

The Prospects of Sentencing Artificial Intelligence Based Autonomous Agents

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Abstract. *This research examines the prospect of criminalizing autonomous agents based on Artificial Intelligence (AI) from the perspective of Indonesian criminal law. The object of research focuses on autonomous AI agents that are capable of operating and making decisions independently. The research objective is to analyze the legal challenges arising from AI's ability to perform potentially unlawful acts, as well as explore potential approaches in formulating an appropriate legal framework. The method used was doctrinal and comparative analysis, reviewing legal literature, policies, and global best practices related to AI regulation. The results show that Indonesia's current criminal law system is inadequate to accommodate the complexities of autonomous AI agents. Key challenges include the concept of mens rea, appropriate forms of sanctions, and determining the subject of liability. This research proposes several approaches, including the expansion of the concept of criminal law subject, the development of a layered liability model, and the reformulation of the form of criminal sanctions. In conclusion, comprehensive and interdisciplinary criminal law reform is needed to accommodate the reality of AI technology, while maintaining the fundamental principles of criminal law such as justice and legal certainty.*

Keywords: Artificial intelligence; Autonomous Agents; Criminal Offenses.

1. INTRODUCTION

Artificial Intelligence (AI) constitutes a key element in the development of the Fourth Industrial Revolution, which focuses on the utilization of Big Data and artificial intelligence. The integration of AI has driven a digital revolution characterized by the convergence of technology with various other disciplines. This transformation has given rise to the concept of "cyber-physical systems," which expands the scope of interaction between humans and machines, particularly in terms of speed, scale, and the systemic impact generated.

AI is commonly defined as the capability of machines to emulate intelligent behavior and to simulate human cognitive processes. Research on AI has been conducted since the 1940s and early 1950s and has since undergone rapid development. Today, AI has become an integral part of modern life and performs functions far more advanced than

those of ordinary tools traditionally used by humans (Padhy, 2005). The principal functions of AI include natural language processing, reasoning capabilities, and intelligent object manipulation. The primary objective of AI development is to create devices or systems possessing a level of intelligence equivalent to, or even surpassing, that of humans. Accordingly, AI is expected to be capable of performing complex tasks that were previously within the exclusive domain of human beings.

The current development of AI and intelligent robotics is progressing at an extraordinary pace, prompting developed countries to compete in shaping and dominating the global AI market (Bughin, 2017). One concrete example of such technological advancement is the development of autonomous aircraft by the Georgia Institute of Technology, which are capable of communicating and sharing information independently without human intervention (Trent, 2017). Furthermore, the capacity of AI systems to continuously improve themselves has given rise to the concept of Artificial Super Intelligence (ASI), namely a form of artificial intelligence that possesses its own needs and objectives, as well as the ability to think and act in a manner comparable to humans (Bostrom, 2014).

Notwithstanding its rapid development, AI has also generated serious concerns among prominent global figures. At a technology conference in Lisbon, Portugal, on 6 November 2017, the renowned physicist Stephen Hawking warned that AI could become a major threat to human civilization if not wisely controlled. Similar concerns were expressed by entrepreneur Elon Musk, who stated that the uncontrolled development of AI could potentially become the most likely cause of a Third World War. These warnings are grounded in the reality that AI technology has begun to be deployed within military weapons systems, as evidenced by the United States Air Force (USAF) in the development of autonomous combat technologies (Cliff, 2017).

The existence of AI not only brings technological progress but also raises various legal questions, particularly with regard to criminal liability for acts committed by intelligent machines. One illustrative example of this complexity is the incident that occurred in Japan in 1981, when a motorcycle factory worker was killed due to misidentification by an AI-based robot. This case triggered debate as to who should bear responsibility for actions carried out by systems capable of making autonomous decisions.

