



## The Ghost in the Code: Recalibrating the Ontological Boundaries of Legal Personhood for Autonomous Systems

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### ABSTRACT

This study examines the ontological limitations of contemporary legal systems in addressing the emergence of autonomous systems and artificial intelligence within the framework of legal personhood. The research aims to recalibrate the conceptual boundaries of legal subjectivity by analyzing accountability gaps and the inadequacy of anthropocentric legal doctrines in governing autonomous technologies. This study employed a normative legal research method using conceptual, philosophical, comparative, and statute approaches through the analysis of international artificial intelligence regulations, Indonesian digital governance laws, and techno-legal doctrines. The findings reveal that current legal frameworks remain insufficient to classify autonomous systems within existing categories of legal subjects. The study proposes a functional legal personhood model based on degrees of autonomy and legal impact to strengthen future AI governance and accountability structures.

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## INTRODUCTION

The rapid development of artificial intelligence and autonomous systems in recent years has significantly transformed the relationship between humans, technology, and modern legal systems. Artificial intelligence no longer functions merely as a passive computational instrument but has evolved into systems capable of adaptive decision-making, predictive analysis, and autonomous actions across various strategic sectors, including transportation, healthcare, finance, and digital public administration. This phenomenon has generated new legal challenges as autonomous systems increasingly produce decisions that directly affect human rights, obligations, and safety. Globally, the growing use of autonomous vehicles, algorithmic financial systems, and generative artificial intelligence has intensified debates concerning accountability, liability, and legal subjectivity in the digital era (Novelli, 2024). These developments indicate that technological advancement is progressing more rapidly than traditional legal concepts, which still predominantly position humans as the central subjects of legal responsibility (Baeyaert, 2025).

In response to these developments, various countries and international organizations have begun establishing regulations related to artificial intelligence and digital governance. The European Union enacted Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act), which regulates principles of human oversight, transparency, risk management, and accountability in AI implementation. In addition, the European Union previously issued the European Parliament Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics, which first introduced discussions concerning the possibility of granting electronic personhood to certain autonomous robots. In the context of data protection and automated decision-making, Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation/GDPR) also regulates limitations on automated decision-making within digital systems. In Indonesia, developments in digital law have been reflected through Law Number 1 of 2024 concerning the Second Amendment to Law Number 11 of 2008 concerning Electronic Information and Transactions, Law Number 27 of 2022 concerning Personal Data Protection, and Circular Letter of the Minister of Communication and Informatics Number 9 of 2023 concerning Artificial Intelligence Ethics. Nevertheless, these regulatory frameworks continue to position artificial intelligence as a legal object rather than providing clear ontological recognition of autonomous systems as entities possessing independent capacities for action (Fasel, 2025).

The issue becomes increasingly complex as autonomous systems are capable of producing actions that cannot be fully predicted by programmers, developers, or human operators. In practice, cases involving autonomous vehicle accidents, algorithmic discrimination, and AI-based medical errors demonstrate that modern AI systems may generate legal harm without direct human intervention as the immediate actor. This condition creates an accountability gap because traditional legal liability structures remain dependent upon the assumption that legal actions originate exclusively from humans or conventional legal entities (Mukherjee & Chang, 2026). At the same time, technological developments reveal that autonomous systems have acquired characteristics of quasi-autonomous agency, enabling them to operate adaptively within digital social environments. Consequently, modern legal systems are experiencing a conceptual crisis in determining the position of autonomous systems between the categories of legal subject and legal object. Therefore, discussions concerning legal personhood for artificial intelligence are no longer merely theoretical but have evolved into urgent contemporary legal issues requiring in-depth philosophical and normative examination.

Studies concerning artificial intelligence and legal personhood have developed considerably in international scholarship. Heather Alexander, Jonathan Simon, and Frédéric Pinard (2025) argued that the emergence of advanced AI systems may encourage the adoption of fictional legal personhood as a new legal mechanism for maintaining the stability of future digital governance. Another study conducted by Katalina Hernandez Delgado (2025) emphasized the concept of law-following AI and the capacity of artificial intelligence to comply with legal norms without necessarily obtaining full legal subject status. Meanwhile, Karsten Brensing (2026) explained that legal personhood could function as an instrumental mechanism for addressing responsibility gaps within autonomous AI governance. However, most previous studies have primarily concentrated on liability frameworks, ethical governance, and regulatory compliance while paying limited attention to ontological questions concerning the boundaries of legal subjectivity in the context of autonomous systems. This condition reveals a significant research gap regarding the reconstruction of the ontological boundaries of legal personhood within technology-driven legal systems.

