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Legal Liability of Artificial Intelligence in Criminal Law: A Comparative Study between Indonesia and European Union

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Abstract: The rapid development of artificial intelligence (AI) technologies has generated complex challenges for criminal law, particularly regarding the attribution of legal liability when AI systems cause harm or facilitate criminal acts. Traditional criminal law doctrine is grounded in the principles of actus reus and mens rea, presupposing human agency and moral culpability. However, AI systems operate autonomously and lack consciousness, raising fundamental questions about responsibility and accountability. This study examines the concept of criminal liability for AI through a comparative analysis between Indonesia and the European Union. While the European Union has adopted a comprehensive regulatory framework through the EU Artificial Intelligence Act and complementary liability instruments, Indonesia currently relies on general criminal law provisions and sectoral regulations without specific AI governance mechanisms. Using normative and comparative legal methods, this research analyzes doctrinal limitations, regulatory approaches, and emerging liability models, including human-centered liability, strict liability, and electronic personhood. The findings indicate that neither jurisdiction recognizes AI as a criminal subject; however, the European Union applies a risk-based regulatory model that enhances accountability for providers and deployers of high-risk AI systems. This article argues that Indonesia should adopt a hybrid framework combining human-centered criminal liability with risk-based regulatory obligations to address accountability gaps while maintaining doctrinal coherence in criminal law.

Keywords: Artificial Intelligence, Criminal Liability, Comparative Law, Indonesia, European Union, AI Governance

Introduction

The accelerated development of artificial intelligence (AI) has reshaped not only economic and technological landscapes but also the foundational assumptions of modern legal systems (Gunasekara et al, 2025). AI-driven technologies are now embedded in financial systems, healthcare diagnostics, law enforcement mechanisms, autonomous transportation, and generative communication platforms developed by companies such as OpenAI. These systems increasingly operate through machine learning models capable of autonomous decision-making, pattern recognition, and adaptive responses beyond direct human supervision (Häglund & Björklund, 2024). While such technological capabilities promise efficiency, predictive accuracy, and cost reduction, they simultaneously generate unprecedented legal challenges particularly within the domain of criminal law.

Criminal law has traditionally been constructed upon anthropocentric assumptions (Butt, 2023). The doctrines of *actus reus* and *mens rea* presuppose that liability arises from a human act accompanied by culpable intent or negligence (Saipudin et al, 2025). The moral foundation of punishment is deeply tied to concepts of blameworthiness, free will, and conscious decision-making. However, AI systems do not possess consciousness, intentionality, or moral awareness. Their outputs are generated through algorithmic processing and probabilistic calculations, often shaped by training data and system architecture rather than deliberate human choice at the moment harm occurs. This technological autonomy destabilizes the classical paradigm of criminal responsibility.

The emergence of highly autonomous systems such as self-driving vehicles (Asad et al, 2023), AI-based predictive policing tools, algorithmic sentencing recommendations, and automated financial trading platforms illustrates the complexity of attributing liability when harm results (Mortazavi, 2025). If an autonomous vehicle causes a fatal accident, is criminal responsibility attributable to the programmer, the manufacturer, the deployer, the user, or the corporation as a whole? If a predictive policing algorithm disproportionately targets certain communities, does criminal accountability arise from the software developer, the data provider, or the law enforcement agency deploying it? These scenarios expose what legal scholars describe as the "accountability gap," a structural mismatch between traditional liability doctrines and technologically mediated harm.

At the global level, jurisdictions have responded differently to this normative disruption. The European Union has positioned itself as a regulatory pioneer by adopting the EU Artificial Intelligence Act, which establishes the world's first comprehensive legal framework governing artificial intelligence. The Act introduces a risk-based classification system distinguishing between unacceptable-risk AI systems, high-risk systems, limited-risk systems, and minimal-risk systems (Königs, 2022). By imposing compliance obligations, transparency requirements, documentation standards, and human oversight mechanisms, the EU seeks to mitigate systemic risks before harm materializes. Complementary reforms in liability directives further clarify the evidentiary burden and accountability of providers and deployers (Feng et al, 2025). Nevertheless, even within this progressive framework, AI itself is not recognized as a subject of criminal law; liability remains anchored to natural or legal persons.

