

Legal Challenges of Artificial Intelligence: An Analysis of Legal Personhood and Civil Liability for Damages Caused by Artificial Intelligence

Neri Aslina *

Sekolah Tinggi Agama Islam Ibnu Sina Batam, Batam, Indonesia

Abstract. *The rapid diffusion of artificial intelligence (AI) into medicine, transportation, finance, and public administration has exposed a structural gap between existing civil law doctrine and the practical realities of autonomous, opaque, and self-learning systems. Conventional liability regimes, namely fault-based tort, vicarious liability, and product liability, were designed around identifiable human or corporate actors and struggle whenever harm originates from an AI system's independent decision-making process. This article examines two interrelated legal problems: whether AI can or should be recognized as a subject of law, commonly termed legal personhood, and how civil liability for AI-caused damages should be allocated among developers, operators, and users. Employing a normative juridical method, the study analyzes primary legal materials, including statutory provisions, judicial doctrines, and comparative regulatory instruments such as the European Union Artificial Intelligence Act, the revised Product Liability Directive, and Indonesian civil law, alongside relevant secondary legal literature. The findings indicate that full legal personhood for AI remains conceptually premature and practically unnecessary, whereas existing liability frameworks urgently require targeted reform, particularly strict liability for high-risk applications, reversed evidentiary burdens, and mandatory insurance mechanisms. The novelty of this article lies in integrating personhood theory with liability allocation into a single risk-based accountability framework adaptable to civil law jurisdictions such as Indonesia.*

Keywords: artificial intelligence; legal personhood; civil liability; normative juridical method; comparative law

Received: 12 05, 2025 | **Revised:** 12 24, 2025 | **Accepted:** 01 14, 2026 | **Published Online:** 01 19, 2026

Correspondence:

Neri Aslina
neriaslina1983@gmail.com



1. Introduction

Artificial intelligence has moved from a speculative technological frontier to an operational infrastructure embedded in medicine, financial services, transportation, public administration, and everyday consumer platforms. Diagnostic algorithms now assist clinicians in detecting disease, autonomous and semi-autonomous vehicles navigate public roads, generative and predictive models underwrite credit decisions, and government agencies increasingly rely on automated systems to allocate social assistance, screen applicants, and support administrative adjudication. This expansion has generated tangible benefits in efficiency, accuracy, and scale, but it has simultaneously produced a new category of harm: injuries and losses that originate not from a clearly identifiable human act, but from the autonomous, adaptive, and often opaque operation of a computational system. A misdiagnosis generated by a clinical decision-support tool, a financial loss caused by an algorithmic trading

system, or bodily injury caused by a self-driving vehicle's misjudgment all raise the same underlying legal question: who bears responsibility when the proximate cause of harm is a machine rather than a person?¹

This question exposes a structural tension between artificial intelligence and the foundational architecture of civil liability law. Classical tort doctrine, whether framed as the fault-based liability found in most civil law codes or the negligence standard of common law systems, presupposes an identifiable actor whose voluntary conduct can be measured against a standard of care, and a causal chain that a court can trace and evaluate. Vicarious liability doctrines extend responsibility to principals for the acts of their agents or employees, again presupposing a subordinate actor whose conduct remains attributable to a supervising person. Product liability doctrine, in turn, targets defects existing at the moment a product is placed into circulation, a premise that fits poorly with AI systems that continue to learn, update, and behave differently after deployment. AI systems complicate every one of these premises. Their outputs are frequently the product of statistical inference across vast datasets rather than discrete, traceable decisions; their internal logic is often opaque even to their own developers, a phenomenon widely described as the "black box" problem; and their behavior may evolve after deployment through continued training, rendering the classical distinction between "defect at the time of sale" and "subsequent misuse" increasingly artificial. These characteristics generate what legal scholars term the accountability gap: harm occurs, a victim suffers loss, yet no single actor's conduct cleanly satisfies the elements required to establish liability under inherited doctrine.²

