legal system. The parties to an agreement in a smart contract may not be clearly identifiable due to the anonymity inherent in blockchain technology (Dave, 2025). The experience of applying new management principles in a sector indicates that fundamental changes in working methods generally require the adjustment of old concepts and rules so that they remain relevant to developing conditions (Mardikaningsih & Nuraini, 2022). Free will in contracts made by artificial intelligence also becomes a question because the decision to make a contract is taken by an algorithm, not by a human. Legal liability in the event of a failure in a smart contract also needs to be clearly regulated so that the parties obtain adequate legal protection.

To overcome these challenges, planned and comprehensive legal development steps are required. First, a revision of the Civil Code or the formation of a more modern contract law that explicitly accommodates electronic contracts needs to be carried out immediately. Second, the Supreme Court needs to issue a Circular Letter or Supreme Court Regulation that provides technical guidance for judges in handling cases related to electronic contracts. Third, bilateral and multilateral cooperation within the framework of international law needs to be strengthened to resolve jurisdictional issues in cross-border electronic contracts. Fourth, increasing public legal literacy regarding electronic contracts and the risks accompanying them needs to be carried out continuously. The urgency of increasing this legal literacy is increasingly felt given that the utilization of digital means as business activity media is now increasingly widespread among the public, making the understanding of the legal risks accompanying it an urgent need (Mardikaningsih & Halizah, 2024).

Strengthening Legal Certainty and Protection of Parties in Electronic Contracts through Regulatory Updates and Jurisprudence Development

The development of electronic contracts in Indonesia still faces various complex legal challenges, both in terms of legal substance, law enforcement, and the extremely rapid development of digital technology. The non-uniform application of law by judicial institutions indicates that regulations and technical guidelines regarding electronic contracts are not yet fully established. Jurisdictional issues in cross-border electronic contracts create potential injustices for Indonesian consumers, especially when faced with foreign choices of law and forums unilaterally determined by business actors (Hasan & Putra, 2025). The development of new technologies such as blockchain-based smart contracts, artificial intelligence, and transactions within metaverse environments also demonstrates that conventional civil law concepts require adjustments to remain relevant to the dynamics of modern digital transactions.

Blockchain technology itself actually offers the potential to strengthen data integrity and security in electronic transactions, making its presence needing to be balanced with adequate regulatory readiness (Mohan et al., 2024). An equally urgent issue is the prevalence of cybercrimes such as carding and phishing, which indicates that the ITE Law needs to be continuously evaluated so that it is capable of reaching evolving digital crime modalities (Darmawan et al., 2025).

Legal reform through regulatory revision constitutes an urgent step that must be taken to guarantee legal certainty and the protection of parties in electronic contracts. Revisions to the Civil Code need to consider the recognition of various forms of electronic contracts, digital consent formation mechanisms, and standards for verifying the identity of the parties. The Information and Electronic Transactions Law also needs to be updated to accommodate the latest technological developments and provide better legal certainty (Herliyan et al., 2025). Strengthening judicial guidelines through the issuance of Supreme Court Regulations or Supreme Court Circular Letters that provide technical guidance for judges in handling electronic contract cases becomes an important step to create uniformity in legal application across all judicial institutions. Such regulatory updates cannot be separated from compliance efforts that must be consistently implemented by every organization in adjusting its business practices to changing rules (Darmawan et al., 2024). The experience of criminal regulation in other fields, such as provisions regarding hazardous chemicals in food distribution, can serve as a reference regarding the importance of clarity in legal norms so that their enforcement runs effectively (Noor et al., 2023).

International cooperation within the framework of international law needs to be strengthened to address jurisdictional issues in cross-border electronic contracts. Indonesia needs to be active in international forums discussing the harmonization of electronic contract law and consumer protection in digital transactions. Bilateral and multilateral agreements concerning the recognition and execution of court judgments in electronic contract disputes need to be formulated to provide legal certainty for the parties involved in cross-border transactions (Taufiqurokhman et al., 2025). This cooperation also includes the exchange of information and best practices in handling electronic contract disputes between countries.

The protection of Indonesian consumers conducting transactions with foreign business actors becomes a priority that must be advocated for in such international cooperation. These cross-border issues are clearly evident in cross-border payment regulations, the impact of which on Indonesian consumers needs to be continuously studied so that users' interests remain protected (Rahman et al., 2024). The strengthening of such cooperation is also relevant to the responsibilities of digital marketplace platforms operating across jurisdictions, including in assessing potentially anticompetitive practices (Negara et al., 2024).