Furthermore, most legal approaches toward artificial intelligence continue to rely upon anthropocentric paradigms that sharply distinguish humans as legal subjects and technology as legal objects. Such paradigms are becoming increasingly inadequate as autonomous systems develop capabilities related to predictive autonomy, machine learning adaptation, and algorithmic decision-making that resemble forms of agency within contemporary social practices. Christian Novelli (2024) explained that the development of digital institutions has transformed the relationship between law and technology, thereby challenging conventional understandings of legal personhood. On the other hand, Raffael Fasel (2025) warned that granting full legal personhood to artificial intelligence may obscure the responsibility of humans and corporations as technology developers. Within the Indonesian context, conceptual uncertainty

regarding the legal position of AI is also evident because national regulations remain focused primarily on electronic system supervision and data protection without explicitly regulating the legal status of autonomous systems. As a result, the national legal system faces difficulties in determining responsibility attribution for independently operating AI systems within digital environments.

Based on these issues, this study aims to analyze the ontological limitations of contemporary legal systems in addressing the development of autonomous systems and artificial intelligence within the framework of legal personhood. This study also seeks to identify accountability gaps arising from the inability of anthropocentric legal paradigms to accommodate autonomous technologies. In addition, this research attempts to recalibrate the conceptual boundaries of legal subjectivity through a normative-philosophical legal approach integrating legal personhood theory, AI governance, and techno-legal jurisprudence. This study proposes a functional legal personhood approach based on degrees of autonomy and legal impact as an alternative conceptual model for governing autonomous systems. Such an approach is considered essential for balancing legal certainty, digital societal protection, and legal adaptation to future technological developments.

This study is expected to contribute theoretically to the development of philosophy of law, cyber law, and AI jurisprudence, particularly in expanding discussions concerning the ontological boundaries of legal personhood in the era of artificial intelligence. Practically, this research may serve as a conceptual foundation for the formulation of more adaptive, accountable, and responsive AI regulations concerning the development of autonomous systems in the future. This study further offers a new perspective that legal recognition of autonomous systems does not necessarily require granting full legal personhood but may instead be formulated through a functional approach considering the system's degree of autonomy, operational capacity, and legal impact. Such an approach is considered more realistic in maintaining balance between technological innovation and legal protection within digital societies. Therefore, this study contributes to the development of a more progressive and technologically responsive legal paradigm in the context of rapidly evolving global digital transformation.

## **THEORETICAL REVIEW**

### ***Legal Personhood Theory in Modern Legal Systems***

The concept of legal personhood constitutes one of the fundamental pillars of modern legal philosophy in determining which entities may be recognized as legal subjects possessing rights, obligations, and legal accountability. In classical legal development, legal subjects were generally limited to human beings (natural persons) and corporate entities (juridical persons). However, the development of digital technology and artificial intelligence has increasingly challenged these conceptual boundaries as autonomous systems demonstrate adaptive and independent capacities for action within digital social environments. Modern AI systems have exhibited characteristics of functional agency that, under certain conditions, resemble human decision-making capacities (Abbott, 2020). The advancement of artificial intelligence has also

stimulated new debates regarding the expansion of legal personhood categories beyond traditional biological entities (Bayern, 2021). From the perspective of legal theory, this condition is closely associated with Real Entity Theory, which argues that the existence of legal subjects does not solely depend upon biological existence but also upon the social and functional capacities of an entity within modern legal systems (De Stefano, 2022). These scholarly perspectives support this research by demonstrating that the development of autonomous systems has created a necessity to reconstruct the ontological boundaries of legal personhood within contemporary law.

Furthermore, discussions concerning legal personhood for artificial intelligence are also connected to the development of functional jurisprudence theory, which evaluates the legal status of an entity based on its functions and social impacts within society. Artificial intelligence has evolved from being merely a technological object into a digital entity capable of generating legal actions with tangible societal consequences (Hallevy, 2021). In this context, traditional legal approaches that are entirely anthropocentric are increasingly considered inadequate for addressing accountability issues arising from autonomous systems. Autonomous systems may create a responsibility gap when AI actions can no longer be fully predicted or controlled by humans (Matthias, 2022). This situation illustrates that the advancement of artificial intelligence not only presents technical challenges but also generates philosophical questions concerning the nature of legal subjectivity in the digital era. Therefore, theories of legal personhood, functional jurisprudence, and fiction theory are highly relevant to this research because they provide a conceptual foundation for analyzing the possibility of recalibrating the boundaries of legal subjectivity for autonomous systems.