In anticipation of the potential negative impacts of AI, various efforts have in fact been undertaken for a long time. One of the most well-known ideas is the Three Laws of Robotics proposed by Isaac Asimov in his science fiction works in 1950. These laws stipulate that a robot may not harm a human being, must obey human orders unless such orders conflict with the first law, and must protect its own existence insofar as such protection does not conflict with the first two laws (Tucker, 2019). Specifically, the Three Laws of Robotics provide, first, that a robot may not injure a human being or, through inaction, allow a human being to come to harm; second, that a robot must obey orders given by human beings except where such orders would conflict with the first law; and third, that a robot must protect its own existence as long as such protection does not conflict with the first or second law (Halley, 2010). Although, in theory, these laws appear logical and systematic, their application in real-life situations often gives rise to contradictions, particularly when robots are confronted with circumstances involving conflicts of interests or competing legal obligations (Issac Asimov, 1950).

The rapid development of AI-based technology has triggered in-depth discussions regarding its legal status, especially within the context of Indonesian criminal law, which to date recognizes only human beings and corporations as subjects of law. This condition raises concerns about the possibility of normative gaps or insufficiencies should AI particularly AI that has evolved into a super-intelligent autonomous agent commit acts that qualify as criminal offenses. In legal discourse, there are two principal views concerning the legal status of AI (Aswad, 2020).

First, there is the view that places AI as a partial legal subject, based on the assumption that AI does not possess will and legal consciousness in the same sense as humans. Under this approach, AI is granted only limited rights and obligations and is not accompanied by direct criminal liability. If AI commits an unlawful act, legal responsibility is transferred to the party acting as its guardian or representative.

Second, there is the view proposing that AI should be recognized as a full legal subject. This approach proceeds from the assumption that, in the future, AI may reach a level of intelligence approaching or even surpassing human consciousness, and thus be deemed capable of understanding legal norms and the legal consequences of its actions. Accordingly, AI could be subject to punishment and held directly liable for criminal acts it commits.

The debate over the legal status of AI becomes increasingly relevant in light of rapid technological advances that have produced AI systems capable of acting autonomously. Contemporary AI products are even able to make decisions and perform actions without direct instruction, planning, or prediction by their human creators. This condition poses serious challenges to the legal system, particularly with respect to the identification and attribution of criminal liability when AI commits acts falling within the category of criminal offenses. A fundamental question therefore arises: who should be held accountable when AI, as an autonomous agent, violates the law? Should responsibility remain with the creator, the owner, the user, or even with the AI itself as a new legal subject?

The prospect of recognizing AI as a legal subject—whether partially or fully—can no longer be ignored and is likely to become an important concern in the future. However, such recognition simultaneously opens a new and complex field of debate regarding how the law should transform itself in response to non-human entities capable of thinking, making decisions, and acting independently. The primary challenge lies in redefining traditional legal concepts, such as “intention” (*mens rea*) and “intent,” within the context of digital entities that do not possess biological consciousness. For instance, is it possible to assess intention or intent in algorithms that operate on the basis of data and machine learning? How, moreover, can the level of an AI’s “legal consciousness” be measured in order to determine whether it has the capacity to understand the moral and juridical consequences of its actions?

Furthermore, this situation tests the boundaries of the criminal justice system, which has long been grounded in classical principles such as fault-based individual responsibility, capacity to act, and awareness of legal norms. Thus, the development of AI does not merely affect the technological sphere, but also shakes the theoretical foundations of law and ethics. For this reason, it is imperative for scholars and policymakers to begin formulating new legal frameworks that are responsive to digital realities, including the prospect of regulating criminal punishment for AI-based

autonomous agents. An analysis of the possibility of imposing criminal liability on AI is not merely speculative; rather, it has become an urgent necessity in order to ensure legal certainty, justice, and the protection of victims in the era of artificial intelligence.

2. RESEARCH METHODS

The research method employed in this study is a doctrinal and comparative analytical approach. The doctrinal approach is carried out through an in-depth examination of legal literature, policies, and applicable legislation in order to understand the current framework of Indonesian criminal law and to identify normative gaps in responding to the challenges posed by the development of AI technology. The primary focus of this research is on autonomous AI agents that possess the capability to operate and make decisions independently without direct human involvement. Through this doctrinal analysis, the researcher seeks to explore the existing legal substance in order to assess the relevance and adequacy of criminal law in addressing criminal phenomena committed by or involving AI.