One influential response to this gap has been the proposal to grant AI systems a form of legal personhood, sometimes styled as "electronic personhood," modeled loosely on the legal fiction already used to grant corporations status as juridical persons capable of holding rights, bearing obligations, and possessing assets against which claims can be executed. The European Parliament's 2017 resolution on civil law rules for robotics floated this idea explicitly, suggesting that the most sophisticated autonomous systems might eventually be assigned a specific legal status to resolve questions of compensation.³ Proponents argue that personhood, or at least a limited functional variant of it, could solve the asset-attribution problem by allowing an AI system, backed by a dedicated insurance fund or capital reserve, to be sued directly, thereby sparing courts the difficulty of tracing fault through complex development and deployment chains involving multiple programmers, data providers, manufacturers, and operators. Critics, however, warn that personhood risks becoming a liability shield rather than a liability solution: assigning legal subjectivity to a non-sentient system could allow the human and corporate actors who design, train, deploy, and profit from AI to disclaim responsibility by pointing to the "personhood" of the system itself, a phenomenon some commentators describe

¹ Soyer & Tettenborn, 2022; Alqodsi & Gura, 2023.

² Boilă, 2026; Balalaeva, 2023; Bottomley & Thaldar, 2023.

³ Ziemianin, 2021; Nemeikšis, 2021.

as responsibility laundering. This unresolved theoretical dispute is compounded by the fact that no jurisdiction has yet adopted AI legal personhood in binding law, leaving both scholars and lawmakers without settled doctrinal guidance.⁴

Regulatory practice has, in the meantime, moved cautiously toward reforming liability rules without resolving the personhood question. The European Union's Artificial Intelligence Act, which entered into force in 2024, establishes a risk-tiered regulatory framework distinguishing unacceptable-risk, high-risk, limited-risk, and minimal-risk AI systems, but it primarily addresses ex ante compliance obligations rather than ex post compensation for victims. To close that gap, the European Commission simultaneously proposed a dedicated Artificial Intelligence Liability Directive alongside a revised Product Liability Directive. The revised Product Liability Directive, adopted in 2024, extends the concept of a "product" to include standalone software and AI systems, and introduces disclosure obligations and rebuttable presumptions of defect and causation that ease the victim's evidentiary burden. The AI Liability Directive, by contrast, encountered sustained industry opposition and disagreement among member states over its scope and necessity; the European Commission listed it among the withdrawn proposals in its 2025 Work Programme, and the withdrawal was formalized in October 2025.⁵ The result is that even the most doctrinally advanced regulatory bloc in this field currently lacks a dedicated, harmonized civil liability instrument for AI-caused harm, leaving victims to rely on a fragmented combination of the revised product liability rules and divergent national tort regimes. This regulatory retreat is a significant and underexplored development: it demonstrates that the liability question cannot simply be deferred to future legislation and instead demands doctrinal clarification through legal scholarship in the interim.

Indonesia faces an analogous, and in some respects more acute, version of this problem. Indonesian civil liability law remains governed by the general tort provision of Article 1365 of the Civil Code (*Kitab Undang-Undang Hukum Perdata*), which requires proof of an unlawful act, fault, loss, and causal connection, and by Article 1367, which extends liability to persons responsible for individuals or objects under their supervision. Neither provision was drafted with autonomous, self-learning systems in mind, and Indonesia currently has no dedicated statute governing civil liability for AI-caused harm, notwithstanding the rapid expansion of AI applications in Indonesian fintech, healthcare, e-commerce, and public digital services. Existing Indonesian scholarship on this subject has tended to analyze either the applicability of Article 1365 and 1367 to isolated AI use cases or the abstract question of legal personhood in isolation, without integrating the two inquiries or benchmarking Indonesian doctrine against the most recent comparative developments, including the 2024 revised Product Liability Directive and the 2025 withdrawal of the AI Liability Directive.⁶

⁴ Novelli et al., 2025; Dešić, 2025.