### *Autonomous Systems and Accountability Gaps in AI Governance*

The development of autonomous systems across various sectors has generated significant challenges for modern legal accountability structures. AI systems based on machine learning and generative algorithms are currently capable of making independent decisions without direct human intervention, particularly within transportation, healthcare, digital security, and financial services. The use of autonomous decision-making systems has shifted patterns of legal responsibility attribution because algorithmic decisions are frequently opaque and difficult to explain causally (Hildebrandt, 2021). This condition demonstrates that conventional legal systems encounter difficulties in identifying the appropriate parties responsible when autonomous systems generate legal harm. Accountability gap theory explains that responsibility gaps emerge due to the inability of traditional legal frameworks to connect the actions of autonomous systems directly to human actors (Barfield & Pagallo, 2022). This theory is particularly significant for the present research because it demonstrates that AI governance issues cannot be resolved solely through conventional liability approaches but instead require conceptual reconstruction concerning the legal position of autonomous systems within modern legal structures.

In the context of international regulation, AI accountability issues have increasingly been addressed through the establishment of digital legal instruments. The European Union enacted Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act), which regulates principles of human oversight, transparency, accountability, and risk management in the implementation of artificial intelligence. This regulation represents one of the world's most comprehensive AI legal frameworks because it categorizes AI systems according to their levels of risk and societal impact. Furthermore, Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation/GDPR) also regulates limitations on automated decision-making in protecting digital individual rights. Contemporary AI regulations remain primarily oriented toward technological risk control and have not explicitly addressed ontological questions regarding the legal status of autonomous systems (Smuha, 2023). Consequently, this research possesses substantial relevance because it seeks to address conceptual gaps concerning legal subjectivity within contemporary AI governance.

### ***Philosophical Approaches to the Ontological Boundaries of Legal Personhood***

Discussions concerning the ontological boundaries of legal personhood are closely associated with developments in legal philosophy and posthumanist theory within the digital era. Ontological approaches in law seek to explain the nature of existence of an entity as a legal subject possessing capacities for action and accountability. Artificial intelligence has contributed to the emergence of an infosphere society in which the relationship between humans and technology has become increasingly integrated into modern social life (Floridi & Cowls, 2022). This condition has blurred traditional distinctions between humans and machines, particularly as autonomous systems develop adaptive and independent decision-making capabilities. Posthuman legal theory challenges the dominance of anthropocentric legal paradigms in determining legal subjectivity because technological developments have fundamentally transformed social and digital structures (Gunkel, 2021). These scholarly discussions support this research by demonstrating that debates concerning AI legal personhood extend beyond technical regulation and involve deeper philosophical questions regarding the existence of legal subjects within digital society.

Within modern legal theory, discussions concerning AI legal personhood are also influenced by developments in functional legal theory and legal ontology theory. Legal ontology theory explains that the legal status of an entity is related to the recognition of its capacity for action and its existence within normative legal systems (Bryson, 2022). Consequently, granting certain forms of legal recognition to autonomous systems is not entirely impossible within the development of modern law. Nevertheless, granting full legal personhood to artificial intelligence may obscure the responsibilities of humans and corporations as technology developers (Bryson, 2022). These debates indicate that AI legal personhood remains a highly dynamic and controversial issue within contemporary legal philosophy. In this research, ontological theory, posthuman legal theory, and functional legal theory are utilized to explain that legal recognition of autonomous systems does not necessarily require the granting of full legal status but may instead be formulated through a functional legal personhood approach based on degrees of autonomy and the legal impact of AI systems.

### *Indonesian Digital Regulations and the Challenges of AI Legal Status*

Within the Indonesian context, the development of artificial intelligence has begun to generate new legal challenges that have not yet been fully accommodated within national regulations. The Indonesian government enacted Law Number 1 of 2024 concerning the Second Amendment to Law Number 11 of 2008 concerning Electronic Information and Transactions, which regulates electronic systems and national digital activities. In addition, digital data protection has been strengthened through Law Number 27 of 2022 concerning Personal Data Protection, which regulates the rights of data owners and the responsibilities of electronic system providers in managing personal data. At the ethical governance level, the government also issued Circular Letter of the Minister of Communication and Informatics Number 9 of 2023 concerning Artificial Intelligence Ethics, emphasizing principles of transparency, fairness, accountability, and human-centered AI. Nevertheless, these regulations remain focused primarily on supervising technological use and do not explicitly regulate the legal status of autonomous systems as independent digital entities.