In contrast, Indonesia has yet to adopt a comprehensive AI-specific statute. The Indonesian legal framework relies primarily on general criminal provisions under the Criminal Code (KUHP), the Electronic Information and Transactions Law, consumer protection regulations, and data protection legislation (Puspa Setyawan et al, 2025). These instruments may indirectly apply to AI-related harm, yet they were drafted in an era when autonomous machine decision-making was not a central concern. As a result, Indonesia faces normative ambiguity in determining how criminal liability should be allocated when AI systems cause or facilitate harm. The absence of a structured regulatory framework risks legal uncertainty, inconsistent judicial interpretation, and potential under-deterrence in high-risk technological sectors.

The divergence between the European Union's structured regulatory model and Indonesia's doctrinal reliance on classical criminal principles reveals a significant comparative and theoretical gap. On one hand, strict adherence to traditional mens rea requirements may render criminal law ineffective in addressing autonomous technological harm. On the other hand, excessive regulatory expansion may threaten foundational principles such as legality (*nullum crimen sine lege*), proportionality, and personal culpability. The central challenge, therefore, lies in reconciling technological innovation with doctrinal coherence.

Beyond doctrinal questions, the debate also engages deeper philosophical concerns regarding legal personhood and moral agency. Some theoretical proposals have explored the notion of granting limited "electronic personhood" to highly autonomous AI systems, an idea once discussed in policy debates within the European Parliament. Although this proposal has not been formally adopted, it reflects a broader intellectual tension: whether the law should adapt by expanding the category of legal subjects, or instead reinforce human-centered accountability through regulatory innovation.

This article argues that the problem of AI liability in criminal law cannot be resolved solely through doctrinal reinterpretation or purely through regulatory expansion. Rather, it requires a hybrid conceptual framework that integrates classical criminal responsibility with preventive, risk-based governance mechanisms. Through a comparative doctrinal analysis between Indonesia and the European Union, this study seeks to identify normative gaps, evaluate existing regulatory models, and propose a coherent approach suitable for Indonesia's legal system.

Methodologically, this research employs normative legal analysis combined with comparative legal methodology. It examines statutory provisions, regulatory frameworks, legal doctrines, and scholarly debates to assess how each jurisdiction conceptualizes accountability for AI-related harm. The comparative approach serves not merely to contrast two systems, but to extract transferable principles that may inform future legislative reform in Indonesia.

Ultimately, this study aims to contribute to the evolving discourse on AI governance by addressing a fundamental question: how can criminal law preserve its moral and doctrinal foundations while remaining responsive to technological autonomy? By situating Indonesia within the broader European regulatory experience, this article seeks to offer both theoretical clarity and practical policy recommendations in confronting the legal challenges posed by artificial intelligence.

Methodology

This study employs a normative legal research design combined with a comparative legal approach to analyze the concept of criminal liability for artificial intelligence within the legal systems of Indonesia and the European Union (Kartiko et al, 2024). Normative legal research is appropriate for examining legal doctrines, statutory frameworks, regulatory instruments, and conceptual developments concerning criminal responsibility (Widiyastuti et al, 2025). Rather than relying on empirical data collection, this study focuses on the

interpretation, systematization, and critical evaluation of legal norms and theoretical constructs.

Research Approach

This research adopts a statutory, conceptual, and comparative approach to examine the issue of criminal liability for artificial intelligence within the legal systems of Indonesia and the European Union (Giannini & Kwik, 2023). The statutory approach is employed to analyze relevant legal instruments that regulate criminal responsibility and artificial intelligence governance. In the European Union context, particular attention is given to the EU Artificial Intelligence Act as the primary regulatory framework governing AI systems, alongside complementary liability mechanisms. In Indonesia, the analysis focuses on the Criminal Code (KUHP), the Electronic Information and Transactions Law, and related regulatory provisions that may indirectly apply to AI-related harm. Through this approach, the research seeks to identify normative structures, interpret legislative intent, and assess whether existing statutory provisions are capable of addressing harms arising from autonomous AI systems.

In addition to statutory analysis, this study applies a conceptual approach to explore foundational doctrines of criminal law (Baker & Sheldrick, 2025). Classical principles such as actus reus, mens rea, culpability, corporate criminal liability, strict liability, and vicarious liability are examined to determine their compatibility with autonomous technological systems. The conceptual approach enables the research to critically assess whether AI-related harm can be accommodated within existing doctrinal frameworks or whether reinterpretation and doctrinal adaptation are required (Geven et al, 2025). Furthermore, the study engages with theoretical debates surrounding legal personhood and the controversial notion of electronic personhood, situating the discussion within broader philosophical and jurisprudential discourse.