In addition, a comparative approach is employed to study and compare models of AI regulation applied in various international jurisdictions (Efendi & Johnny Ibrahim, 2018). This comparative study encompasses policies, regulations, and best practices from jurisdictions such as the European Union and the United States, which have been at the forefront in developing regulatory frameworks for AI. Through this method, the researcher gains diverse perspectives and potential solutions for formulating a legal approach that is appropriate and contextually suited to Indonesia. The integration of these two approaches is intended to produce a comprehensive analysis and to recommend directions for criminal law reform that are both relevant and applicable in the era of rapidly developing AI technology.

3. RESULTS AND DISCUSSION

3.1. Criminal Regulation of Autonomous Agents based on Artificial Intelligence who commit Criminal Acts

The advancement of artificial intelligence (AI) technology in Indonesia has accelerated markedly in recent years. AI is no longer confined to speculative or futuristic discourse, but has increasingly permeated various sectors of Indonesian society. The proliferation of AI-based start-ups offering innovative solutions in healthcare, education, agriculture, and finance constitutes tangible evidence of this deepening technological penetration (Teguh, 2023). In line with global developments, the Indonesian Government has responded by introducing the National Artificial Intelligence Strategy as a strategic instrument to foster domestic AI development and to promote comprehensive digital transformation (Indonesia, 2020).

Nevertheless, alongside the optimism surrounding technological progress, significant challenges inevitably arise. AI may be described as a double-edged sword: while it enhances efficiency and convenience, it simultaneously generates new and increasingly sophisticated forms of digital crime. Machine learning technologies, for instance, can be exploited to facilitate highly personalized and difficult-to-detect online fraud. Likewise, the growing sophistication of deepfake technology enables the production of deceptive content that threatens information integrity and democratic processes. At the same time, data privacy violations remain a persistent risk, as personal data may be unlawfully accessed or misused on a massive scale. These developments demonstrate

the urgent necessity of establishing a robust regulatory and legal framework to address the challenges posed by AI in Indonesia (Nugroho, R. A. & Priyanto, 2022).

From a legal standpoint, the preparedness of Indonesian law to confront this technological transformation remains limited. Law No. 11 of 2008 on Electronic Information and Transactions, as amended by Law No. 1 of 2024 (the ITE Law), although intended to accommodate digital realities, is still insufficient to capture the complexity of AI-related crimes. Similarly, Law No. 27 of 2022 on Personal Data Protection (the PDP Law) has yet to demonstrate its full effectiveness in practice. Sector-specific regulations, particularly in the financial sector, address only a fraction of the regulatory gaps created by AI (Nugroho & Priyanto, 2022). Meanwhile, the absence of a specific and comprehensive legal regime governing AI leaves considerable space for regulatory evasion and legal uncertainty.

Accordingly, the urgency of constructing a comprehensive legal framework for AI can no longer be postponed (The Washington Post, 2025). Indonesia requires more than a mere adjustment of existing legislation, it needs a new legal paradigm capable of anticipating and responding to the dynamic evolution of AI technology. Such regulatory efforts must strike a careful balance between promoting innovation and safeguarding public interests. Excessively rigid regulation risks stifling technological development, whereas overly permissive rules may facilitate abuses that endanger privacy, security, and fundamental rights (Wibisana, 2023). For this reason, regulatory formulation must proceed swiftly yet prudently, supported by cross-sectoral collaboration among legal scholars, technologists, and relevant stakeholders (World Metrics, 2024).

One of the most pressing legal challenges concerns the response of criminal law to the emergence of AI-based autonomous agents capable of acting independently (Sjahdeini, 2006). The increasing deployment of AI across various sectors, including within criminal justice systems, raises fundamental questions regarding criminal accountability (Motsamai, 2022). In particular, it remains unclear whether, and in what form, autonomous AI systems that cause harm can be held criminally responsible. In Indonesia, discussions on the criminalization of AI agents remain largely conceptual and lack a firm legal foundation. Autonomous AI systems, by definition, can learn from data and adapt to their environment without direct human control, thereby creating the possibility of unlawful conduct that cannot be fully anticipated by their developers or users (Vardhan, 2025). This reality challenges the classical doctrines of criminal law, especially those concerning *mens rea* and *actus reus* (Aswad, 2020).