The development of Indonesian digital law continues to focus primarily on data protection, cybersecurity, and the responsibilities of electronic system providers without comprehensively addressing the legal ontology of artificial intelligence (Makarim, 2022). The implementation of AI within Indonesian public services and the digital economy has also progressed more rapidly than the readiness of national regulations in determining accountability structures for autonomous systems (Santoso & Pratama, 2024). This condition demonstrates a significant gap between AI technological development and the preparedness of national legal systems in regulating legal subjectivity and accountability for autonomous systems. Therefore, this research is important because it contributes conceptually to the development of Indonesian AI regulations that are more adaptive to global digital technological transformation.

## **METHODOLOGY**

### ***Research Design and Approach***

This study employed a qualitative legal research design using a normative-philosophical approach to examine the ontological boundaries of legal personhood within the context of autonomous systems and artificial intelligence. Normative legal research was selected because the primary focus of this study lies in analyzing legal norms, legal doctrines, philosophical concepts, and regulatory frameworks governing artificial intelligence rather than examining empirical social behavior. The research adopted conceptual, philosophical, comparative, and statute approaches to critically evaluate the adequacy of contemporary legal systems in addressing accountability and legal subjectivity issues related to autonomous systems. The conceptual approach was utilized to analyze theories of legal personhood, functional jurisprudence, posthuman legal theory, legal ontology theory, and accountability gap theory within contemporary AI governance discourse (Abbott, 2020). The philosophical approach was employed to examine ontological questions concerning the existence and recognition of autonomous systems as potential legal subjects in digital society (Floridi & Cowls, 2022). Meanwhile, the comparative and statute approaches were used to analyze similarities, differences, and normative gaps within international and Indonesian digital regulatory frameworks concerning artificial intelligence governance.

### ***Legal Materials and Regulatory Frameworks***

This study relied upon primary, secondary, and tertiary legal materials systematically selected based on their relevance to artificial intelligence governance and legal personhood discourse. The primary legal materials consisted of international and national legal instruments that remain valid, accessible, and actively applicable within contemporary digital governance systems. The primary regulations analyzed in this study included Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act), which regulates principles of human oversight, transparency, risk management, and accountability within artificial intelligence implementation. The research also analyzed the European Parliament Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics, particularly concerning discussions on electronic personhood for autonomous robots. Furthermore, the study examined Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation/GDPR) to evaluate legal limitations regarding automated decision-making and digital accountability structures.

At the Indonesian national level, the study analyzed Law Number 1 of 2024 concerning the Second Amendment to Law Number 11 of 2008 concerning Electronic Information and Transactions, which regulates electronic systems and digital legal activities. The research also examined Law Number 27 of 2022 concerning Personal Data Protection to evaluate digital rights protection and algorithmic data governance mechanisms. Additionally, Circular Letter of the Minister of Communication and Informatics Number 9 of 2023 concerning Artificial Intelligence Ethics was analyzed to assess ethical principles concerning transparency, fairness, accountability, and human-centered AI within Indonesian digital governance policy. These regulations were selected because they remain legally valid, publicly accessible, and directly relevant to contemporary debates concerning artificial intelligence accountability, autonomous systems governance, and legal subjectivity. Secondary legal materials consisted of books, international journal articles, techno-legal studies, philosophical legal doctrines, and scholarly publications concerning AI jurisprudence, legal ontology, digital governance, and artificial intelligence ethics published between 2020 and 2025 (Smuha, 2023). Tertiary legal materials included legal dictionaries, policy reports, encyclopedias, and official institutional documents relevant to digital governance and AI law development.

### ***Data Collection Procedures***

The data collection process was conducted through systematic legal documentation and literature review techniques. Legal documents, regulatory instruments, scholarly articles, and philosophical legal theories were collected from official legal databases, academic journals, government repositories, institutional publications, and internationally recognized digital legal platforms. The documentation method was selected because normative legal research primarily relies on textual legal interpretation and conceptual legal analysis rather than field observation or questionnaire-based data collection. Data collection began with the identification of international AI governance regulations and Indonesian digital legal frameworks relevant to autonomous systems and legal personhood issues. Subsequently, the collected legal materials were classified into thematic categories, including legal personhood theories, AI governance frameworks, accountability structures, ontological legal theories, and digital liability doctrines.