A comparative approach is also central to this research. By juxtaposing Indonesia's reliance on traditional criminal law doctrine with the European Union's risk-based regulatory governance model, the study identifies structural differences in how each jurisdiction conceptualizes accountability. The European Union serves as a comparative benchmark due to its advanced and comprehensive regulatory architecture for AI governance. The objective of comparison is not merely descriptive but analytical: it aims to extract normative insights and evaluate the transferability of regulatory principles to the Indonesian legal system (Arafat et al, 2025). Through this comparative lens, the research seeks to illuminate both accountability gaps and potential pathways for reform in Indonesia (Klempka et al, 2024).

Scope and Limitations

This study is confined to the analysis of criminal liability arising from the use, deployment, or operation of artificial intelligence systems. It does not comprehensively examine civil liability, administrative sanctions, or contractual responsibility, except where such mechanisms are relevant to clarifying comparative differences between Indonesia and the European Union (Valencia, 2022). The primary focus remains on the doctrinal and

regulatory foundations of criminal law, particularly concerning the attribution of responsibility, culpability standards, and the allocation of liability among natural and legal persons involved in AI systems.

In terms of jurisdictional scope, the research compares Indonesian national law with the supranational regulatory framework of the European Union (Walsh & Ward, 2022). The analysis of the European Union is centered on its harmonized legislative instruments, particularly the EU Artificial Intelligence Act, rather than on the individual criminal codes of each EU Member State. Consequently, variations in domestic criminal legislation across EU countries are not examined in detail. This delimitation ensures analytical clarity and maintains focus on the EU's overarching regulatory model as a comparative benchmark.

Technologically, this research concentrates on autonomous and high-risk AI systems capable of producing legally significant consequences, such as autonomous vehicles, predictive policing systems, algorithmic decision-making tools, and generative AI with potential for criminal misuse. Low-risk or purely assistive AI applications are not the primary concern unless they illustrate broader doctrinal issues. The study also does not engage in technical or engineering analysis of AI architecture; instead, it addresses AI as a legal and regulatory subject within normative discourse.

Methodologically, the research is doctrinal and normative in nature, relying on statutory interpretation, conceptual analysis, and comparative legal reasoning. It does not incorporate empirical fieldwork, case studies involving court decisions, or quantitative data analysis (Ramadhan et al, 2024). While this approach enables deep theoretical examination, it may limit insights into practical enforcement challenges or judicial interpretation in real-world cases.

These limitations are acknowledged to preserve analytical coherence and doctrinal depth. By clearly defining its scope, this study seeks to provide a focused and theoretically rigorous contribution to the evolving discourse on criminal liability and artificial intelligence, particularly within the Indonesian legal context.

Results and Discussion

The comparative analysis reveals that the core legal tension surrounding artificial intelligence (AI) in criminal law lies in the incompatibility between autonomous technological systems and classical doctrines of culpability. Both Indonesia and the European Union adhere to the fundamental criminal law principle that liability must be grounded in fault. The doctrine of *mens rea* remains central to criminal responsibility, presupposing intent, negligence, or recklessness attributable to a conscious subject. AI systems, however, operate through algorithmic computation without subjective awareness, intention, or moral agency. Consequently, neither jurisdiction recognizes AI as a bearer of criminal liability.

In Indonesia, criminal responsibility is regulated primarily through the Criminal Code (KUHP), which recognizes natural persons and, under certain circumstances, corporations as subjects of criminal law (Tuomi & Moritz, 2024). When harm is caused by AI systems such as automated financial fraud, algorithmic discrimination, or autonomous

vehicle accidents liability must be attributed to identifiable human actors or legal entities. This attribution typically depends on proving negligence, intent, or corporate fault. However, Indonesian legislation does not yet provide explicit guidance on how responsibility should be allocated among developers, deployers, system operators, data providers, and corporate entities involved in complex AI ecosystems (Morse, 2025). As a result, doctrinal uncertainty persists, particularly in scenarios where harm emerges from machine-learning processes that evolve beyond initial programming parameters.

By contrast, the European Union has adopted a structured regulatory framework through the EU Artificial Intelligence Act, which entered into force in 2024. Rather than redefining criminal subjectivity, the EU addresses accountability gaps through a risk-based governance model. AI systems are classified into categories unacceptable risk, high risk, limited risk, and minimal risk with differentiated compliance obligations. High-risk AI systems, including those used in critical infrastructure, law enforcement, employment, and biometric identification, are subject to strict documentation, transparency, conformity assessment, and human oversight requirements. This preventive regulatory approach reduces the likelihood of criminally relevant harm and clarifies responsibility among providers and deployers.