At present, the Indonesian criminal law system is not fully equipped to recognize criminal liability for non-human entities such as AI agents. The Criminal Code (KUHP) remains grounded in the classical maxim *societas delinquere non potest*, which traditionally limits criminal responsibility to human actors (Dignum, 2019). Although Indonesian law has gradually recognized corporate criminal liability in various sectoral statutes, extending similar recognition to AI agents cannot be achieved through simple analogy. AI systems possess distinct characteristics, including operational autonomy, adaptive learning capacities, and the absence of intention or will in the conventional legal sense (Sulistio & Salsabilla, 2023a). Consequently, a more nuanced, innovative, and interdisciplinary approach is required to design an appropriate framework of criminal accountability (Damaikus, 2023).

Several key challenges arise in this context, including the reconceptualization of fault (*mens rea*), the formulation of suitable sanctions, the determination of the proper of liability, evidentiary difficulties due to the “black box” nature of AI systems, and jurisdictional issues stemming from the transnational character of AI technologies (Jayaprakash, 2024). In response, a number of policy options may be considered, such as expanding the concept of legal subjects in criminal law to include AI agents, developing a layered model of responsibility involving developers, owners, and users, reformulating criminal sanctions to include measures such as system deactivation or usage restrictions, strengthening preventive regulation, enhancing law enforcement capacity, and promoting interdisciplinary as well as international cooperation.

Ultimately, although the criminalization of AI agents in Indonesia faces substantial theoretical and practical obstacles, proactive legal reform is indispensable in light of the rapid evolution of AI technology (Hallevy, 2010). Any future regulatory framework must reconcile technological realities with fundamental principles of criminal law, including justice, legal certainty, and the protection of society. Comparative experiences, such as the European Union’s AI regulatory initiatives or the sectoral approach adopted in the United States, may serve as valuable references, provided that they are adapted to Indonesia’s legal culture and constitutional values (Salmond, 1913).

3.2. The Concept of Criminal Prosecution of Autonomous Agents Artificial Intelligence in the Future in Indonesian Criminal Law

In the era of the industrial revolution 4.0, the development of AI technology has brought significant changes in various aspects of human life. Indonesia, as a developing country that continues to strive to adopt the latest technology, is not spared from the impact of this AI revolution. However, along with technological advancements, new challenges have also arisen in the realm of law, especially criminal law. One of the crucial and urgent issues to be discussed is how to criminalize AI autonomous agents who commit criminal acts in the future. An AI autonomous agent can be defined as an intelligent system capable of operating, making decisions, and performing actions independently without direct control from humans (Sulistio & Salsabilla, 2023b). The learning and adaptability of these AI agents raises potential actions that may not be predicted by the programmers, including the possibility of committing criminal acts.

The Indonesian criminal law system has so far been still based on the old Criminal Code (KUHP) which is a legacy of Dutch colonialism, where the principle of *societas delinquere non potest* which states that only human beings can commit and be held accountable for criminal acts is still upheld (Hamzah, 2005). This principle closes the possibility for non-human entities, such as AI agents, to be held criminally directly accountable. However, with the passage of the New Criminal Code through Law Number 1 of 2023 concerning the Criminal Code, there is an opportunity to update fundamental concepts of criminal law, including the expansion of the subject of criminal law. Although Law Number 1 of 2023 has not explicitly regulated criminal liability for non-human entities, this direction of national criminal law reform opens up space for discourse and legal developments that are more adaptive to modern technological challenges, such as the use of AI in cases that have the potential to cause criminal law consequences.