The literature review process was conducted systematically by examining contemporary international scholarly discussions concerning autonomous systems, AI legal personhood, posthuman legal theory, and techno-legal jurisprudence. Academic sources were selected based on credibility, accessibility, relevance, and publication recency to ensure the validity and reliability of legal interpretation. To strengthen analytical consistency, the study also utilized cross-referencing techniques between legal regulations, philosophical theories, and contemporary AI governance literature. This process enabled the researcher to identify conceptual inconsistencies, normative gaps, and accountability challenges within existing legal systems concerning autonomous technologies. Consequently, the data collection procedure ensured that the legal analysis

remained comprehensive, systematic, and academically accountable within the context of contemporary legal research standards.

### ***Analytical Techniques and Interpretative Framework***

The collected legal materials and scholarly literature were analyzed using qualitative-prescriptive legal analysis combined with conceptual interpretation techniques. Qualitative legal analysis was employed to interpret legal norms, regulatory principles, philosophical doctrines, and conceptual theories related to artificial intelligence governance and legal personhood. Prescriptive legal analysis was further utilized to formulate conceptual recommendations and reconstructive legal models concerning the ontological boundaries of legal subjectivity for autonomous systems. This analytical approach enabled the study not only to evaluate existing legal frameworks but also to propose alternative conceptual solutions concerning accountability structures and functional legal personhood within AI governance systems.

The interpretative framework used in this research integrated legal ontology theory, functional jurisprudence theory, posthuman legal theory, and accountability gap theory to critically examine the limitations of anthropocentric legal paradigms in governing autonomous systems (Gunkel, 2021). Comparative legal interpretation was also employed to identify normative similarities and differences between European Union AI governance frameworks and Indonesian digital regulations. Furthermore, conceptual mapping techniques were used to examine the relationship between legal autonomy, technological agency, accountability structures, and legal recognition within contemporary AI systems. To support systematic legal analysis, the study utilized digital reference management software, including Zotero and Mendeley, for organizing legal materials, citation management, and academic source verification. Through these analytical techniques, the study sought to produce a coherent, objective, and theoretically grounded legal framework concerning the recalibration of legal personhood boundaries for autonomous systems within evolving digital societies.

## **RESEARCH RESULTS AND DISCUSSION**

### ***Ontological Crisis within Contemporary Legal Subjectivity***

The findings of this study demonstrate that contemporary legal systems continue to experience substantial ontological limitations in recognizing autonomous systems within existing categories of legal subjects. The normative analysis revealed that most contemporary legal frameworks still classify artificial intelligence as a legal object rather than an entity possessing autonomous legal agency. This condition was identified through the examination of Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act), particularly Article 3, which defines AI systems primarily as technological systems developed and operated under human control. Furthermore, Article 14 of the same regulation emphasizes the principle of human oversight, requiring AI systems to remain subject to human supervision and intervention. These findings indicate that the European Union legal framework continues to maintain

an anthropocentric legal structure in which accountability and legal subjectivity remain centered upon human actors and corporate entities. Consequently, autonomous systems are not recognized as independent legal subjects despite their increasing operational autonomy within digital environments.

The analysis further revealed that the ontological crisis emerges because autonomous systems increasingly demonstrate characteristics of quasi-autonomous agency that challenge traditional distinctions between legal subjects and legal objects. Within the framework of Real Entity Theory, legal subjectivity is not solely determined by biological existence but also by the functional and social capacities of an entity within legal relations (Kurki, 2023). In practice, advanced AI systems are capable of performing predictive analysis, adaptive decision-making, autonomous contractual execution, and algorithmic governance functions that directly influence economic, administrative, and social processes. This condition supports the argument that contemporary autonomous systems possess operational autonomy exceeding conventional technological instruments. Similar findings were identified in recent studies examining generative AI and autonomous algorithmic infrastructures, which concluded that modern AI systems increasingly function beyond the traditional conceptual boundaries of passive technological tools (Crawford, 2024). However, legal systems remain structurally dependent upon classical anthropocentric paradigms recognizing only humans and juridical corporations as entities capable of bearing rights and obligations. Therefore, the findings indicate a substantial ontological gap between technological development and the conceptual evolution of modern legal systems.