The following table summarizes the comparative findings:

Table 1. Comparative Framework of AI Criminal Liability: Indonesia and European Union

Aspect of Regulation	Indonesia	European Union
Primary Legal Basis	Criminal Code (KUHP), Electronic Information and Transactions Law, sectoral regulations	EU Artificial Intelligence Act (2024), complemented by liability and product safety directives
Recognition of AI as Criminal Subject	Not recognized	Not recognized
Subjects of Criminal Liability	Natural persons and corporations	Natural persons and legal entities (providers, deployers, distributors)
Regulatory Approach	Reactive, case-based application of general criminal doctrines	Preventive, risk-based regulatory governance
Risk Classification System	No formal AI risk classification	Explicit four-tier risk classification (unacceptable, high, limited, minimal)
Allocation of Responsibility	Determined through general negligence or intent doctrines	Explicit allocation of compliance obligations to AI providers and deployers
Preventive Compliance Obligations	Limited and indirect	Mandatory documentation, risk assessment, transparency, human oversight for high-risk AI
Legal Certainty in AI Context	Normatively ambiguous	Structured and harmonized at supranational level

The comparison indicates that the difference between Indonesia and the European Union is not doctrinal recognition of AI as a legal subject both reject that notion but rather the method of allocating accountability. Indonesia relies on traditional criminal law mechanisms applied retrospectively after harm occurs. The European Union, in contrast,

emphasizes ex ante regulatory compliance designed to prevent harm before criminal liability becomes necessary.

This divergence has significant implications. Indonesia's reliance on classical doctrines may prove insufficient in complex AI ecosystems where causation is diffused across multiple actors and system layers. Without explicit legislative clarification, courts may face difficulty establishing the degree of fault attributable to developers or corporations, especially when AI systems evolve through self-learning mechanisms. Such uncertainty risks weakening deterrence and undermining legal predictability.

The EU's model demonstrates that accountability gaps can be mitigated without recognizing AI as a legal person. By imposing structured compliance obligations and clearly defining the responsibilities of providers and deployers, the regulatory framework strengthens traceability and reduces ambiguity in liability attribution. Importantly, criminal law remains anchored to human and corporate actors, thereby preserving the moral foundations of punishment while adapting to technological complexity.

From a normative standpoint, the findings suggest that Indonesia does not require a radical transformation of criminal law doctrine. Instead, it requires regulatory clarification that integrates risk-based governance principles into the existing human-centered liability framework. Such integration would enhance accountability while maintaining doctrinal coherence with foundational principles such as culpability and legality.

Ultimately, the results demonstrate that the challenge posed by AI is not the absence of a punishable subject, but the need for clearer allocation of responsibility within technologically mediated systems. The European Union addresses this challenge through structured governance, whereas Indonesia remains at an early stage of regulatory adaptation. This asymmetry highlights the urgency of legislative development in Indonesia to prevent accountability gaps in the era of autonomous artificial intelligence.

Conceptual Models of Criminal Liability for Artificial Intelligence

The comparative findings between Indonesia and the European Union reveal that the debate over AI liability ultimately converges into three principal conceptual models (Eurike Hailtik & Afifah, 2024). These models represent different philosophical and doctrinal responses to the accountability gap created by autonomous systems.

1) Human-Centered Liability Model

The first model is the Human-Centered Liability Model. Under this approach, artificial intelligence is treated strictly as a tool or instrument (van Sliedregt, 2025). Criminal responsibility remains exclusively attributable to natural persons or legal entities involved in the development, deployment, or operation of the AI system. This model preserves the classical structure of criminal law by maintaining the requirement of human culpability. Both Indonesia and the European Union fundamentally adhere to this framework. Even under the EU Artificial Intelligence Act, liability is not transferred to AI systems themselves but remains with providers, deployers, and corporate actors (Mensah, 2024). The strength of this model lies in its doctrinal consistency with established principles of fault and moral

blameworthiness. However, its limitation emerges in complex AI ecosystems where causation is diffused and identifying a culpable human actor becomes legally intricate.

