

Civil Liability for Losses Due to Autonomous Decisions of Artificial Intelligence (AI) Systems in Electronic Transactions in Indonesia

Syarifah Nurul Aziizi¹, Siti Zhahira Ilman¹

¹ Universitas Pamulang, Indonesia

Received: 25/05/2026	Revised: 29/07/2026	Received: 04/09/2026
Abstract	The development of Artificial Intelligence (AI) has driven the transformation of electronic transactions in Indonesia through the use of systems that are able to produce recommendations, predictions, and decisions autonomously. Although it provides various benefits in improving the efficiency and effectiveness of digital services, the use of AI also raises legal issues when the decisions it produces cause material and immaterial losses for users. This study aims to analyze the form of civil liability for losses arising from AI autonomous decisions in electronic transactions based on Indonesia's positive laws. This research is a normative legal research with a legislative, conceptual, and comparative approach. The legal materials used include laws and regulations, legal doctrines, and literature relevant to AI, electronic transactions, and civil liability. The results of the study show that AI has not been recognized as a legal subject in the Indonesian legal system so it cannot be held accountable independently. Liability for losses caused by AI autonomous decisions remains charged to humans or legal entities that have a relationship with the development, operation, supervision, and use of the system. The form of liability can be based on default if the loss arises in a contractual relationship, or unlawful acts if the loss occurs outside the contractual relationship. This study also found that the multi-layered liability model involving developers, Electronic System Operators, and users is the most appropriate model to be applied in the context of Indonesian law to ensure legal certainty, accountability, and protection for the aggrieved party.	
Keywords	Artificial Intelligence (AI); Electronic Transactions; Civil Liability; Electronic System Operators	
Corresponding Author: Syarifah Nurul Aziizi Universitas Pamulang, Indonesia; dosen03434@unpam.ac.id		

1. INTRODUCTON

The introduction should briefly place the study in a broad context and highlight why it is important. It should define the purpose of the work and its significance. The current state of the research field should be reviewed carefully, and key publications cited. Please highlight controversial and diverging hypotheses when necessary. Finally, briefly mention the main aim of the work and highlight the principal conclusions. As far as possible, please keep the introduction comprehensible to scientists outside your particular field of research. References should be cited as (Kamba, 2018) or (Marchlewska



et al., 2019) or (Cichocka, 2016; Hidayat & Khalika, 2019; Ikhwan, 2019; Madjid, 2002) or (Miller & Josephs, 2009, p. 12) or Rakhmat (1989). See the end of the document for further details on references. Technical terms should be defined. Symbols, abbreviations, and acronyms should be defined the first time they are used. All tables and figures should be cited in numerical order.

2. METHOD

This research is a normative legal research that aims to analyze civil liability for losses due to autonomous decisions of Artificial Intelligence (AI) systems in electronic transactions in Indonesia. The approach used in this study includes three main approaches. First, the statute approach to examine applicable regulations related to electronic transactions, consumer protection, personal data protection, and civil law provisions. Second, a conceptual approach to examine legal doctrine regarding civil liability, default, unlawful acts, and legal subject concepts in the context of AI technology.

The legal materials used in this study consist of primary legal materials, namely laws and regulations such as the Civil Code, the Electronic Information and Transaction Law, the Consumer Protection Law, and the Personal Data Protection Law. Secondary legal materials include legal textbooks, scientific journals, legal articles, and expert opinions relevant to the research topic. Tertiary legal materials are in the form of legal dictionaries and encyclopedias that support the understanding of the legal concepts used.

The technique of collecting legal materials is carried out through documentation studies by systematically examining various relevant written legal sources. Data analysis is carried out qualitatively using content analysis and deductive reasoning methods, namely drawing conclusions from general premises (legal norms) to special cases (AI liability). The validity of legal materials is guaranteed through triangulation of sources and credibility checks of the legal materials used.

3. FINDINGS AND DISCUSSION

3.1. Characteristics of AI Autonomous Decisions and Their Implications for Legal Relations

The results of the study show that the main problem in the use of Artificial Intelligence (AI) in electronic transactions does not lie in its technological ability to produce predictions, recommendations, or decisions automatically. A more fundamental problem lies precisely in the incompatibility between the characteristics of AI autonomous decisions and the construction of civil liability that currently applies in the Indonesian legal system. Based on a search of the Civil Code, the Electronic Information and Transaction Law, the Consumer Protection Law, and the Personal Data Protection Law, it was found that the entire applicable liability regime is basically built on the assumption that there is a clear relationship between the perpetrator, the action, and the legal consequences caused. This assumption

becomes problematic when the decisions that cause losses are no longer directly generated by humans, but by systems that work through complex algorithmic processes.

The study's first findings suggest that AI-autonomous decisions create a separation between legal subjects and decision-making processes. In conventional electronic transactions, decisions that give rise to legal consequences can generally be traced directly to the parties involved in the legal relationship. In contrast, in AI-based electronic transactions, part of the decision-making process is transferred to a system capable of automatically evaluating, classifying, and selecting actions. As a result, when a decision causes harm, the relationship between the perpetrator and the legal consequences is no longer as simple as the relationship between human actions and their consequences as assumed in the classic civil liability doctrine.