The principle of *pacta sunt servanda* adhered to in Article 1338 paragraph (1) of the Civil Code, which states that all legally made agreements apply as law for those who make them, remains a strong foundation for the validity of electronic contracts. This principle must be balanced with adequate protection for the weaker party and the prevention of the abuse of freedom of contract. The harmonization among legal certainty, justice, and utility in the context of electronic contracts constitutes both a challenge and a task for the future development of Indonesian civil law (Utomo & Thukuse, 2025). The legal system must be capable of accommodating the interests of the parties in a balanced manner without sacrificing either party. Protection for the weaker party is in line with product liability regulations concerning defective goods, which demand that business actors provide fair compensation to disadvantaged consumers (Marsal et al., 2025). The importance of balanced legal protection is also apparent in other vulnerable groups, such as the fulfillment of the rights of elderly inmates, which requires the strengthening of supervisory systems to ensure their rights remain fulfilled (Pamungkas et al., 2025).

The improvement of public legal literacy regarding electronic contracts and the risks accompanying them needs to be carried out continuously. The public needs to understand their rights and obligations in conducting electronic transactions, as well as the available mechanisms to resolve disputes if losses occur (Yuswanti & Redi, 2025). Socialization regarding the importance of reading and understanding the contents of electronic contracts before giving consent serves as an effective preventive step to reduce future disputes. Legal education integrated into formal and non-formal education curricula can serve as an effective means to increase public legal awareness. Thus, the public can become intelligent and protected consumers in electronic transactions. Such digital empowerment is also important to apply in trust-based transaction practices such as online rotating savings and credit associations (*arisan daring*), so that participants understand the legal protections safeguarding their interests (Negara & Darmawan, 2023). The issue of ethics in disseminating information on digital media, for instance concerning traffic accident victims, also emphasizes that legal literacy needs to be accompanied by ethical awareness in using electronic media (Muhammad et al., 2023). Good legal awareness ultimately contributes to forming fairer social acceptance, as seen in efforts to build civic relations for former inmates post-release (Rizaldy et al., 2023).

Optimization of the electronic certification system to guarantee legal certainty and protection in electronic transactions is a strategic step that needs to be taken. Electronic Certification Providers need to receive adequate recognition and supervision from the government to ensure that the electronic certificates issued meet security and reliability standards. The use of certified electronic signatures needs to be encouraged through incentives for business actors and ease of access for the public. Education regarding the difference between certified and uncertified electronic signatures needs to be widely disseminated so that the public can make appropriate decisions in choosing the type of electronic signature to use. The reliability of such certification systems is closely related to strengthening consumer rights to the recovery of losses resulting from personal data leaks, particularly in the financial technology and e-commerce sectors (Mujisulistyo et al., 2024). User trust in electronic systems also depends on the protection of privacy rights and responsible data management by digital platform organizers (Oluwatosin, 2024). The development of ethical and fair technology serves as a principle that needs to be upheld in building an electronic certification system trusted by the wider public (Radjawane & Mardikaningsih, 2022).

The Supreme Court needs to build consistent jurisprudence regarding the validity standards of electronic contracts through rulings that serve as guidelines for judges in handling similar cases. Established jurisprudence will provide legal certainty for parties conducting electronic transactions and reduce disparities in rulings among courts (Perdana et al., 2025). The role of academics and legal practitioners in providing input to the Supreme Court through in-depth legal studies is crucial for building quality jurisprudence that is responsive to technological developments. Such jurisprudential consistency has been evident in the application of the elements of money laundering criminal acts in various Indonesian court decisions, which demonstrates the importance of uniform guidelines for judges (Rusianto et al., 2023). Another example can be seen in the regulation of narcotics abuse criminal acts, which illustrates how the clarity of legal norms determines the consistency of court decisions (Prabowo et al., 2024).

Supervision over the implementation of consumer protection in electronic contracts needs to be strengthened through the active role of supervisory institutions and civil society organizations. Business actors who violate provisions regarding standard clauses and information disclosure obligations need to be subjected to firm sanctions to provide a deterrent effect (Rahma & Sulastri, 2025). Easily accessible and responsive consumer complaint mechanisms need to be developed so that consumers can obtain legal protection quickly and efficiently. Alternative Dispute Resolution Institutions and Consumer Dispute Resolution Bodies need to continuously develop their capacities to handle disputes originating from electronic transactions. Such supervisory roles are also relevant to the importance of consumer reviews as a form of feedback that can serve as evaluation material for business actors in improving their business strategies (Negara et al., 2021). The enforcement of product labeling regulations, for instance on cosmetic products, likewise serves as an example of how business actor compliance influences fair competition in the market (Purwanto et al., 2023). The active involvement of civil society organizations in such supervision can be understood as part of citizen participation in maintaining public policy accountability (Rojak et al., 2021).

Research and development of electronic contract law need to be continuously carried out to anticipate future technological developments. An interdisciplinary approach involving legal experts, information technology professionals, and digital economists is necessary to produce comprehensive and futuristic legal policies. Indonesia needs to learn from the experiences of other countries that are more advanced in regulating electronic contracts and adopt best practices suited to national needs. Thus, the Indonesian legal system can become an adaptive and responsive system toward digital technology developments without sacrificing the principles of justice and legal certainty.