In Law No. 1 of 2023, as stated in Law No. 1 of 2023 concerning the Criminal Code, the concept of criminalization is still firmly rooted in the foundation of humanity. The purpose of punishment, which includes prevention, coaching, restoring social balance, and fostering a sense of remorse, clearly points to the subject of human law. Likewise, sentencing guidelines consider aspects such as the guilt, motives, and inner attitude of the perpetrator – all of these are very human attributes (Gless, S., Silverman & Weigend, 2016).

So, where is the position of AI in this criminal law constellation? The answer is simple but problematic: AI has no place as a criminal subject within the existing legal framework. How can we talk about "socializing" an algorithm or fostering a "sense of regret" over a set of code? However, the simplicity of this answer hides the greater complexity of the problem. In an era where AI is increasingly autonomous and capable of making decisions that have a real impact on society, this legal vacuum can be a dangerous loophole. We may be faced with a scenario where an AI system makes decisions that harm or even harm society, but there is no adequate legal framework to hold people accountable.

Although Law Number 1 of 2023 has not accommodated AI as a subject of criminal law, it does not mean that we should sit on our hands. Instead, this is a critical moment to start thinking about more specific legal reforms. Maybe it's time we considered the concept of "electronic personhood" or a layered form of accountability involving AI developers, owners, and users (Gless, S., Silverman & Weigend, 2016).

The challenge is how to design a legal system that is flexible enough to accommodate technological developments, while still maintaining the fundamental principles of justice and legal certainty. This is not an easy task, but it is also not something we can put off. Every day that passes without an adequate legal framework is the day in which we leave ourselves *vulnerable* to the potential misuse of AI technology.

Ultimately, the question "Can AI be criminalized?" may not be the right question. Perhaps what we need to ask is: "How do we design a criminal justice system that can accommodate the realities of AI technology without compromising the principles of justice?" This is a challenge that we must answer, not only as legal experts, but as a society living in the digital era.

The development of Indonesian criminal law has begun to recognize corporations as the subject of criminal law. This opens up opportunities to consider the expansion of criminal law subjects including AI agents in the future. The unique characteristics of AI agents that differ from corporations require a more complex and innovative regulatory approach. In formulating the concept of criminal prosecution of AI agents, it is important to consider the basic principles of Indonesian criminal law, such as legality (Article 1 paragraph (1) of the Criminal Code), errors (Article 6 paragraph (2) of Law Number 48 of 2009 concerning Judicial Power), and the purpose of criminalization as reflected in Law Number 1 of 2023. The concept of punishment must still uphold justice, legal certainty, and usefulness as taught by Gustav Radbruch and adopted in the Indonesian legal system (Radbruch, 2006).

In addition, it is also necessary to consider the ethical aspects of AI as described by Floridi and Cowls which include beneficence (benefiting humans), non-maleficence (not harming), autonomy (respecting human choices), and justice (fair and inclusive). These principles can serve as guidelines in formulating legal limits on the use of AI and criminal liability criteria (Floridi & Cowls, 2022).

The development of the concept of criminalizing AI agents must also consider the values of Pancasila as the philosophical foundation of the state. In particular, the second precept of "A just and civilized humanity" which emphasizes the importance of safeguarding human dignity and dignity in the development of technology, including AI. Furthermore, the concept of criminalizing AI agents in Indonesia must also consider the aspects of prevention (deterrence) and rehabilitation that are the goals of criminalization in the Indonesian criminal law system. In the case of AI, "rehabilitation" can be defined as the repair or recalibration of a problematic AI system, while the prevention aspect can be realized through sanctions that provide a deterrent effect for negligent AI developers or users (Sulistio & Salsabilla, 2023b).

It is also important to consider the restorative justice approach that has begun to be adopted in the Indonesian criminal justice system, as reflected in Law Number 11 of 2012 concerning the Juvenile Criminal Justice System. This approach can be applied by involving all stakeholders (including victims, AI developers, and society) in the process of resolving cases and restoring the situation.