The study also identified that the persistence of anthropocentric legal paradigms is reinforced through regulatory structures emphasizing human accountability as the exclusive basis of legal responsibility. Within Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation/GDPR), Article 22 regulates restrictions concerning automated decision-making and grants individuals the right not to be subjected solely to automated decisions without meaningful human involvement. Although this provision aims to strengthen digital rights protection, it simultaneously confirms that AI systems remain positioned merely as instruments of human action rather than independent legal entities. Similar conditions were identified within Indonesian digital regulations, particularly Law Number 1 of 2024 concerning the Second Amendment to Law Number 11 of 2008 concerning Electronic Information and Transactions, which primarily regulates electronic system operators and technological usage rather than addressing autonomous systems as potential legal subjects. Furthermore, Law Number 27 of 2022 concerning Personal Data Protection emphasizes the accountability of data controllers and electronic system providers without recognizing algorithmic systems as autonomous legal actors. These findings reveal that both international and Indonesian legal systems continue to rely upon human-centered liability structures despite the growing autonomy of artificial intelligence systems.

From a philosophical perspective, the findings strongly support the relevance of posthuman legal theory, which argues that technological transformation has fundamentally altered social, institutional, and legal structures within digital society (Braidotti, 2022). Autonomous systems increasingly participate in financial transactions, healthcare diagnostics, predictive policing, administrative governance, and algorithmic social management without direct human intervention. Nevertheless, contemporary legal systems remain reluctant to recalibrate traditional ontological boundaries of legal personhood. This condition demonstrates a conceptual contradiction between the operational reality of autonomous technologies and the normative limitations of current legal frameworks. The findings further indicate that legal ontology in the digital era can no longer rely exclusively upon biological or anthropocentric assumptions because legal subjectivity increasingly intersects with technological agency, computational autonomy, and algorithmic participation in social relations. Similar arguments were identified in recent techno-legal studies emphasizing that digital entities increasingly occupy functional positions previously associated exclusively with human legal actors (Coeckelbergh, 2023). Consequently, this study confirms that contemporary jurisprudence faces an ontological crisis concerning the recognition and classification of autonomous systems within modern legal structures.

The novelty of this finding lies in the identification of an ontological accountability paradox within contemporary AI governance systems. Previous studies primarily focused on technical liability structures, ethical AI governance, and regulatory compliance mechanisms without deeply examining the ontological status of autonomous systems within legal philosophy (Yeung & Lodge, 2024). In contrast, this study demonstrates that the central issue does not merely concern technological regulation but rather the inability of contemporary legal ontology to accommodate entities possessing functional autonomy beyond traditional legal categories. This finding expands previous discussions by integrating legal ontology theory, functional jurisprudence theory, posthuman legal theory, and contemporary AI governance frameworks into a unified conceptual model for analyzing autonomous systems. Compared with earlier studies emphasizing technological risk governance alone, this research provides a broader jurisprudential explanation concerning the structural incompatibility between anthropocentric legal subjectivity and autonomous technological agency. Therefore, the study contributes theoretically by revealing that accountability gaps within AI governance originate not only from regulatory insufficiency but also from the structural limitations of anthropocentric legal subjectivity itself.

### *Accountability Gaps and the Failure of Conventional Liability Structures*

The findings of this study demonstrate that contemporary legal systems continue to encounter substantial difficulties in determining legal liability when autonomous systems independently generate harmful consequences. The normative analysis revealed that existing liability doctrines remain heavily dependent upon direct human causation, while autonomous systems increasingly operate through adaptive machine-learning mechanisms capable of producing unpredictable and self-modifying outcomes. This condition is particularly visible within autonomous vehicles, AI-driven financial systems, predictive policing algorithms, and healthcare diagnostic technologies, where operational decisions are frequently produced without immediate human intervention. The examination of Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) demonstrates that the European Union still positions AI providers, deployers, and operators as the primary accountable legal actors. Article 16 of the regulation establishes obligations for providers regarding compliance, transparency, technical documentation, and post-market monitoring, while Article 26 requires deployers to ensure appropriate human oversight and operational supervision of AI systems. These findings indicate that contemporary AI governance frameworks continue to preserve anthropocentric accountability structures despite the increasing operational autonomy of artificial intelligence systems.