The second finding shows that the characteristics of AI autonomous decisions have direct implications for proving the element of fault and causal relationship. In the construction of Article 1365 of the Civil Code, the party filing a lawsuit must prove the existence of unlawful acts, mistakes, losses, and causal relationships between the act and the loss. However, when losses arise from decisions generated by AI systems, the identification of the source of error becomes more complex. Losses can come from algorithm design, biased training data, system supervision failures, technology integration errors, or even a combination of all of these factors. This condition causes the error-based liability model that has been the foundation of civil law to face new challenges that are not fully recognized in conventional legal relationships.

The third finding is related to the absence of explicit regulations regarding AI autonomous decisions in Indonesia's positive law. Based on the legal approach used in this study, no regulation was found that specifically regulates the legal status of decisions generated by AI or the legal consequences born from these decisions. The Electronic Information and Transaction Law only recognizes the concept of electronic systems and electronic system operators. The Personal Data Protection Law focuses on the governance of personal data, while the Civil Code still relies on the construction of legal relationships that are assumed to be carried out by humans or legal entities. Thus, the development of AI technology is moving faster than the development of legal norms that govern it.

Based on the overall findings, this study argues that the main characteristic of AI's autonomous decisions is not only its ability to produce decisions independently, but its ability to obscure the relationship between actors, actions, and legal consequences that have been the foundation of civil liability. It is at this point that the need arises to review the adequacy of the doctrine of default and unlawful acts in responding to losses arising from AI autonomous decisions. Therefore, before determining who should be responsible for these losses, it is first necessary to analyze how Indonesia's positive law positions AI in the existing legal relationship structure.

3.2. Civil Liability for Losses Due to AI Autonomous Decisions

a. Liability Based on Default

The results of the study show that the default regime is one of the bases that can be used to impose civil liability for losses arising from AI autonomous decisions, as long as these losses are born in legal relationships based on agreements or electronic contracts. In the context of electronic transactions, the relationship between consumers, business actors, digital service providers, and electronic system operators is generally built through agreements outlined in the form of electronic contracts. Therefore, when the use of AI causes non-fulfillment of agreed achievements, these problems can be analyzed in the framework of default.

Normatively, the legal basis for default is found in Book III of the Civil Code, especially Article 1238 and Article 1243 of the Civil Code. According to Subekti (1987), default occurs when one of the parties does not carry out its obligations as agreed, performs but not as it should, is late in carrying out the achievement, or does something that according to the agreement is prohibited. In this perspective, the main focus does not lie on the technology used to carry out the achievement, but on whether or not the legal obligations born from the contractual relationship are fulfilled.

The research findings show that the use of AI does not change the nature of the contractual relationship between the parties. Even if a service is run through an AI system, the party bound to the contract is still a human or a legal entity. Thus, when AI produces a decision that causes the service to not run as promised, then legally what is assessed is not the fault of AI, but the failure of the party using AI to fulfill the agreed achievements. At this point, AI functions as an instrument for the execution of the contract, not as a party to the contract itself.

In the practice of electronic transactions, forms of default that have the potential to arise due to the use of AI can occur in various forms. For example, AI-based chatbots provide false information about product specifications so that consumers receive goods that do not match the promised information. Another example can be found in digital financial services that use AI to process certain applications, but the system mistakenly rejects or hinders services that are contractually supposed to be provided to the user. In such a situation, the losses experienced by the user are basically born from the non-fulfillment of the achievements as agreed upon by the parties.

This study found that in the framework of default, the most potential party to be held accountable is a business actor or service provider who has a direct contractual relationship with the aggrieved party. This is in line with the basic principle of agreement law that each party who binds himself to an agreement is obliged to carry out his achievements in good faith as stipulated in Article 1338 paragraph (3) of the Civil Code. Therefore, the use of AI cannot be used as an excuse to escape from the contractual obligations that have been agreed.

Furthermore, this study argues that the existence of AI actually strengthens the importance of the duty of care principle in the implementation of electronic transactions. Parties who choose to use AI as a means of implementing services must ensure that the system used works properly, accurately, and does not pose risks that harm users. If the failure of the system causes the promised achievement not to be fulfilled, then the legal consequences will still be imposed on the party who derives economic benefits from the use of the system.

Based on this description, this study concludes that losses due to AI's autonomous decisions can be the basis for liability based on default as long as there is a contractual relationship between the parties. In this construction, AI is not positioned as a defaulter, but as an instrument used in the implementation of achievements. Therefore, legal responsibility remains on the party who is contractually obliged to fulfill the achievement to the aggrieved party, both business actors, digital service providers, and electronic system operators involved in the transaction.

b. Liability Based on Unlawful Acts

The results of the study show that the unlawful acts regime has a wider scope for application than default in explaining losses due to AI autonomous decisions. If the default requires a contractual relationship between the parties, then the unlawful act can be applied even if there is no prior contractual relationship. This characteristic is important because not all losses caused by AI systems are born in the context of contractual relationships. In many cases, losses arise from automatic decisions that have an impact on a person's rights, interests, or legal standing without a direct commitment between the aggrieved party and the party operating the AI system.