Conclusion

The validity of electronic contracts essentially continues to be guided by the legal requirements of agreements under Article 1320 of the Indonesian Civil Code, yet its application undergoes adjustments to accommodate the characteristics of digital transactions. Certified electronic signatures possess evidentiary force equivalent to wet ink signatures, whereas uncertified electronic signatures possess limited force that depends on supporting evidence. The legal protection of the parties in electronic contracts is manifested through the principle of good faith, the prohibition of detrimental standard clauses, as well as obligations regarding information disclosure and personal data protection. The implications of this research are the necessity for updating electronic contract regulations, issuing technical guidelines for judges, and strengthening international cooperation to address jurisdictional issues in cross-border electronic contracts.

Although the regulatory framework for electronic contracts in Indonesia has experienced significant development through the latest Electronic Information and Transactions Law, the Personal Data Protection Law, the Consumer Protection Law, and the Government Regulation on the Implementation of Electronic Systems and Transactions, various challenges still require serious attention. Inconsistencies in law application within judicial institutions, jurisdictional issues in cross-border electronic contracts, and the emergence of new technologies such as blockchain-based smart contracts, artificial intelligence, and the metaverse indicate that legal reform is an urgent step that must be taken. The revision of the Indonesian Civil Code and the establishment of consistent jurisprudence through Supreme Court Regulations constitute urgent needs to guarantee legal certainty and protection for the parties in electronic contracts. Strengthening international cooperation, enhancing public legal literacy, optimizing electronic certification systems, and supervising the implementation of consumer protection are also strategic steps that must be carried out in a planned and sustainable manner. Thus, the Indonesian legal system can become an adaptive and responsive system toward digital technology developments without sacrificing the principles of justice, legal certainty, and protection for the parties involved in electronic transactions.

References

Abdullah, M. H. A. B., Gardi, B., & Darmawan, D. 2021. Innovation in Human Resource Management to enhance Organizational Competitiveness in the Era of Globalization. *Journal of Social Science Studies*, 1(1), 51–58.

Al Haibah, M. F. F., Hardyansah, R., & Saktiawan, P. 2024. Implementation of the Juvenile Justice System in the Case of Child Murder Offenders: Restorative, Protection, and Social Reconstruction Principles. *Studi Ilmu Sosial Indonesia*, 4(2), 21-40.

Ali, E. M., Dirgantara, F., & Darmawan, D. 2024. Legal Protection of Consumers in Online Transactions: A Case Study of Online Fraud in Indonesia. *International Journal of Service Science, Management, Engineering, and Technology*, 6(3), 27-38.

Ali, R., & Darmawan, D. 2023. Big Data Management Optimization for Managerial Decision Making and Business Strategy. *Journal of Social Science Studies*, 3(2), 139-144.

Anugroh, Y. G., Hardyansah, R., Darmawan, D., Khayru, R. K., & Putra, A. R. 2023. Consumer Protection and Responsibilities of E-commerce Platforms in Ensuring the Smooth Process of Returning Goods in COD Transactions. *Journal of Social Science Studies*, 3(2), 89-94.

AV, G. P. K. M., & Yustiawan, D. G. P. 2023. Legal consequences of electronic agreements reviewed from article 1866 of the civil code. *POLICY LAW NOTARY AND REGULATORY ISSUES (POLRI)*, 2(1), 102–108. https://doi.org/10.55047/polri.v2i1.535

Aziz, A., Darmawan, D., Khayru, R. K., & Wibowo, A. S. 2023. Effectiveness of Personal Data Protection Regulation in Indonesia's Fintech Sector. *Journal of Social Science Studies*, 3(1), 23-28.

Balkista, D. N., Hardyansah, R., Darmawan, D., Saktiawan, P., & Saputra, R. 2024. Legal Gaps and Enforcement Challenges in Addressing Digital Fraud Involving Cryptocurrencies as Tradable Commodities in Indonesia. *Journal of Science, Technology and Society (SICO)*, 5(2), 33–44.

Barzani, L. A., Darmawan, D., & Zulkarnain, M. A. B. 2022. The Application of Sustainable Supply Chain Management Principles in the Manufacturing Industry to Improve Operational Performance and Corporate Social Responsibility. *International Journal of Service Science, Management, Engineering, and Technology*, 1(1), 38–45.

Bashori, B., Hardyansah, R., & Darmawan, D. 2024. Legal Analysis of Big Data and Analytics in Preventing Discrimination and Protecting Insurance Customers. *Journal of Social Science Studies*, 4(1), 185-192.

Budiman, A., S. Waksito, & K. Wijaya. 2026. Regulation of Electronic Data and Personal Data in Indonesian Criminal Procedure Law, *Studi Ilmu Sosial Indonesia*, 6(1), 41-68.

Da Silva, E. B., & Khayru, R. K. 2025. Marital Rape in the Perspective of Legal Consciousness and Social Norms. *Studi Ilmu Sosial Indonesia*, 5(1), 359-380.