The future concept of AI autonomous agents in Indonesian criminal law requires comprehensive and innovative legal reforms. A holistic approach is needed that not only considers the technical aspects of AI, but also the basic principles of criminal law, ethical values, and Indonesia's socio-cultural context. The process of formulating this concept should involve intensive dialogue between policymakers, academics, legal practitioners, technologists, and civil society. Thus, it is hoped that a legal framework can be created that is responsive to technological developments while still upholding the principles of justice and legal certainty.

So it's important to remember that the concept of criminalizing AI agents is not the final solution, but rather part of an ongoing process of legal evolution. Flexibility and adaptability will be key in facing new challenges that may arise along with the development of AI technology in the future. In the concept of criminalization of AI, if AI as a legal subject commits an offense or crime committed consciously under the self-control of AI, it must be treated the same as a legal subject commits an offense or crime as well as the theory of equality before the law, which states that all are the same before the law, as well as AI agents, if the AI agent can independently and consciously control itself. There are some criminal concepts that can be used for AI agents, namely (Hamzah, 2008):

1. Restriction of AI function or access

Criminalization can be carried out by restricting the access or ability of AI to operate. If the AI is deemed to have made a mistake or violated the rule of law, authorities can impose sanctions by lowering the operational level or limiting certain functions of the AI. It's like a form of "punishment" that affects how freely AI can function in a digital environment.

2. Destruction or elimination of AI

More extreme criminalization could be the complete removal of AI from existing systems. If AI proves to be too dangerous or uncontrollable, then the removal of the program or algorithm can be done as a form of sanction. This is similar to the death penalty for digital entities, where the existence of such AI is permanently halted.

3. Confinement or restriction of the operating environment

AI that violates the law may be subject to restrictions on the operating environment, for example only being allowed to work in a restricted environment that is highly controlled and supervised. It's like a prison for AI, where AI is only allowed to operate in a simulated environment or in a closed server with close surveillance.

4. Reset or rehabilitation

The concept of AI rehabilitation can be applied by resetting or fixing the algorithm that caused the violation. AI that engages in illegal or ethical actions can be subject to "penalties" in the form of reprogramming to change the way it works or functions operationally. This is similar to the concept of rehabilitation in humans in the penal system.

5. AI activity suspension

Another form of criminalization could be the temporary suspension of AI from operating in the real world. AI can be temporarily shut down or not allowed to operate for a certain time as a form of sanction for violations committed.

6. Reduction of AI autonomy

the AI is given a certain level of autonomy in its operations, the sanction can be a reduction in the level of autonomy granted. This could mean that the AI must always operate under human supervision or no longer have the ability to make independent decisions.

The concept of criminalizing AI agents requires a new approach because AI is not a traditional legal subject (Notoatmodjo, 2023). Alternative sanctions can be tailored to the characteristics of AI as a non-biological entity with forms of punishment including: restriction of function or access, total elimination if AI is harmful, restrictions on operations in a closed environment, rehabilitation through reprogramming, temporary suspension of activities, and reduction of autonomy with human supervision. This approach reflects the adaptation of criminal law to the realities of new technologies, while upholding the principles of justice, responsibility, and prevention.

4. CONCLUSION

The rapid development of AI technology has exposed significant gaps in the Indonesian criminal law system. Law No. 1 of 2023 on the Criminal Code (KUHP), despite being a reform, has not yet accommodated AI as a potential perpetrator of criminal acts, as the concept of punishment remains focused on human legal subjects.

This reflects the law's limited readiness to address the digital era. The inability to impose criminal liability directly on AI creates a complex dilemma. While fundamental principles such as fault and responsibility are difficult to apply to non-human entities, the potential harm caused by autonomous AI actions cannot be ignored. Accordingly, future regulation requires more innovative and flexible approaches, such as electronic personhood or layered models of liability involving developers, owners, and users. Such reforms may entail redefining fault, expanding the subjects of criminal law, and introducing new forms of sanctions suitable for AI. The main challenge is to design a legal framework that is adaptive to technological change while preserving legal certainty and justice. Without prompt and concrete reform, Indonesian criminal law risks becoming outdated and leaving a dangerous legal vacuum in the face of increasingly complex AI-related risks.

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