⁵ De Bruyne et al., 2023.

⁶ Sari & Harwika, 2022; Mantili et al., 2025; Hirawan & Parmitasari, 2026.

Comparative practice beyond the European Union further illustrates the absence of doctrinal consensus. Jurisdictions such as Kazakhstan, Ukraine, and the Russian Federation have each produced recent scholarly and legislative proposals addressing AI-related civil liability, ranging from strict liability for operators of high-risk systems to hybrid models that combine fault-based tort with mandatory insurance, yet none has converged on a single accepted standard, and none extends legal subjecthood to the AI system itself.⁷ This divergence suggests that the accountability gap identified above is not confined to any single legal family or level of technological development; it is a shared structural consequence of applying twentieth-century liability doctrine to twenty-first-century autonomous systems, and it therefore calls for a comparative and doctrinal, rather than purely jurisdiction-specific, mode of legal analysis.⁸

The novelty of this article rests on three contributions that, taken together, are not found in the existing literature reviewed. First, it treats the personhood question and the liability-allocation question as a single, integrated normative problem rather than two separate debates, arguing that the answer to whether AI should be a legal subject directly determines how liability across the developer-operator-user chain should be structured. Second, it incorporates the most recent regulatory turning point in comparative AI law, the 2025 withdrawal of the European Union's AI Liability Directive, as a central analytical data point demonstrating that harmonized, AI-specific liability legislation remains an unresolved global challenge rather than an inevitability, which in turn strengthens the case for doctrinal, judge-made, and code-based solutions in the interim. Third, it translates these comparative and theoretical findings into a concrete, risk-tiered accountability framework that can be operationalized within Indonesia's existing civil law architecture without requiring wholesale codification, offering a doctrinally grounded contribution to a legal system that has not yet enacted AI-specific civil liability rules.

2. Research Methods

This study employs a normative juridical (*yuridis normatif*) research method, treating law as a coherent system of norms to be analyzed doctrinally rather than as a social phenomenon to be measured empirically. Three complementary approaches are used. The statutory approach (*pendekatan perundang-undangan*) examines relevant positive legal instruments, including Articles 1365 and 1367 of the Indonesian Civil Code, Regulation (EU) 2024/1689 on Artificial Intelligence, and Directive (EU) 2024/2853 on liability for defective products. The conceptual approach (*pendekatan konseptual*) is used to analyze doctrinal constructs that lack direct statutory codification in Indonesia, particularly legal personhood, fault-based liability, strict liability, and vicarious liability, by reference to established legal theory and scholarly literature. The comparative approach (*pendekatan perbandingan*) places

⁷ Kharitonova et al., 2022; Sharivkhan et al., 2026; Michurin, 2025.

⁸ Tursunbaeva et al., 2026; Vasilevskaya, 2025; Bakhteev, 2024; Balalaeva, 2023.

Indonesian doctrine alongside European Union, Eurasian, and other comparative civil liability frameworks to identify convergences, divergences, and transferable normative solutions.

Data consist exclusively of secondary legal materials, differentiated into primary legal materials (binding legislation, regulations, and directives), secondary legal materials (peer-reviewed journal articles, scholarly commentaries, and official regulatory reports), and tertiary legal materials (legal dictionaries and reference works used to clarify terminology). Materials were collected through library-based document study (*studi kepustakaan*) and analyzed using qualitative-prescriptive legal reasoning, combining systematic interpretation, to situate each provision within the broader structure of civil liability law, and teleological interpretation, to assess whether existing norms still serve their protective purpose when applied to AI-generated harm. No field data, interviews, or statistical analysis were used, consistent with the doctrinal character of the research problem.