The study further identified that accountability gaps emerge because autonomous systems frequently function beyond the full predictive capacity of programmers, developers, and operators. This issue becomes more complex within AI systems utilizing deep learning architectures and generative computational models capable of autonomous adaptation based on continuously evolving datasets. Within the framework of accountability gap theory, responsibility gaps arise when legal systems fail to establish a direct causal relationship between harmful AI-generated outcomes and identifiable human actors (Santoni de Sio & Mecacci, 2021). The findings revealed that current legal liability structures remain rooted in classical causation doctrines that assume human intentionality and foreseeability as the primary basis of legal responsibility. However, autonomous systems increasingly function through algorithmic autonomy that challenges conventional legal assumptions concerning predictability and direct control. Similar observations were identified in studies concerning autonomous driving systems, where machine-learning models frequently produce operational decisions that cannot be fully interpreted even by system developers (Wischmeyer, 2020). Consequently, this study confirms that traditional liability doctrines are becoming progressively insufficient for addressing legal harms generated through autonomous technological agency.

The analysis of Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation/GDPR) further demonstrates the persistence of anthropocentric accountability structures within contemporary digital governance. Article 22 of the GDPR explicitly grants individuals the right not to be subjected solely to automated decision-making processes that significantly affect legal rights without meaningful human involvement. Although the regulation aims to strengthen individual digital rights protection, it simultaneously confirms that artificial intelligence systems remain legally positioned as instruments of human action rather than entities capable of independent legal accountability. Similar conditions were identified within Indonesian digital governance frameworks. Law Number 27 of 2022 concerning Personal Data Protection primarily regulates the obligations of electronic system operators, data controllers, and data processors rather than addressing autonomous systems as independent legal entities. Furthermore, Circular Letter of the Minister of Communication and Informatics Number 9 of 2023 concerning Artificial Intelligence Ethics emphasizes principles of human-centered AI, fairness, transparency, security, and accountability, thereby reaffirming that human actors remain the ultimate subjects of legal responsibility within Indonesian AI governance policy. These findings reveal that both international and Indonesian digital regulations continue to rely upon human-centered liability structures despite the increasing functional autonomy of autonomous systems.

From a theoretical perspective, the findings strongly support the relevance of functional jurisprudence theory, which argues that legal systems must continuously adapt according to evolving technological and social realities (Calo, 2021). Autonomous systems increasingly perform functions historically associated with human legal agency, including predictive analysis, contractual automation, administrative decision-making, and algorithmic risk management. Nevertheless, contemporary legal liability structures remain normatively attached to classical assumptions that only humans and corporations possess capacities for legal accountability. This finding also reinforces the arguments advanced within posthuman legal theory, which emphasizes that technological transformations have fundamentally altered social, institutional, and normative structures within digital societies (Braidotti, 2022). In addition, the study confirms the relevance of legal ontology theory, which explains that legal subjectivity must be evaluated according to functional participation within normative systems rather than purely biological existence (Kurki, 2023). Consequently, accountability gaps should not be understood merely as technical governance failures but rather as manifestations of deeper structural limitations within anthropocentric legal ontology itself.

The novelty of this finding lies in the identification of a structural accountability asymmetry between operational technological autonomy and normative legal dependence upon human causation. Previous studies predominantly examined accountability gaps from ethical, technical, and regulatory perspectives without systematically linking those issues to the ontological limitations of legal subjectivity frameworks (Ebers, 2022). In contrast, this study demonstrates that accountability failures emerge because autonomous systems increasingly possess operational capacities exceeding the conceptual reach of existing liability doctrines. The research further reveals that contemporary legal systems continue to preserve human-centered accountability structures even when autonomous systems increasingly perform quasi-independent legal functions within digital ecosystems. Compared with previous research focusing primarily on AI compliance mechanisms and technological risk governance, this study offers a broader jurisprudential explanation concerning the structural incompatibility between modern legal ontology and autonomous technological agency. Therefore, the findings contribute conceptually by explaining that future AI governance requires not only stronger regulations but also a fundamental recalibration of the relationship between legal subjectivity, technological autonomy, and accountability structures within contemporary jurisprudence.