Normatively, the legal basis for unlawful acts is contained in Article 1365 of the Civil Code which states that every act that violates the law and causes harm to others obliges the party who caused the loss due to his fault to compensate for the damage that occurred. Since the *Lindenbaum v. Cohen* decision in 1919, the definition of unlawful acts is no longer limited to violations of the law, but also includes actions that are contrary to the rights of others, the legal obligations of the perpetrators, morality, and propriety that live in society (Nieuwenhuis, 1985). This expansion of meaning provides a more flexible space to analyze various forms of losses that arise due to the use of AI technology.

The findings of the study show that the use of AI has the potential to cause various forms of losses that can be qualified as unlawful acts. For example, AI systems that use personal data without a valid legal basis, algorithms that produce discriminatory treatment against certain groups, system errors that cause unfounded denial of service, and system failures in protecting user data that lead to the leakage of personal information. In such a situation, the legal issue is no longer related to the fulfillment of contractual achievements, but rather to acts or omissions that cause harm to the legal rights or interests of other parties.

This study found that the main challenge in the application of Article 1365 of the Civil Code to AI systems lies in proving the elements of error and causality relationships. In conventional legal relationships, the parties who commit the act and the responsible party can generally be identified relatively easily. However, in AI-based systems, losses often arise from decision-making processes involving algorithms, training data, system updates, and the interaction of various complex technological components. As a result, identifying the source of error becomes more difficult than in cases of conventional unlawful acts.

Nevertheless, this study argues that the complexity of technology does not eliminate the possibility of errors in the legal sense. Errors can be found in the form of developers' failure to design systems safely, negligence of electronic system operators in supervising, inaccurate use of data, and operation of systems that are not in accordance with the standards of prudence that should be applied. Thus, the focus of the analysis is not directed at the actions of AI as a technology, but on the actions or omissions of humans and legal entities behind the development and use of the system.

c. The Causality Relationship in AI Autonomous Decisions

The results of the study show that the most complex problem in determining civil liability for losses incurred in electronic transactions does not lie in the identification of the losses themselves, but in proving the causal relationship between the actions taken by the legal subject and the losses suffered by other parties. In Indonesian civil law, the causal relationship is the element that determines whether a loss can be legally imposed on a particular party. In the absence of an adequate causal relationship, civil liability cannot be charged even if a real loss has occurred.

Based on an analysis of Article 1365 of the Civil Code, this study found that the doctrine of unlawful acts is basically built on the assumption that there is a relatively clear relationship between the perpetrator, the action, and the legal consequences caused. In this classical construction, the party who committed the act can be identified, the action committed can be proven, and the losses incurred can be traced as a result of the action. However, the development of electronic transactions shows that the causal relationship does not always take place simply and linearly as assumed by traditional civil law doctrine.

The findings of the study show that the use of digital systems in electronic transactions has resulted in a chain of actions involving many actors at once. In a single transaction, for example, there are electronic system operators, technology providers, software developers, platform owners, service users, and other parties who indirectly contribute to the occurrence of an electronic activity. These conditions cause losses that arise are often the result of a series of interrelated actions, rather than the result of a single, stand-alone action. Thus, the question of causality shifts from the question of who performs the action to the extent to which the actions of each party contribute to the occurrence of losses.

This study found that the theory of *conditio sine qua non* (conditions without which nothing would happen) has limitations when applied to disputes involving modern digital systems. If the theory is applied strictly, almost all parties involved in a transaction can be considered the cause of the loss because without their involvement the loss would not have occurred. As a result, the scope of liability becomes too broad and has the potential to create legal uncertainty. Therefore, such an approach is not always adequate to determine who should bear civil liability in complex legal relationships.

On the contrary, this study finds that the theory of adequate causation is more relevant to be used in the context of disputes arising from electronic transactions. According to this theory, not every condition that precedes a loss can be considered a cause in the legal sense, but rather only an action that according to general experience and reasonable judgment has an adequate probability of giving rise to such an effect. With this approach, causality analysis does not stop at the search for the factors that contribute to the loss, but also assesses whether a party can be properly held liable for the consequences that occurred.

Another important finding is that causal relationships in disputes involving technology cannot be understood solely as technical relationships, but rather as normative relationships. That is, the question that must be answered is not only whether an action contributes to the occurrence of losses, but also whether the law considers such contributions significant enough to be the basis for the imposition of liability. In this perspective, causality relationships serve as an instrument to limit and distribute responsibility to those closest to the source of risk and most capable of preventing losses from occurring.

Based on the overall analysis, this study finds that the main problem of causality relationships in electronic transactions is not the absence of a causal relationship, but rather the increasingly complex process of identifying parties that can legally be considered as the cause of loss. Therefore, proving causality in disputes involving autonomous decisions is not enough through a purely factual approach, but also requires a normative assessment of control, supervision, economic benefits, and the ability of each party to prevent losses from occurring. This approach is important to ensure that civil liability can still be applied effectively without ignoring the principles of justice and legal certainty.