3. Result and Discussion

3.1 The Legal Personhood Question Reconsidered

The doctrinal starting point for any liability analysis is the question of subjecthood: can an artificial intelligence system itself be a bearer of rights and obligations, or must responsibility always be traced back to a human or corporate actor? Legal personhood is not a natural fact but a legal fiction extended by the state to entities the law finds useful to treat as subjects, most visibly corporations, which can own property, enter contracts, sue, and be sued despite having no consciousness of their own. Proponents of AI personhood, echoing the European Parliament's 2017 proposal for a status of "electronic person," argue that a similar fiction could be extended to sufficiently autonomous AI systems, coupled with a mandatory insurance fund or a dedicated pool of assets, so that victims could recover compensation directly from the AI-linked fund rather than litigating a complex, multi-party causal chain running through developers, trainers, data suppliers, manufacturers, and operators.⁹

This study's analysis suggests that this proposal, while doctrinally coherent in the abstract, is premature and normatively risky at present. Three arguments support this conclusion. First, corporate personhood is functionally justified because a corporation is a persistent, asset-holding organization with identifiable natural persons directing it; an AI system, by contrast, is a tool without independent will, interests, or capacity for moral agency, and granting it personhood does not add real accountability, it merely relocates the point at which human responsibility is examined. Second, empirical experience with corporate personhood shows that legal fictions can be exploited to externalize risk, an outcome scholars label the "moral crumple zone" or "responsibility laundering" problem: if an AI system can be sued as a nominal defendant backed by a limited insurance fund, the developers and deployers who actually profit from its operation may escape liability that exceeds the fund's ceiling,

⁹ Novelli et al., 2025; Ziemianin, 2021.

leaving victims under-compensated.¹⁰ Third, no jurisdiction examined in this study, including the European Union, Indonesia, Ukraine, Kazakhstan, or the Russian Federation, has adopted binding AI personhood; comparative regulatory practice has instead converged on refining liability rules for existing legal subjects, namely producers, operators, and users, which indicates an emerging, if uncoordinated, international consensus that the personhood route is not currently the preferred normative solution.¹¹ Accordingly, this article treats AI as a legal object, an instrument or product whose operation generates liability for the human and corporate actors who design, deploy, and profit from it, while acknowledging that a narrower, functional form of personhood, limited strictly to procedural capacity to be named in litigation backed by compulsory insurance, remains a defensible long-term policy option should AI autonomy increase substantially.

3.2 Comparative Liability Frameworks: Convergence and Divergence

Having positioned AI as a legal object rather than a legal subject, the liability question becomes one of allocation: among the developer who designs and trains the system, the operator or deployer who places it into service, and the user who operates it, who bears responsibility, and under what standard of proof? Comparative analysis reveals three broad regulatory strategies. The first strategy, exemplified by the European Union's revised Product Liability Directive, extends classical product liability to AI by defining software and AI systems as "products," introducing rebuttable presumptions of defect and causation, and compelling disclosure of technical evidence to correct the structural information asymmetry between claimants and technologically sophisticated defendants.¹² Notably, the complementary Artificial Intelligence Liability Directive, which would have harmonized fault-based liability rules across member states and eased the burden of proof for non-product AI harms, was withdrawn by the European Commission in 2025 after failing to secure political agreement, leaving a harmonization gap that member states must currently fill through divergent national tort law. The second strategy, visible in recent Eurasian scholarship and legislative proposals from Kazakhstan, Ukraine, and the Russian Federation, favors strict or quasi-strict liability for operators of high-risk AI systems, often modeled on liability for "sources of increased danger" familiar from civil law tradition governing hazardous activities, combined with compulsory insurance.¹³ The third strategy, dominant in jurisdictions without AI-specific legislation such as Indonesia, relies on general fault-based tort provisions supplemented, where applicable, by vicarious liability doctrine, leaving courts to stretch inherited categories to fit AI-generated harm on a case-by-case basis.