2) Strict Liability Model

The second model is the Strict Liability Model, which shifts emphasis from moral blameworthiness to risk allocation. Under strict liability, responsibility may arise without proof of intent or negligence, particularly in contexts involving high-risk technologies (Yu & Li, 2022). This model is compatible with regulatory approaches that prioritize public safety and preventive governance. Although neither Indonesia nor the European Union formally adopts strict criminal liability for AI in a comprehensive manner, elements of risk-based responsibility can be observed within the EU regulatory framework. By imposing mandatory compliance obligations on high-risk AI providers, the EU effectively strengthens accountability even where direct intent may be difficult to establish. The strict liability approach enhances victim protection and legal certainty but must be carefully balanced to avoid undermining the foundational principle of culpability in criminal law.

3) Electronic Personhood Model

The third and most controversial framework is the Electronic Personhood Model (Singhal & Sharma, 2025). This approach proposes granting limited legal personality to highly autonomous AI systems, thereby allowing AI to become a direct bearer of rights and obligations. The concept was once debated within discussions at the European Parliament, though it has not been adopted into binding legislation. Proponents argue that as AI systems become increasingly autonomous and capable of independent decision-making, recognizing a form of legal personhood could simplify liability attribution (MINDIZ, 2022). Critics, however, contend that punishment presupposes moral agency and the capacity for blame qualities that AI fundamentally lacks. Moreover, recognizing AI as a criminal subject could dilute human accountability and create constitutional complications regarding proportionality and enforcement.

From the comparative analysis, it becomes evident that the Human-Centered Liability Model remains the most doctrinally coherent and practically viable framework for both Indonesia and the European Union. The Strict Liability Model may serve as a complementary mechanism for high-risk AI systems, particularly within preventive regulatory structures. In contrast, the Electronic Personhood Model remains largely theoretical and normatively premature in the current stage of technological development.

Accordingly, the future direction for Indonesia should not involve recognizing AI as a criminal subject, but rather refining human-centered liability through clearer statutory allocation of responsibility and incorporating risk-based regulatory safeguards. Such an approach would maintain the integrity of criminal law doctrine while responding effectively to the evolving risks posed by artificial intelligence.

Conclusion

The rapid advancement of artificial intelligence has exposed structural limitations within traditional criminal law doctrines. As demonstrated in this comparative study, both Indonesia and the European Union maintain a human-centered foundation of criminal liability rooted in culpability, moral agency, and the principle of fault. Artificial intelligence, lacking consciousness and intentionality, cannot satisfy the doctrinal requirements of *mens rea* and therefore cannot be recognized as a criminal subject under existing legal frameworks.

However, the absence of AI personhood does not eliminate the accountability challenges generated by autonomous systems. The comparative findings reveal a significant divergence in regulatory response. Indonesia continues to rely primarily on classical criminal law mechanisms that operate reactively, attributing liability to natural persons or corporations after harm has occurred. While doctrinally coherent, this approach lacks specific statutory guidance for allocating responsibility in complex AI ecosystems, where multiple actors contribute to system design, training, deployment, and operation.

In contrast, the European Union has adopted a preventive and structured governance model through the EU Artificial Intelligence Act. Rather than redefining criminal subjectivity, the EU addresses accountability gaps through risk classification, compliance obligations, transparency requirements, and mandatory human oversight for high-risk AI systems. This regulatory architecture strengthens traceability and clarifies responsibility among providers and deployers, thereby reducing legal ambiguity before criminal liability becomes necessary. The EU model demonstrates that accountability gaps can be mitigated without fundamentally altering the moral foundations of criminal law.

The analysis of the three conceptual models Human-Centered Liability, Strict Liability, and Electronic Personhood further clarifies the normative direction forward. The Human-Centered Liability Model remains the most doctrinally sound and practically viable framework. Elements of Strict Liability may be justified in high-risk AI contexts to enhance preventive accountability, provided that safeguards are maintained to preserve proportionality and fairness. Conversely, the Electronic Personhood Model remains largely theoretical and normatively premature, as it conflicts with foundational principles of punishment and moral blameworthiness.

Accordingly, this study concludes that Indonesia does not require a radical transformation of criminal law doctrine. Instead, it requires regulatory refinement. A hybrid framework should be developed that preserves human-centered criminal responsibility while incorporating risk-based regulatory obligations for high-risk AI systems. Such reform should include clearer statutory allocation of responsibility among developers, deployers, and operators; mandatory transparency and audit mechanisms; and enhanced corporate accountability provisions.

Ultimately, the challenge posed by artificial intelligence is not the need to punish machines, but the necessity of designing legal structures capable of allocating responsibility within technologically mediated systems. By integrating doctrinal coherence with structured governance mechanisms, Indonesia can address emerging accountability gaps

while maintaining the moral integrity of its criminal law system in the age of artificial intelligence.

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