3.3. Determination of Parties Responsible for Losses Due to AI

a. System Developer Liability

The results of the study show that system developers are one of the parties who have the potential to be held civilly liable for losses arising from AI autonomous decisions. These findings are based on the fact that developers have a central role in designing system architectures, determining algorithm parameters, selecting training data, and building decision-making mechanisms that will be used by AI systems. In other words, even though certain decisions are automatically generated by the system, the

technical foundation that allows them to be born basically comes from the design and development process carried out by humans.

Based on the conceptual approach used in this study, the developer's responsibility does not arise solely because he created the AI system, but because of the relationship between the development actions carried out and the losses that arise. From a civil law perspective, it is related to the principle that any party who, through his actions or negligence, causes losses to other parties can be held accountable under Article 1365 of the Civil Code. Therefore, the focus of the analysis does not lie on the existence of AI as a technology, but on whether there is *fault* or negligence in the system development process that contributes to the occurrence of losses.

The findings of the study show that developer liability generally arises in three circumstances. First, when there is a *design defect* that causes the system to produce decisions that systematically harm users. Second, when the developer fails to apply a proper standard of care in the system development and testing process. Third, when the developer knows or should be aware of the risks that can cause losses, but does not take adequate steps to prevent or mitigate these risks. In this context, the concept of *duty of care* is important because it places the developer as a party who has a professional obligation to ensure that the system he builds works safely and accountably.

The findings are in line with Ryan Abbott's views (2020) which states that legal responsibility in AI systems should essentially be traced back to the human actors who design and control the technology. According to Abbott, the technical autonomy of a system does not necessarily eliminate human responsibility for predictable risks (*foreseeable risks*) from the use of the technology it develops (Abbott, 2020). A similar view was put forward by Pagallo (2013) which emphasizes that the greater the influence of a system on decision-making that has an impact on other parties, the greater the demand for accountability for the party that develops the system.

This study found that in the context of positive Indonesian law, the construction of developer liability is more appropriate to be placed in a regime of unlawful acts rather than default. This is because developers do not always have a direct contractual relationship with the party who suffers losses. In many situations, legal relationships actually occur between users and operators of electronic systems or business actors who use AI. Therefore, developer liability is generally born from errors or negligence in the development process that cause losses to other parties, as stipulated in Article 1365 of the Civil Code.

b. Responsibilities of Electronic System Operators (Platform Liability)

The results of the study show that compared to system developers, Electronic System Operators (PSEs) are the parties that have the most strategic position and are closest to the risks arising from the use of AI in electronic transactions. This finding is based on the fact that PSEs are parties that provide, operate, control, and obtain economic benefits from the use of AI systems in business activities and

digital services. Therefore, when an AI autonomous decision causes losses to users, consumers, or third parties, PSEs are the first to face legal liability demands.

PSE's responsibility has a stronger normative basis than other parties. Article 15 of Law Number 1 of 2024 concerning Electronic Information and Transactions emphasizes that every electronic system operator is obliged to operate an electronic system reliably, safely, and responsibly. This provision is strengthened by Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions which requires PSEs to ensure the reliability, security, and sustainability of the systems used. Thus, Indonesia's positive law has placed PSE as a party that bears a legal obligation to ensure that the electronic systems it uses do not cause losses to users.

The findings of the study show that these obligations do not stop at the provision of technological infrastructure alone, but also include the obligation to supervise the systems used in the provision of electronic services. In the context of AI, these obligations become increasingly important because the decisions generated by the system can have a direct impact on the rights and interests of users. Therefore, when losses arise due to system failures, processing errors, inaccurate automated decisions, or inappropriate use of data, PSE cannot immediately escape responsibility on the grounds that the decisions are generated by AI.

This research found that there are at least three bases that can be used to impose liability on PSE. First, there is a failure to fulfill contractual obligations to users or consumers. In this situation, liability is born through a default regime because the services provided are not in accordance with what was promised. Second, there is negligence in operating or supervising the system that causes losses to other parties. In this condition, liability can be born through a regime of unlawful acts as stipulated in Article 1365 of the Civil Code. Third, there is a violation of legal obligations that are specifically imposed on PSE based on the ITE Law, PP PSE, and personal data protection regulations.

These findings are in line with the evolving development of the platform liability doctrine in modern digital law. According to Balkin (2018), digital platforms can no longer be seen as mere passive intermediaries (*passive intermediary*), but rather as actors who actively regulate, moderate, and influence the interactions that occur within the systems they manage. Therefore, the greater the control a platform has over the system used, the greater the accountability demands that can be placed on it. In the context of AI, this argument becomes relevant because PSEs have control over the implementation, configuration, and use of the systems used in the delivery of electronic services.

c. Responsibilities of AI System Users

The results of the study show that users of AI systems (*user liability*) can also be held to be held civilly liable for losses arising from AI autonomous decisions. However, unlike system developers and Electronic System Operators (PSEs), user responsibility is not born due to the design or management

process of the system, but rather to the way the system is used. In other words, the focus of the analysis does not lie on the mistakes of the technology used, but on the actions of users who use the technology inappropriately, go beyond the purpose of its use, or ignore the duty of care that should be carried out.