Indonesian doctrine falls squarely into the third category and exhibits acute strain when applied to AI. Article 1365 of the Civil Code requires a claimant to prove an unlawful act, fault

¹⁰ Dešić, 2025; Yehya & Djillali, 2025.

¹¹ Wen & Tong, 2023; Farajpour, 2025; Jamil, 2025.

¹² De Bruyne et al., 2023.

¹³ Kharitonova et al., 2022; Sharivkhan et al., 2026.

(kesalahan), loss, and a causal link, a structure that presumes the defendant's conduct is knowable and evaluable against a standard of care. When harm originates from an opaque machine-learning model whose decision pathway cannot be reconstructed even by its developers, proving fault in the classical sense becomes exceedingly difficult, effectively denying many victims an practical remedy despite the letter of the law technically covering the harm. Article 1367 offers a partial analogy through vicarious liability for persons or things under one's supervision, and could plausibly be extended, by judicial interpretation, to hold an AI operator liable for harm caused by a system under its operational control, much as an employer is liable for an employee's tortious acts. However, Article 1367 was not designed with self-learning systems in mind, and its application to AI remains untested in Indonesian jurisprudence, creating legal uncertainty for both victims seeking compensation and businesses seeking to manage risk.¹⁴

Table 1 synthesizes the comparative liability landscape examined in this study, situating each framework along four analytical dimensions: legal basis, treatment of AI personhood, applicable liability standard, and the allocation of the evidentiary burden.

Table 1. Comparative Civil Liability Frameworks for Artificial Intelligence-Caused Damages

Jurisdiction / Instrument	Legal Basis	AI Legal Personhood	Liability Standard	Evidentiary Burden	Key Distinguishing Feature
European Union (revised Product Liability Directive, 2024)	Directive (EU) 2024/2853	Not recognized	Strict/product liability (defect-based)	Presumption of defect and causation; mandatory disclosure	Extends "product" to software and AI systems
European Union (withdrawn AI Liability Directive)	Proposal COM(2022)496, withdrawn 2025	Not recognized	Fault-based (as proposed)	Presumed causal link (proposed, never enacted)	2025 withdrawal leaves a harmonization gap for non-product AI harm

¹⁴ Sari & Harwika, 2022; Mantili et al., 2025; Hirawan & Parmitasari, 2026.

Kazakhstan / Ukraine / Russia (scholarly and legislative proposals)	Draft rules analogous to "source of increased danger" doctrine	Not recognized	Strict/quasi-strict liability for high-risk operators	Burden largely on operator once use and harm are shown	Insurance-backed strict liability from hazardous-activity doctrine
Indonesia	Civil Code Arts. 1365 and 1367	Not recognized ; no AI-specific statute	Fault-based tort; vicarious liability by analogy	Burden on claimant to prove fault and causation	No dedicated AI liability instrument; doctrine applied by extension
Proposed risk-tiered framework (this study)	Recommended lex specialis	Not recognized (AI treated as legal object)	Strict liability (high-risk); rebuttable fault presumption (other risk levels)	Burden shifts to developer/operator or once prima facie harm is shown	Tripartite allocation by control and benefit; mandatory insurance for high-risk AI

3.3 Toward a Risk-Based Accountability Framework

The comparative and doctrinal analysis above supports a proposed accountability framework built on three pillars. The first pillar is risk-tiered strict liability, adapting the risk classification already established by the EU Artificial Intelligence Act for regulatory compliance purposes into a liability standard: AI systems classified as high-risk, such as those used in medical diagnosis, autonomous transportation, or credit scoring, should trigger strict liability for the deploying operator regardless of individually provable fault, on the theory that an entity profiting from a high-risk technology should internalize the cost of the harm it statistically and foreseeably generates, an application of the classical civil law principle of liability for hazardous activities.¹⁵ Systems classified as limited or minimal risk may remain subject to fault-based liability, but with the second pillar, a reversed or eased evidentiary burden, requiring the developer or operator, rather than the victim, to disclose technical logs and demonstrate that reasonable design and monitoring standards were met once the claimant establishes a prima facie case of harm and use, mirroring the disclosure and presumption