Dahlan, D., Bangun, A. R., & Prakarsa, T. 2025. The binding power of electronic signatures in civil agreements: a comparative study of the civil code and electronic information and transactions law. *Pranata Hukum: Jurnal Ilmu Hukum*, 20(2), 131–140. https://doi.org/10.36448/pranatahukum.v20i2.408

Darmawan, D. 2023. Innovation Culture That Balances Technological Speed with the Depth of Humanistic Thought. *International Journal of Service Science, Management, Engineering, and Technology*, 4(1), 47–54.

Darmawan, D. 2023. Knowledge Management as a Source Of Competitive Advantage in Information Technology Companies. *International Journal of Service Science, Management, Engineering, and Technology*, 3(2), 44–50.

Darmawan, D. 2023. Measuring Employee Productivity in the Digital Era by Considering Human Creativity and Innovation. *International Journal of Service Science, Management, Engineering, and Technology*, 4(3), 47–53.

Darmawan, D. 2023. Social Inclusion for Older Workers in the Implementation of Digital Technology within Organizations. *International Journal of Service Science, Management, Engineering, and Technology*, 4(2), 44–51.

Darmawan, D. 2023. The Concept Of Remote Work: A Literature Review on its Impact on Work Dynamics, Psychological Well-Being, and Social Relationships Among Employees. *International Journal of Service Science, Management, Engineering, and Technology*, 3(3), 49–55.

Darmawan, D. 2024. Algorithmic Management in Digital Platforms and Work Dehumanization in the Gig Economy. *Studi Ilmu Sosial Indonesia*, 4(2), 183-216.

Darmawan, D. 2024. Strategies for Enhancing Employee Knowledge fnd Engagement in Automated Routine Work. *International Journal of Service Science, Management, Engineering, and Technology*, 6(1), 65–71.

Darmawan, D. 2024. The Role of Technology in Promoting or Hindering Gender Equality in the Workplace. *International Journal of Service Science, Management, Engineering, and Technology*, 6(2), 67–73.

Darmawan, D., & Mardikaningsih, R. 2022. The Role of Positive Psychological Factors in Enhancing Employee Engagement and Commitment to Work Tasks. *International Journal of Service Science, Management, Engineering, and Technology*, 1(2), 37–45.

Darmawan, D., & Mardikaningsih, R. 2023. The Role of Flexible Organizational Structures in Enhancing Corporate Adaptability to Environmental Dynamics. *International Journal of Service Science, Management, Engineering, and Technology*, 3(1), 44–49.

Darmawan, D., & Negara, D. S. 2023. The Application of Restorative Justice in Resolving Speech Cases in the Digital Space: A Normative Analysis of the Electronic Information and Transactions Law and the Criminal Code. *Journal of Social Science Studies*, 3(1), 295-306.

Darmawan, D., Hardyansah, R., & Marzuki, A. A. A. 2025. Analysis of The ITE Law and Criminal Acts of Carding and Phishing in Indonesia. *Jurnal Bina Mulia Hukum*, 10(1), 1-17.

Darmawan, D., Hardyansah, R., Sulani, S., Marsal, A. P., & Da Silva, E. B. 2024. Change Management and Legal Compliance in Modern Organizations. *International Journal of Service Science, Management, Engineering, and Technology*, 6(3), 11-16.

Dave, E. 2025. Smart Contracts and AI: The Legal Landscape of Autonomous Transactions. *OSF Preprints*. https://doi.org/10.31219/osf.io/m2pt4_v1

Elyviatino, E. P., & Nugroho, L. D. 2025. Keabsahan Kontrak Elektronik dalam Perjanjian Jual Beli, Ditinjau dari Perspektif Pasal 1313 KUHPerdata. *Ahkam*, 4(2), 465–476. https://doi.org/10.58578/ahkam.v4i2.6010

Ferdinanta, A. S. I., Saputra, R., & Darmawan, D. 2024. The Effectiveness of Death Penalty as an Effort to Counter Serious Crimes: A Literature Review. *Bulletin of Science, Technology and Society*, 3(1), 52-62.

Firmanto, F. 2025. The Legality of Electronic Trading Contracts Is Reviewed in the Civil Code. *Proceeding International Conference on Law and Digital Practice*, 4, 50139. https://doi.org/10.30659/picldpw.v4i0.50139

Halizah, S. N., & Darmawan, D. 2025. Kompetensi Digital Marketing dan Peran Literasi Digital pada Wirausaha Muda. *Jurnal Ekonomi Dan Bisnis*, 15(1), 81-96.

Hartika, Y., Saputra, R., Pakpahan, N. H., Darmawan, D., & Putra, A. R. 2023. A Study on the Falsification of Health Certificates: Perspective of Criminal Law and Professional Ethics. *Journal of Social Science Studies*, 3(2), 175-180.