The findings of the study show that in Indonesian civil law there are no special provisions that explicitly regulate the responsibilities of AI users. Therefore, the basis for liability must still be traced through the regime of default and unlawful acts. In the context of a contractual relationship, users can be held liable if the use of AI causes non-fulfillment of obligations that have been agreed upon to other parties. Meanwhile, in contexts outside of contractual relationships, user liability can arise if the use of AI causes harm to the legal rights or interests of other parties as referred to in Article 1365 of the Civil Code.

The results of the study found that user liability generally arises in three circumstances. First, when the user deliberately gives the wrong data, instructions, or commands to the system so that it results in a decision that is detrimental to the other party. Second, when the user continues to use the system that is known to have certain weaknesses or risks without taking adequate preventive measures. Third, when the user uses AI for purposes that are contrary to the law, ethics, or use objectives that have been set by the developer or system operator. In these three circumstances, the losses incurred can no longer be fully charged to the technology or service provider because there is a real contribution from the user's own actions.

This finding is in line with the general principle in civil law that everyone is liable for losses incurred as a result of his own actions (Muhammad, 1990; Simbolon, 2023). As explained by Van Dam (2013), civil liability basically departs from the assumption that a person who has control over an action must bear the legal consequences born of his or her actions. In the context of the use of AI, such control lies in the user's decision to activate, direct, enter data, or utilize the output generated by the system. Therefore, when the user has the space to control the process, then the user cannot completely escape responsibility for the consequences caused.

The study also found that in modern AI use practices, the final decision is not always entirely in the hands of the system. In many digital services, AI only serves to provide recommendations, predictions, or analysis results that are then used by humans as the basis for decision-making. In such a situation, users still have the role of the final decision-maker (*human-in-the-loop*). Therefore, if users consciously accept or implement recommendations that have the potential to cause real harm, then legal responsibility cannot be transferred entirely to AI systems or technology providers.

However, this study found that user responsibility is not absolute. Users cannot be held liable if the losses incurred are entirely caused by system design defects, development failures, or negligence of electronic system operators that are beyond their control. Therefore, the imposition of liability on users

must still be based on proving a causal relationship between the user's actions and the losses that occur. The greater the level of user control over the process of using the system, the more likely it is that the user will be held liable for the consequences caused.

Based on the overall findings, this study argues that users of AI systems can be held civil liable if the losses incurred are directly related to the actions, negligence, or misuse of the system that they committed. However, this responsibility does not eliminate the possibility of liability from the developer or the Electronic System Operator. Thus, in disputes involving AI autonomous decisions, the determination of user responsibility must be carried out through an analysis of the level of control, the contribution of the action, and the causal relationship between the use of the system and the losses that arise.

d. Can AI be a subject of accountability?

The findings of the study show that until now there is not a single legislation in Indonesia that recognizes AI as a legal subject. The Civil Code only recognizes humans and legal entities as holders of rights and obligations. Similarly, the Law on Information and Electronic Transactions, the Personal Data Protection Law, and Government Regulation Number 71 of 2019 concerning the Implementation of Electronic Systems and Transactions do not give AI a separate legal status. All legal obligations in these regulations are still imposed on humans, legal entities, electronic system operators, business actors, and personal data controllers. These findings show that Indonesia's positive law still maintains an anthropocentric paradigm that places humans as the center of the attribution of legal rights, obligations, and responsibilities.

The results of the study show that the idea of electronic personhood has received very strong criticism from academics and policymakers. Bryson, Diamantis, and Grant (2017) argue that granting AI legal subject status has the potential to obscure the responsibility of humans and corporations that develop or use such technology. According to them, the recognition of AI as a legal subject can create a mechanism for the transfer of responsibility (*liability shield*) which allows parties who derive economic benefits from the technology to avoid legal liability for the risks posed. Similar criticism was also conveyed by Solum (2020) which affirms that legal personality is a normative construct given by law to achieve a specific social goal, not an automatic consequence of an entity's technical capabilities.

Based on the overall findings, this study argues that AI cannot be positioned as a subject of accountability in the Indonesian legal system. In addition to the absence of a normative basis that recognizes AI as a legal subject, such recognition also has the potential to raise various practical problems. AI does not have its own assets, does not have the legal capacity to fulfill obligations, cannot be sanctioned like humans or legal entities, and does not have normative awareness that is the basis for imposing responsibility in civil law. As a result, the recognition of AI as a subject of liability risks

weakening legal protection for aggrieved parties because there is no effective mechanism to execute these responsibilities.

3.4. The Ideal Model of Civil Liability for Losses Due to AI Autonomous Decisions in Electronic Transactions in Indonesia

The findings of the study show that the source of losses due to AI autonomous decisions can come from three different points, namely the system development stage, the system implementation stage, and the system use stage. In the development stage, legal risks are related to the possibility of design *defects*, algorithm errors, and failures in the testing process. At the implementation stage, risks arise from failures in the supervision, control, and risk mitigation by the Electronic System Operator (PSE). Meanwhile, at the use stage, losses can arise due to misuse of the system or use that is not in accordance with the predetermined objectives. Thus, this study finds that the source of losses in AI systems is multidimensional and cannot always be traced to one specific actor.