¹⁵ Abouhaiba et al., 2026; Eldakak et al., 2024.

mechanisms already adopted in the EU's revised Product Liability Directive.¹⁶ The third pillar is mandatory insurance or a compensation fund for high-risk AI operators, ensuring that victims are not left without recourse when a specific defendant's share of fault cannot be cleanly isolated among multiple contributors in the AI value chain, and distributing the residual risk of technological uncertainty across the industry rather than onto individual victims.

A remaining question concerns how liability should be distributed among the developer, the operator or deployer, and the end user once a strict or presumed-fault standard is triggered. This study proposes that liability should follow the locus of control and benefit rather than mere proximity to the harmful event. The developer, who designs the model architecture, selects training data, and sets the parameters of the system's autonomy, should bear liability for design defects and foreseeable failure modes that a reasonably competent developer, applying prevailing technical standards, ought to have anticipated and mitigated, an allocation consistent with the design-defect branch of classical product liability. The operator or deployer, who integrates the AI system into an actual service, configures its operating parameters, and decides the context and scale of its deployment, should bear liability for operational fault, including inadequate monitoring, failure to update the system in response to known risks, and deployment in contexts exceeding the system's validated scope, an allocation consistent with liability for the custodian of a hazardous instrumentality. The end user should bear liability only for demonstrable misuse that departs from the system's intended operating parameters, such as deliberately circumventing safety features, since imposing liability on end users for harms arising from the AI's inherent design or the operator's deployment choices would be both unfair and would fail to place incentives for safer design where they can most effectively be acted upon. This tripartite allocation does not eliminate the possibility of joint and several liability where more than one actor's conduct contributed to the harm, but it gives courts and regulators a principled starting point for apportionment rather than leaving the entire causal inquiry to ad hoc judicial discretion.¹⁷

Applied to Indonesia, this framework does not require replacing the Civil Code but rather supplementing it with a *lex specialis* regulation on AI-related civil liability, analogous to how Indonesia previously addressed data protection gaps through the enactment of the Personal Data Protection Law rather than amending the Civil Code directly. Such a regulation could statutorily classify AI systems by risk level, drawing on the EU AI Act's taxonomy as comparative guidance while adapting thresholds to Indonesia's regulatory capacity, codify a rebuttable presumption of fault against operators of high-risk systems once causation between the AI's operation and the harm is shown, and mandate liability insurance for operators deploying high-risk AI in sectors such as healthcare, financial technology, and public digital services. This approach preserves the existing structure of Articles 1365 and 1367 as a general fallback for AI-related harms not covered by the specific regulation, while directly addressing

¹⁶ De Bruyne et al., 2023; Alqodsi & Gura, 2023.

¹⁷ Boilă, 2026; Balalaeva, 2023; Bakhteev, 2024.

the practical evidentiary obstacles that currently prevent Indonesian victims of algorithmic harm from securing an effective remedy, and does so without resolving, or needing to resolve, the unsettled and arguably premature question of whether AI itself should ever be recognized as a subject of law.¹⁸