Hasan, L. K., & Putra, M. R. S. 2025. Electronic Contracts and E-Signatures in Indonesia: Legal Framework and Challenges in the Digital Revolution. *HELIUM: Journal of Multidisciplinary Research*, 2(1), 178–185. https://doi.org/10.57235/helium.v2i1.4769

Herliyan, E., Sutrisno, E., & Astawa, I. G. P. 2025. Digitalization of notary services towards legal certainty for the parties in making deeds. *Veredas Do Direito*, 22(6), e223573. https://doi.org/10.18623/rvd.v22.n6.3573

Herry, M., & Fajarani, M. 2022. The Problems of International Civil Law of Indonesia in Protecting Transnational E-Commerce Consumers. *Jurnal IUS Kajian Hukum Dan Keadilan*, 10(3), 620–630. https://doi.org/10.29303/ius.v10i3.1042

Hosseininasab, F., & Hosseininasab, S. A. 2024. Methods of Concluding Electronic Contracts. *KMAN Publication*, 3(2), 73–82. https://doi.org/10.61838/kman.lsda.3.2.6

Indarto, T., Negara, D. S., & Darmawan, D. 2023. Legal Frameworks for Mitigating Monopoly Practices Adverse to MSMEs in Indonesia. *Journal of Social Science Studies*, 3(1), 1-8.

Infante, A., & Mardikaningsih, R. 2022. The Potential of Social Media as a Means of Online Business Promotion. *Journal of Social Science Studies,* 2(2), 45-49.

Irfansyah, M. F., Darmawan, D., & Hardyansah, R. 2024. Implementation of the Principle of Good Faith in Contract Performance. *Bulletin of Science, Technology and Society*, 3(2), 51-56.

Issalillah, F., & Khayru, R. K. 2025. Mental Health as an Organizational Construct: A Strategic Reorientation of Human Resource Management for Work Environment Design. *International Journal of Service Science, Management, Engineering, and Technology*, 8(3), 1–9.

Jayadi, H., Saputra, R., & Dirgantara, F. 2025. The Role of Lawyers in the Judicial System: Responsibilities, Challenges and Strengthening Legal Protection. *Studi Ilmu Sosial Indonesia*, 5(2), 81-94.

Jorovlea, E., & Tudor, P. 2023. Legal research methods: approaches, efficiency, and best legal practices. *SWorld Journal*, 33(5), 211–218. https://doi.org/10.30888/2663-5712.2025-33-05-038

Kurniawan, Y., & Darmawan, D. 2021. The Adaptive Learning Effect on Individual and Collecting Learning. *Journal of Social Science Studies*, 1(1), 93–98.

Lukmantara, R. H., Suwito, S., & Darmawan, D. 2022. Criminological Perspectives on Criminal Law Enforcement in Human Trafficking Cases: A Literature Review. *Bulletin of Science, Technology and Society*, 1(3), 37-44.

Lutrianto, I., & Al-Qasimi, H. A. S. B. M. 2025. Legal Problems of Personal Data Protection in The Digital Era in Personal Data Protection Law in Indonesia. *Global International Journal of Social Sciences*, 3(2), 345–350. https://doi.org/10.38035/gijlss.v3i2.429

Mahmud, M., Darmawan, D., Khayru, R. K., Nuraini, R., & Issalillah, F. 2023. Enforcement of Criminal Law Against Perpetrators of Environmental Pollution. *International Journal of Service Science, Management, Engineering, and Technology*, 4(1), 43-46.

Mardikaningsih, R. 2025. The Deconstruction of Work and HRM Reconfiguration: Flexibility and Employer Branding in the Digital Era. *International Journal of Service Science, Management, Engineering, and Technology*, 8(2), 10-17.

Mardikaningsih, R., & Darmawan, D. 2021. Business Sustainability Strategies in the Facing of Regulatory Uncertainty and Managerial Challenges. *Journal of Social Science Studies*, *1*(2), 111-118.

Mardikaningsih, R., & Darmawan, D. 2022. The Role of Self-Efficacy in Predicting Employee Adaptability to Technological Change in the Workplace. *International Journal of Service Science, Management, Engineering, and Technology*, 2(3), 43–55.

Mardikaningsih, R., & Halizah, S. N. 2024. Strategi Promosi Usaha Berbasis Media Sosial pada Era Ekonomi Digital. *Jurnal Ekonomi Dan Bisnis*, 14(1), 51-66.

Mardikaningsih, R., & Hariani, M. 2021. Realizing Sustainability in Public Policy: Building a Balance between Economy, Social, and Environment. *Journal of Social Science Studies*, *1*(1), 191-196.

Mardikaningsih, R., & Nuraini, R. 2022. Implementation of Circular Economy Principles for Sustainable Waste Management in the Industrial Sector. *International Journal of Service Science, Management, Engineering, and Technology*, 1(3), 41–47.

Mardikaningsih, R., & Wardoyo, D. T. W. 2024. Green Technology Integration in Management for Social and Environmental Sustainability. *International Journal of Service Science, Management, Engineering, and Technology*, 6(2), 6-10.