Furthermore, the model shows that the Electronic System Operator occupies the most central position in the construction of accountability. This finding is based on the consideration that PSE is a party that has a direct legal relationship with users, derives economic benefits from system operations, and has the greatest capacity to supervise the use of AI. Therefore, compared to other actors, PSE has the strongest position to be burdened with *primary liability* when losses arise in the implementation of AI-based electronic transactions.

On the other hand, this study also found that the responsibility of developers and users cannot be ruled out. Developers can still be held liable if the losses are proven to have originated from errors in the system design or development process. Similarly, users can be held liable if losses arise from actions that exceed the purpose of using the system or are carried out in disregard of reasonable care standards. Thus, the relationship of responsibility that is formed is not an exclusive relationship, but a relationship that allows for the distribution of responsibility based on the contribution of each party to the occurrence of losses. Another important finding is that AI itself does not appear as a subject of liability in the formulated model. Although AI is able to produce decisions that have an impact on a person's legal rights and interests, this study finds that Indonesia's positive law still places AI as a technological instrument and not as a holder of legal rights and obligations. Therefore, all legal consequences arising from the use of AI must still be traced to the human or legal entity behind its development, implementation, and use.

Based on all these findings, this study argues that the most appropriate accountability model for Indonesia is the *multi-layered liability model*. This model is not only more in line with the characteristics of AI technology involving many actors, but is also better able to guarantee legal certainty and

protection for aggrieved parties. In the model, liability is not determined by the existence of AI as an autonomous technology, but by the level of control, economic benefits, and the contribution of each party to the risks that ultimately cause losses. Thus, this model provides a conceptual basis for the development of a more comprehensive AI regulatory framework in Indonesia in the future.

4. CONCLUSION

Based on the results of the research, it can be concluded that Indonesia's positive law has not recognized *Artificial Intelligence* (AI) as a legal subject that can assume rights and obligations independently. AI is still positioned as a technological instrument or part of an electronic system used by humans and legal entities. Therefore, material and immaterial losses due to AI autonomous decisions cannot be imposed on AI, but on parties involved in its development, operation, supervision, and use. Civil liability can be based on default if losses arise from contractual relationships or electronic contracts, as well as unlawful acts if losses occur outside of contractual relationships, such as data leaks, algorithmic discrimination, recommendation errors, or adverse automated decisions. The determination of the responsible party must consider the level of control, economic benefits, causality relationship, and each party's contribution to the loss. The developer can be liable if the loss is caused by design defects, algorithm errors, test failures, or development negligence. The Electronic System Operator (PSE) has the potential to be the main responsible party because it has a direct relationship with the user, operates the system, obtains economic benefits, and is obliged to ensure the security and reliability of the system. Meanwhile, users can be held accountable in the event of abuse or negligence in the use of AI. Thus, the most ideal model is the *multi-layered liability model*, which is proportionate to the responsibility of developers, PSEs, and users based on the source of risk, level of control, economic benefit, and causal relationship. This model is more in line with the complexity of the AI ecosystem and is able to provide legal certainty and more optimal protection for aggrieved parties.

REFERENCES

- Abbott, R. (2020). *The Reasonable Robot: Artificial Intelligence and the Law* (1st ed.). Cambridge University Press. <https://doi.org/10.1017/9781108631761>
- Abimanyu, E., & Sinaga, D. P. (2025). UNCITRAL Model Law on International Commercial Arbitration and the Reform of the Arbitration Evidence Process in Indonesia. *Media Iuris*, 8(2), 293–310. <https://doi.org/10.20473/mi.v8i2.63627>
- Ally, A. M. (2026). Artificial intelligence (AI) and financial technology (FinTech) in Tanzania; legal and regulatory issues. *International Journal of Law and Management*, 68(4), 723–741. <https://doi.org/10.1108/IJLMA-07-2024-0251>
- Apeldoorn, L. J. van. (2001). *Pengantar Ilmu Hukum*. Pradnya Paramita.