4. Conclusion

This article set out to answer two interrelated questions: whether artificial intelligence should be recognized as a subject of civil law, and how civil liability for AI-caused damages should be allocated among the actors who design, deploy, and use it. On the first question, the normative juridical analysis conducted here concludes that granting AI full or even limited legal personhood is, at the current stage of technological development and comparative regulatory practice, conceptually premature and practically counterproductive, since no examined jurisdiction has adopted it and the reform risks functioning as a shield that relocates rather than resolves human accountability. On the second question, the analysis demonstrates that existing fault-based and vicarious liability doctrines, both in Indonesia's Civil Code and in comparable civil law systems, were not designed for autonomous, opaque, and continuously evolving systems, and that even the European Union's more advanced regulatory apparatus remains incomplete following the 2025 withdrawal of its proposed AI Liability Directive. The article accordingly proposes a risk-tiered accountability framework combining strict liability for high-risk AI operators, reversed evidentiary burdens modeled on the EU's revised Product Liability Directive, mandatory insurance mechanisms, and a principled allocation of responsibility among developers, operators, and users based on control and benefit rather than mere causal proximity. For Indonesia specifically, the recommended path is a targeted *lex specialis* regulation on AI civil liability that supplements, rather than replaces, Articles 1365 and 1367 of the Civil Code, thereby closing the practical evidentiary gap facing victims of algorithmic harm without prematurely committing the legal system to unresolved questions of AI subjecthood. Future research should examine how Indonesian courts interpret Article 1367 in early AI-related disputes as they arise, and should further explore the design of sector-specific insurance pools for high-risk AI applications in healthcare and financial technology.

References

- Abouhaiba, N., Khouli, S. A., & Khater, M. (2026). Towards protecting the injured party from errors and hallucinations of artificial intelligence: A contemporary legal perspective. *F1000Research*, 15. <https://doi.org/10.12688/f1000research.179603.1>
- Alqodsi, E., & Gura, D. (2023). High tech and legal challenges: Artificial intelligence-caused damage regulation. *Cogent Social Sciences*, 9(1). <https://doi.org/10.1080/23311886.2023.2270751>

¹⁸ Mantili et al., 2025; Vasilevskaya, 2025; Tursunbaeva et al., 2026.

- Bakhteev, D. (2024). The legal status of artificial intelligence systems and models of differentiation of legal liability for damage caused by them. *Lex Russica*, 209(4), 9–23. <https://doi.org/10.17803/1729-5920.2024.209.4.009-023>
- Balalaeva, Y. (2023). The issue of determining the subjects of legal liability for harm caused by artificial intelligence: Analysis of solutions. *Vestnik of the St. Petersburg University of the Ministry of Internal Affairs of Russia*, (3), 10–19. <https://doi.org/10.35750/2071-8284-2023-3-10-19>
- Boilă, L. (2026). Liability for damages caused by artificial intelligence—A new special case of liability in which traditional rules prove insufficient and sometimes inapplicable. *Curentul Juridic/Juridical Current*. <https://doi.org/10.62838/cjjc-2024-0070>
- Bottomley, D., & Thaldar, D. (2023). Liability for harm caused by AI in healthcare: An overview of the core legal concepts. *Frontiers in Pharmacology*, 14, Article 1297353. <https://doi.org/10.3389/fphar.2023.1297353>
- De Bruyne, J., Dheu, O., & Ducuing, C. (2023). The European Commission's approach to extra-contractual liability and AI—An evaluation of the AI Liability Directive and the revised Product Liability Directive. *Computer Law & Security Review*, 51, Article 105894. <https://doi.org/10.1016/j.clsr.2023.105894>
- Dešić, J. (2025). Legal personhood for AI: A necessary step or a perilous path? *Facta Universitatis, Series: Law and Politics*. <https://doi.org/10.22190/fulp250304001d>
- Eldakak, A., Alremeithi, A., Dahiyat, E., El-Gheriani, M., Mohamed, H., & Abdulrahim Abdulla, M. I. (2024). Civil liability for the actions of autonomous AI in healthcare: An invitation to further contemplation. *Humanities and Social Sciences Communications*, 11(1), Article 305. <https://doi.org/10.1057/s41599-024-02806-y>
- Farajpour, R. (2025). The role of civil liability in artificial intelligence laws from the perspective of major global legal systems. *Journal of Law and Political Studies*, 5(1), 182–196. <https://doi.org/10.48309/jlps.2025.518711.1353>
- Hirawan, A. N., & Parmitasari, I. (2026). Civil liability for losses resulting from the use of artificial intelligence. *Journal of Private and Commercial Law*, 3(1). <https://doi.org/10.20885/jpcol.vol3.iss1.art1>
- Jamil, A. (2025). The harm caused by artificial intelligence and its impact on civil liability: A comparative analytical study in Iraqi, Egyptian and French law. *Journal of Anbar University for Law and Political Sciences*. <https://doi.org/10.37651/aujlps.2025.161224.1547>
- Kharitonova, Y., Savina, V., & Pagnini, F. (2022). Civil liability in the development and application of artificial intelligence and robotic systems: Basic approaches. *Vestnik Permskogo Universiteta. Juridicheskie Nauki*, 58, 683–708. <https://doi.org/10.17072/1995-4190-2022-58-683-708>
- Mantili, R., Putri, S. A., & Fakhriah, E. L. (2025). Compensation for damages caused by artificial intelligence under Indonesian civil law. *Pena Justisia: Media Komunikasi dan Kajian Hukum*, 24(1). <https://doi.org/10.31941/pj.v24i1.5164>
- Michurin, I. (2025). Subjects of civil liability for damage caused by the use of artificial intelligence under the legislation of the EU and Ukraine. *University Scientific Notes*. <https://doi.org/10.37491/unz.106.1>