Mardikaningsih, R., & Wardoyo, D. T. W. 2024. The Role of Technology in Human Resource Development for Sustainability: A Literature Review on Digital Innovation. *Bulletin of Science, Technology and Society*, *3*(3), 20-26.

Mardikaningsih, R., Azizah, E. I., Putri, N. N., Alfan, M. N., & Rudiansyah, M. M. D. H. 2022. Business Survival: Competence Of Micro, Small and Medium Enterprises. *Journal of Social Science Studies (JOS3),* 2(1), 1-4.

Mardikaningsih, R., Halizah, S. N., Darmawan, D., Masithoh, N., & Nuraini, R. 2022. Examining the Role of Authentic Leadership in Shaping Positive Work Climate and Organizational Citizenship Behavior. *International Journal of Service Science, Management, Engineering, and Technology*, 2(1), 52–59.

Mardikaningsih, R., Halizah, S. N., Nuraini, R., & Darmawan, D. 2022. The Role of Ethical Leadership in Shaping a Positive and Sustainable Organizational Culture. *International Journal of Service Science, Management, Engineering, and Technology*, 2(2), 48–55.

Marsal, A. P., Darmawan, D., & Hardyansah, R. 2025. Product Liability, Defective Goods, and Consumer Compensation in Business Law. *Bulletin of Science, Technology and Society*, 4(3), 59-68.

Martam, N. K. 2024. The Effectiveness Of Electronic Signatures In Civil Contracts In The Digital Era. *International Journal of Law, Crime and Justice*, 1(4), 128–136. https://doi.org/10.62951/ijlcj.v1i4.276

Martinelli, I., Wibowo, S. H., Andreas, G. F. M., & Fae, M. O. 2024. Penggunaan Click-Wrap Agreement Pada E-Commerce: Tinjauan Terhadap Keabsahannya Sebagai Bentuk Perjanjian Elektronik. *Jurnal Supremasi*, 14(1). https://doi.org/10.35457/supremasi.v14i1.2797

Mohan, C. R., Saxena, R., Thilagham, K. T., Solleti, P. K., Sivasubramanian, S., & Dharamvir. 2024. Blockchain-Based Solutions for Enhancing Data Integrity and Security. *IEEE*, 1416–1420. https://doi.org/10.1109/ic3i61595.2024.10828945

Moro, M. M. 2024. Análisis desde el Derecho Privado: La implementación de la inteligencia artificial en los smart contract. *Revista Jurídica sobre Gran Alacant*, 2024(13). https://doi.org/10.69592/2530-5093-n13-diciembre-2024-art-3

Muhammad, A. I., Saputra, R., Pakpahan, N. H., Darmawan, D., & Khayru, R. K. 2023. Ethics and Legality in the Dissemination of Information on Traffic Accident Victims Through Digital Media. *Journal of Social Science Studies*, 3(2), 235-244.

Mujisulistyo, Y. F., Darmawan, D., & Dirgantara, F. 2024. Reconstruction of the Legal Mechanism for Consumer Rights Recovery Regarding Personal Data Leaks in the Financial Technology and E-Commerce Sectors in Indonesia. *Journal of Social Science Studies*, 4(1), 75-84.

Negara, D. S., & Darmawan, D. 2023. Digital Empowerment: Ensuring Legal Protections for Online Arisan Engagements. *Bulletin of Science, Technology and Society*, 2(2), 13-19.

Negara, D. S., Darmawan, D., & Gardi, B. 2021. The Approach of Consumer Reviews to Product Competitiveness and Management Strategies. *Journal of Social Science Studies*, 1(2), 149-154.

Negara, D. S., Jauhari, M. A., & Darmawan, D. 2024. Responsibilities of Digital Marketplace Platforms and Anticompetitive Assessments in Business Law. *Journal of Social Science Studies*, 4(1), 407-422.

Nilamjati, R. S., Sudarwanto, A. S., & Muryanto, Y. T. 2025. E-contract in the Aspect of Online Sale and Purchase Agreement Correlated with Article 1320 of the Civil Code.

Siber International Journal of Advanced Law, 2(3), 106–112. https://doi.org/10.38035/sijal.v2i3.130

Ningrum, I. P., & Dalimunthe, S. N. I. S. 2022. The Validity and Power of Proof of Electronic Signatures That Have Not Been Certified in Indonesian Law. *Asian Journal of Law and Governance*, 4(1). https://doi.org/10.55057/ajlg.2022.4.1.2

Noor, T., Putra, A. R., Suyuti, M., Khayru, R. K., Hariani, M., Issalillah, F., & Mardikaningsih, R. 2023. Implementation of Criminal Regulations on The Use of Hazardous Chemicals in Food Distribution. *International Journal of Service Science, Management, Engineering, and Technology*, 4(3), 13-17.

Oluwatosin, A. 2024. Privacy Rights, Inference, and User Trust in Digital Platform Services. *Journal of Social Science Studies,* 4(1), 381-390.