- Atkinson, K., Bench-Capon, T., & Bollegala, D. (2020). Explanation in AI and law: Past, present and future. *Artificial Intelligence*, 289, 103387. <https://doi.org/10.1016/j.artint.2020.103387>
- Azis Putri, D. D., & Satriawan, H. A. (2024). Kedudukan Dan Keabsahan Perjanjian Elektronik Dalam Perspektif Hukum Perdata. *Private Law*, 4(1), 112–119. <https://doi.org/10.29303/prlw.v4i1.3922>
- Balkin, J. M. (2018). Free Speech is a Triangle. *Columbia Law Review*. <https://ssrn.com/abstract=3186205>
- Bellini, V., Cascella, M., Cutugno, F., Russo, M., Lanza, R., Compagnone, C., & Bignami, E. G. (2022). Understanding basic principles of Artificial Intelligence: A practical guide for intensivists: Basic Principles of Artificial Intelligence. *Acta Biomedica Atenei Parmensis*, 93(5), e2022297. <https://doi.org/10.23750/abm.v93i5.13626>
- Bryson, J. J., Diamantis, M. E., & Grant, T. D. (2017). Of, for, and by the people: The legal lacuna of synthetic persons. *Artificial Intelligence and Law*, 25(3), 273–291. <https://doi.org/10.1007/s10506-017-9214-9>
- Burrell, J. (2016). How the machine ‘thinks’: Understanding opacity in machine learning algorithms. *Big Data & Society*, 3(1), 2053951715622512. <https://doi.org/10.1177/2053951715622512>
- Candrian, C., & Scherer, A. (2022). Rise of the machines: Delegating decisions to autonomous AI. *Computers in Human Behavior*, 134, 1–16. <https://doi.org/10.1016/j.chb.2022.107308>
- Carabantes, M. (2020). Black-box artificial intelligence: An epistemological and critical analysis. *AI & Society*, 35(2), 309–317. <https://doi.org/10.1007/s00146-019-00888-w>
- Castellani, L. G. (2025). *UNCITRAL model laws on digital trade: Electronic transferable records, digital identity and trust services*. Hart. <https://doi.org/10.5040/9781509937448>
- Cronin, I. (2024). Autonomous AI Agents: Decision-Making, Data, and Algorithms. In I. Cronin, *Understanding Generative AI Business Applications* (pp. 165–180). Apress. https://doi.org/10.1007/979-8-8688-0282-9_11
- Diky Budiman, Sri Iswati, & Mey Krisselni Sitompul. (2025). Perkembangan Ekosistem Ekonomi Digital di Indonesia: Sebuah Kajian Literatur. *JUMINTAL: Jurnal Manajemen Informatika Dan Bisnis Digital*, 4(1), 115–126. <https://doi.org/10.55123/jumintal.v4i1.5130>
- Efendi, J., & Ibrahim, J. (2021). *Metode penelitian hukum: Normatif dan empiris*. Prenadamedia Group.
- Finocchiaro, G. (2024). The regulation of artificial intelligence. *AI & Society*, 39(4), 1961–1968. <https://doi.org/10.1007/s00146-023-01650-z>
- Fomin, V. V., & Astromskis, P. (2024). The Black Box Problem. In J.-S. Gordon (Ed.), *Future Law, Ethics, and Smart Technologies: The Future of Legal Education*. Brill. <https://doi.org/10.1163/9789004682900>
- Fuady, M. (2002). *Perbuatan melawan hukum: Pendekatan kontemporer* (Cet. 1). Citra Aditya Bakti.
- Hart, H. L. A. (2000). Legal Responsibility and Excuses. In J. L. Coleman (Ed.), *Readings in the Philosophy of Law* (pp. 1–24). Routledge. <https://doi.org/10.4324/9781315054247>

- Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, 62(1), 15–25. <https://doi.org/10.1016/j.bushor.2018.08.004>
- Kushariyadi, H. Apriyanto, Herdiana, Y., Asy'ari, F. H., Judijanto, L., Pasrun, Y. P., & Mardikawati, B. (2024). *Artificial Intelligence: Dinamika Perkembangan AI Beserta Penerapannya* (Y. Agusdi, Ed.). PT. Sonpedia Publishing Indonesia.
- Laudon, K. C., & Traver, C. G. (2024). *E-commerce: Business, technology, society* (Eighteenth edition, global edition). Pearson.
- Laux, J., Wachter, S., & Mittelstadt, B. (2024). Trustworthy artificial intelligence and the European Union AI act: On the conflation of trustworthiness and acceptability of risk. *Regulation & Governance*, 18(1), 3–32. <https://doi.org/10.1111/rego.12512>
- Lu, L. (2024). The Law of Fintech: How Artificial Intelligence and Innovative Technologies Contribute to a Sustainable Financial Industry and Its Effective Regulation. In T. Walker, D. Gramlich, & A. Sadati (Eds.), *Artificial Intelligence, Finance, and Sustainability* (pp. 243–263). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-66205-8_10
- Marzuki, P. M. (2017). *Penelitian hukum* (3rd ed.). Kencana.
- Maskur, M. A., Masyhar, A., Damayanti, R., Ramada, D. P., & Sanyal, S. (2025). Reimagining Criminal Liability in the Age of Artificial Intelligence: Toward a Comparative and Reform-Oriented Legal Framework. *Journal of Law and Legal Reform*, 6(4), 1805–1838. <https://doi.org/10.15294/jllr.v6i4.35540>
- McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (1955). *A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence* [Research Proposal]. Dartmouth College.
- Pagallo, U. (2013). *The Laws of Robots: Crimes, Contracts, and Torts* (Vol. 10). Springer Netherlands. <https://doi.org/10.1007/978-94-007-6564-1>
- Paramesha, M., Rane, N., & Rane, J. (2024). Artificial intelligence, machine learning, deep learning, and blockchain in financial and banking services: A comprehensive review. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4855893>
- Parycek, P., Schmid, V., & Novak, A.-S. (2023). Artificial Intelligence (AI) and Automation in Administrative Procedures: Potentials, Limitations, and Framework Conditions. *Journal of the Knowledge Economy*, 15(2), 8390–8415. <https://doi.org/10.1007/s13132-023-01433-3>
- Patil, D. (2025). *Artificial Intelligence In Financial Services: Advancements In Fraud Detection, Risk Management, And Algorithmic Trading Optimization*. SSRN. <https://doi.org/10.2139/ssrn.5057412>
- Pearl, J. (2014). *Probabilistic Reasoning in Intelligent Systems: Networks of Plausible Inference*. Morgan Kaufmann.