- Nemeikšis, G. (2021). Artificial intelligence as legal entity in the civil liability context. *Journal of the University of Latvia. Law*, 12, 89–102. <https://doi.org/10.37804/1691-6077-2021-12-89-102>
- Novelli, C., Floridi, L., Sartor, G., & Teubner, G. (2025). AI as legal persons: Past, patterns, and prospects. *Journal of Law and Society*, 52(4), 533–555. <https://doi.org/10.1111/jols.70021>
- Sari, A. P., & Harwika, D. M. (2022). Legal liability of artificial intelligence in perspective of civil law in Indonesia. *International Journal of Social Science Research and Review*, 5(2). <https://doi.org/10.47814/ijssrr.v5i2.191>
- Sharivkhan, Z., Satybaldy, L., Koldassov, B., & Osmanova, D. (2026). Civil liability for damage caused by artificial intelligence systems: Key issues of legal regulation in the Republic of Kazakhstan. *Eurasian Scientific Journal of Law*, 1–2, 157–169. <https://doi.org/10.46914/2959-4197-2026-1-2-157-169>
- Soyer, B., & Tettenborn, A. (2022). Artificial intelligence and civil liability: Do we need a new regime? *International Journal of Law and Information Technology*, 30(4), 385–397. <https://doi.org/10.1093/ijlit/eaad001>
- Tursunbaeva, N., Turatbekova, C., Tukubasheva, A., Grundel, L., Kudryavtsev, V., & Shapovalov, A. (2026). Models of civil liability for the unlawful use of artificial intelligence in the economy. *Veredas do Direito*, 23(4). <https://doi.org/10.18623/rvd.v23.n4.4833>
- Vasilevskaya, L. (2025). Compensation of damage caused by artificial intelligence: Challenges and legal development areas. *Economy and Law*, (7), 3–14. <https://doi.org/10.18572/0134-2398-2025-7-3-14>
- Wen, Z., & Tong, D. (2023). Analysis of the legal subject status of artificial intelligence. *Beijing Law Review*, 14(1), 45–58. <https://doi.org/10.4236/blr.2023.141004>
- Yehya, A., & Djillali, D. B. T. (2025). Artificial intelligence, liability, and legal personhood: Towards a human-centered framework balancing innovation, responsibility, and ethical safeguards. *Science, Education and Innovations in the Context of Modern Problems*. <https://doi.org/10.56334/sei/8.12.19>
- Ziemianin, K. (2021). Civil legal personality of artificial intelligence. Future or utopia? *Internet Policy Review*, 10(2). <https://doi.org/10.14763/2021.2.1544>