Pamungkas, D. S. P., Dirgantara, F., Saputra, R., Khayru, R. K., & Pakpahan, N. H. 2025. Efforts to Fulfill the Rights and Legal Protection of Elderly Prisoners in Correctional Institutions Through Service Reform and Strengthening the Monitoring System. *Studi Ilmu Sosial Indonesia*, 5(1), 45-64.

Perdana, M. R. A., Bhakti, R. T. A., & Maileni, D. A. 2025. Validity of Electronic Signatures in Digital Agreements: An Analysis of the Application of the Intellectual Property Law and the Civil Code in E-Commerce Transactions. *Jurnal Mahkamah: Kajian Ilmu Hukum Dan Hukum Islam*, 10(2), 565–578. https://doi.org/10.25217/jm.v10i2.7158

Permatasari, Y., & Silalahi, W. 2025. The Validity of Electronic Sales and Purchase Agreements in Indonesian Civil Law: A Law of Obligations Perspective. *Journal of Business, Management, and Social Studies*, 5(2). https://doi.org/10.53748/jbms.v5i2.122

Prabowo, D. S., Mujito, M., & Darmawan, D. 2024. Regulation of Criminal Acts of Narcotics Abuse in the Narcotics Law. *Bulletin of Science, Technology and Society*, 3(1), 46-51.

Purnomo, A. A., Negera, D. S., & Darmawan, D. (2025). Fair and Accountable Electronic Transactions: The Urgency of Consumer Protection, the Validity of Digital Contracts, and the Optimisation of Preventive and Repressive Dispute Resolution. Studi Ilmu Sosial Indonesia, 5(2), 43-64.

Purwanto, D., Hardyansah, R., & Darmawan, D. 2025. Counterfeit Product Sales in Traditional Markets and Public Attitudes. *Studi Ilmu Sosial Indonesia*, 5(1), 139-166.

Purwanto, I., Darmawan, D., Dirgantara, F., & Halizah, S. N. 2023. Implementation of Cosmetic Product Labeling Regulations for Consumer Protection and Fair Competition in the Marketplace. *Journal of Social Science Studies*, 3(1), 165-170.

Radjawane, L. E., & Mardikaningsih, R. 2022. Building Ethical and Fair Technology: Approaches to Responsible Technology Development and Application. *Journal of Social Science Studies*, 2(1), 189-194.

Rahma, D. A., & Sulastri, S. 2025. Bad-Faith Practices in E-Commerce Standard Clauses and Their Impact on Consumer Protection. *Jurnal USM Law Review*, 8(3). https://doi.org/10.26623/julr.v8i3.13116

Rahman, A., Darmawan, D., & Saputra, R. 2024. Analysis of Cross-border Payment Regulation and its Impact on Consumers in Indonesia. *Bulletin of Science, Technology and Society*, 3(2), 23-28.

Ramle, N. L. B., & Mardikaningsih, R. 2022. Inclusivity in Technology-Based Services: Access and Skills Challenges. *Journal of Social Science Studies,* 2(2), 225-230.

Rianto, R., Darmawan, D., & Negara, D. S. 2023. The Application of Restorative Justice in Resolving Speech Cases in the Digital Space: A Normative Analysis of the Electronic Information and Transactions Law and the Criminal Code. *Journal of Social Science Studies*, 3(1), 295-306.

Rizaldy, B. M., Waskito, S., & Putra, A. R. 2023. Constructing Social Acceptance of Former Prisoners After Release through Citizenship Relations. *Studi Ilmu Sosial Indonesia*, 3(2), 309-332.

Rojak, J. A., Khayru, R. K., & Darmawan, D. 2021. Citizens' Political Participation in Electoral Democracy and the Dynamics of Civil Society Movements. *Studi Ilmu Sosial Indonesia*, 1(1), 161-176.

Rusianto, R., Hardyansah, R., & Darmawan, D. 2023. Application of the Elements of Money Laundering Crime in Indonesian Jurisprudence. *Bulletin of Science, Technology and Society*, 2(3), 44-50.

Sahid, R. R., Hardyansah, R., Darmawan, D., Negara, D. S., & Khayru, R. K. 2023. Legal Perspective of Investment Risk Mitigation on Peer-to-peer Lending Platforms. *Journal of Social Science Studies*, 3(1), 177-184.

Sajjapong, T., Darmawan, D., & Marsal, A. P. 2022. The Role of Social Stereotypes in Shaping Opportunities and Inequalities in Society: Their Impact on Education, Employment, and Intergroup Interactions. *Bulletin of Science, Technology and Society*, 1(1), 44-49.

Saktiawan, P., Hardyansah, R., Darmawan, D., & Putra, A. R. 2021. Ethical Principles in Indonesian Legal Advocacy: Sustaining Justice in Adversarial Systems Through Professional Integrity. *Journal of Social Science Studies*, 1(2), 239-244.