- Perc, M., Ozer, M., & Hojnik, J. (2019). Social and juristic challenges of artificial intelligence. *Palgrave Communications*, 5(1), 61. <https://doi.org/10.1057/s41599-019-0278-x>
- Pezzulo, G., Parr, T., Cisek, P., Clark, A., & Friston, K. (2024). Generating meaning: Active inference and the scope and limits of passive AI. *Trends in Cognitive Sciences*, 28(2), 97–112. <https://doi.org/10.1016/j.tics.2023.10.002>
- Puannandini, D. A., Fabian, R., Firdaus, R. A. P., Mustopa, M. Z., & Herdiyana, I. (2025). Liabilitas Produk Ai Dalam Sistem Hukum Indonesia: Implikasi Bagi Pengembang, Pengguna, Dan Penyedia Layanan. *Iuris Studia: Jurnal Kajian Hukum*, 6(1). <https://doi.org/10.55357/is.v6i1.808>
- Rahardjo, S. (2009). *Hukum progresif: Sebuah sintesa hukum Indonesia* (Cet. 1). Genta Pub.
- Rao Challa, S. (2023). Artificial Intelligence and Big Data in Finance: Enhancing Investment Strategies and Client Insights in Wealth Management. *International Journal of Science and Research (IJSR)*, 12(12), 2230–2246. <https://doi.org/10.21275/SR231215165201>
- Russell, S. J., & Norvig, P. (with Chang, M., Devlin, J., Dragan, A., Forsyth, D., Goodfellow, I., Malik, J., Mansinghka, V., Pearl, J., & Wooldridge, M. J.). (2022). *Artificial intelligence: A modern approach* (Fourth edition, global edition). Pearson.
- Scherer, M. U. (2015). Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies. *SSRN Electronic Journal*, 29(2), 353–400. <https://doi.org/10.2139/ssrn.2609777>
- Setiawan, A., Kusumaningtyas, R. F., Widyastuti, A., & Abdullah, I. H. (2025). The Urgency of Legal Profession Regulation Amidst The Integration of Artificial Intelligence. *Lex Scientia Law Review*, 9(2), 1484–1516. <https://doi.org/10.15294/lslr.v9i2.26448>
- Setiawan, R. (1977). *Pokok-pokok hukum perikatan*. Binacipta.
- Shidarta. (2000). *Hukum perlindungan konsumen Indonesia*. Grasindo.
- Simbolon, Y. (2023). Pertanggungjawaban Perdata terhadap Artificial Intelligence yang Menimbulkan Kerugian Menurut Hukum di Indonesia. *Veritas et Justitia*, 9(1), 246–273. <https://doi.org/10.25123/vej.v9i1.6037>
- Soekanto, S., & Mamudji, S. (1995). *Penelitian hukum normatif: Suatu tinjauan singkat* (4th ed.). Raja Grafindo Persada.
- Solum, L. B. (2020). Legal Personhood for Artificial Intelligences. In W. Wallach & P. Asaro, *Machine Ethics and Robot Ethics* (1st ed., pp. 415–471). Routledge. <https://doi.org/10.4324/9781003074991-37>
- Subekti, R. (1987). *Hukum perjanjian*. : Intermasa.
- Sulaiman, H., Adam, A., Universitas Mega Buana, & Kamaruddin, S. (2025). Penggunaan Kecerdasan Buatan dalam Karya Seni: Perspektif Teori Kritis Adornodan Implikasinya terhadap Hak Kekayaan Intelektual. *Jurnal Media Hukum*, 13(1), 91–103. <https://doi.org/10.59414/jmh.v13i1.870>

- Veale, M., & Borgesius, F. Z. (2021). Demystifying the Draft EU Artificial Intelligence Act. *Computer Law Review International: A Journal of Information Law and Technology*, 4, 97–112. <https://doi.org/10.48550/ARXIV.2107.03721>
- Wadipalapa, R. P., Katharina, R., Nainggolan, P. P., Aminah, S., Apriani, T., Ma'rifah, D., & Anisah, A. L. (2024). An Ambitious Artificial Intelligence Policy in a Decentralised Governance System: Evidence From Indonesia. *Journal of Current Southeast Asian Affairs*, 43(1), 65–93. <https://doi.org/10.1177/18681034231226393>
- Wibisono, G., Raharya, N., & Prasetyo, S. (2026). *Artificial Intelligence dalam Transformasi Bisnis Modern*. Deepublish Digital.
- Wissink, M. (2004). Book Review: Cases, Materials and Text on National, Supranational and International Tort Law. *Maastricht Journal of European and Comparative Law*, 11(1), 110–112. <https://doi.org/10.1177/1023263X0401100107>
- Yudhistira, A. R. P., & Zakaria, A. (2026). Urgensi Pengaturan Pertanggungjawaban Pidana atas Tindakan yang Dilakukan oleh Autonomous Artificial Intelligence. *RechtJiva*, 3(1), 147–170. <https://doi.org/10.21776/rechtjiva.v3n1.9>