Salsabila, D., & Ispriyarso, B. 2023. Efektivitas Keabsahan Kontrak Elektronik Berdasarkan Hukum Positif di Indonesia. *Al-Manhaj: Jurnal Hukum Dan Pranata Sosial Islam*, 5(2). https://doi.org/10.37680/almanhaj.v5i2.3085

Sinambela, E. A. & D. Darmawan. 2022. Advantages and Disadvantages of Using Electronic Money as a Substitute for Cash, *Journal of Social Science Studies*, 2(2), 56-61.

Sinambela, E. A., & Darmawan, D. 2022. Strengths and Weaknesses of Using Electronic Money as a Substitute for Cash. *Journal of Social Science Studies*, 2(2), 56-61.

Sinambela, E. A., Nurmalasari, D., Darmawan, D., & Mardikaningsih, R. 2021. The Role of Business Capital, Level of Education, and Technology in Increasing Business Income. *Studi Ilmu Sosial Indonesia*, 1(1), 77-92.

Suhartono, S., Sudjai, S., Darmawan, D., Rizky, M. C., & Saktiawan, P. 2024. The Effectiveness of Criminal Sanctions in Preventing Corruption: A Literature Review of the Indonesian Legal System. *Bulletin of Science, Technology and Society*, 3(3), 43-48.

Sulani, S., Darmawan, D., Suwito, S., Mardikaningsih, R., & Gautama, E. C. 2025. Private Sales Deeds In Land Disputes: Weaknesses In Evidence And Registration Obstacles. *Bureaucracy Journal: Indonesia Journal of Law and Social-Political Governance*, 5(3), 4194-4218.

Taufiqurokhman, Sara, R., Suseno, W. H., & Zakaria, R. M. 2025. Cross-Border Consumer Disputes in the Digital Marketplace: Rethinking Jurisdiction and Law in Global E-Commerce Governance. *Legalis*, 3(4), 464–502. https://doi.org/10.61978/legalis.v3i4.1122

Tudose, M. 2025. Legal features of contracts concluded by electronic means. *Studia Universitatis Moldaviae (Seria Ştiinţe Sociale)*, 304–308. https://doi.org/10.59295/spd2024j.46

Udjari, H., Hardyansah, R., Da Silva, E. B., & Cruz, C. da. 2022. Integrating Restorative Justice into Offender Rehabilitation Programs. *Journal of Social Science Studies*, 2(2), 201-206.

Utama, S. P., Suwito, S., Waskito, S., & Khayru, R. K. 2024. Legal Protection of Juvenile Offenders Through Diversion, Development, and Social Reintegration in the Criminal Justice System. *Studi Ilmu Sosial Indonesia*, 4(2), 1-20.

Utomo, H. D., & Thukuse, B. 2025. Electronic Contracts (E-Contracts) and Validity in Indonesian Civil Law: Analysis of Article 1320 of The Civil Code and The ITE Law. *Jembatan: Jurnal Ekonomi, Manajemen, dan Akuntansi*, 2(4). https://doi.org/10.62383/jembatan.v2i4.2765

Wibowo, A. S., Darmawan, D., Halizah, S. N., & Mardikaningsih, R. 2023. Optimizing the Principles of Healthy Business Competition and the Role of KPPU for a Fair Economy in the Digital Era. *Journal of Social Science Studies*, 3(1), 95-100.

Wibowo, A. S., Darmawan, D., Negara, D. S., & Hardyansah, R. 2023. Analysis of Value Added Tax Application on Electronic Commerce Transaction in Digital Economy System in Indonesia. *Journal of Social Science Studies,* 3(2), 83-88.

Wijaya, F. P., Safira, M. E., & Darmawan, D. 2022. Application of Restorative Justice in Criminal Case Settlement in Indonesia: A Literature Perspective. *Bulletin of Science, Technology and Society*, 1(3), 30-36.

Wijayanto, D. D., Indrayanti, K. W., & W., D. 2025. Personal Data Protection in Digital Business Based on the Law on Personal Data Protection. *International Journal of Research in Social Science and Humanities*, 6(8), 6–12. https://doi.org/10.47505/ijrss.2025.8.2

Wiyandarini, G., Hariani, M., & Mardikaningsih, R. 2021. Community-based Institutional Financing Model through Cooperatives for Micro and Small Enterprises. *Journal of Social Science Studies*, *1*(1), 263-268.

Yuristiawan, A., Darmawan, D., & Hardyansah, R. 2024. Digital Credit Regulations in Business Law and Financial Markets. *Journal of Social Science Studies*, 4(1), 371-380.

Yuswanti, A., & Redi, A. 2025. Optimizing the Role of Notaries in Increasing Legal Certainty and Consumer Protection in Electronic Commerce Transactions. *Global International Journal of Social Sciences*, 3(2), 143–152. https://doi.org/10.38035/gijlss.v3i2.407

Zulkarnain, A., Darmawan, D., & Hardyansah, R. 2024. Effectiveness of Law No. 5 of 1999 in Handling Cross-Border Business Competition. *SAPIENTIA ET VIRTUS*, 9(2), 461-475.