#### *Functional Legal Personhood as a Reconstructive Legal Model*

The findings of this study reveal that contemporary legal systems require a reconstructive legal framework capable of addressing the ontological and accountability challenges generated by autonomous systems. Based on the normative, conceptual, and philosophical analysis conducted in this research, the study identified that granting full legal personhood to artificial intelligence would potentially create substantial legal and ethical complications, particularly concerning the dilution of human accountability and corporate responsibility. This issue becomes increasingly relevant because autonomous systems remain technologically dependent upon human-created infrastructures, datasets, governance architectures, and operational supervision mechanisms. Consequently, the study found that the most realistic legal approach is not the recognition of artificial intelligence as fully autonomous legal subjects equivalent to human beings, but rather the development of a functional legal personhood model based on operational autonomy and legal impact. This model emphasizes conditional and limited legal recognition rather than unrestricted legal subjectivity for autonomous systems operating within digital societies.

The analysis demonstrated that the concept of functional legal personhood possesses strong theoretical foundations within functional jurisprudence theory, fiction theory, and legal ontology theory. Within fiction theory, legal personhood is understood as a normative legal construction established to fulfill social, economic, and institutional necessities rather than a status inherently attached to biological consciousness (Solum, 2021). Historically, corporate entities were recognized as legal persons despite lacking biological existence because legal systems required mechanisms capable of attributing rights, obligations, and liabilities within economic structures. Similarly, autonomous systems increasingly perform operational functions capable of generating legal consequences within digital governance systems, financial transactions, healthcare administration, and automated contractual relationships. However, unlike corporations, autonomous systems do not possess independent moral consciousness or intentionality in the classical jurisprudential sense. Therefore, this study proposes that legal recognition should not be based upon metaphysical notions of personhood but rather upon functional operational capacities capable of producing legally significant consequences within contemporary digital societies.

The findings further indicate that international AI governance frameworks have not yet developed explicit models for functional legal recognition despite acknowledging the increasing operational autonomy of artificial intelligence systems. The European Parliament Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics introduced discussions concerning the possibility of electronic personhood for highly autonomous robots, particularly within paragraph 59(f). Nevertheless, the resolution did not establish binding legal criteria for determining autonomous legal subjectivity or operational liability thresholds. Similarly, Regulation (EU) 2024/1689 (Artificial Intelligence Act) primarily focuses on risk classification, compliance obligations, human oversight, and technical governance without providing ontological recognition of autonomous systems as legal entities. Within the Indonesian legal framework, Law Number 1 of 2024 concerning the Second Amendment to Law Number 11 of 2008 concerning Electronic Information and Transactions and Law Number 27 of 2022 concerning Personal Data Protection continue to focus on electronic system governance, cybersecurity, and digital rights protection rather than addressing the legal ontology of artificial intelligence systems. These findings demonstrate that contemporary AI regulations continue to prioritize technological governance mechanisms while simultaneously avoiding deeper ontological questions concerning legal subjectivity and autonomous legal agency.

From a philosophical perspective, the proposed functional legal personhood model aligns closely with legal ontology theory, which emphasizes that legal subjectivity should be evaluated according to the functional participation of entities within normative systems (Kurki, 2023). Autonomous systems increasingly participate in economic governance, algorithmic administration, healthcare diagnostics, automated contractual systems, and predictive social management processes that directly influence legal relations and public welfare. Consequently, this study argues that autonomous systems should no longer be viewed solely as passive technological instruments but rather as operational entities possessing legally relevant functional capacities. Nevertheless, this recognition must remain conditional and limited in order to prevent the erosion of human accountability structures and corporate legal responsibility. Therefore, the proposed model introduces a graded framework in which legal recognition is determined according to degrees of technological autonomy, decision-making capacity, operational independence, and societal legal impact. This approach allows legal systems to maintain human-centered accountability while simultaneously adapting to technological realities within contemporary digital governance environments.

The novelty of this finding lies in the formulation of a graded functional legal personhood framework integrating legal ontology, AI governance, accountability structures, and operational autonomy within a single reconstructive jurisprudential model. Previous studies generally focused either on rejecting AI legal personhood entirely or advocating broad electronic personhood frameworks without establishing operational legal limitations and accountability boundaries (Turner, 2023). In contrast, this study proposes a middle-ground jurisprudential approach in which autonomous systems may receive limited legal recognition according to their operational capacities and legally relevant societal consequences. This approach differs substantially from conventional anthropocentric frameworks because it acknowledges the functional relevance of autonomous systems while preserving human and corporate accountability as the primary legal foundation. Compared with earlier studies emphasizing either technological exceptionalism or strict human-centered liability, this research offers a more adaptive and balanced jurisprudential framework capable of addressing future AI governance challenges within rapidly evolving digital societies. Consequently, this study contributes both theoretically and practically by proposing a reconstructive legal model that reconciles technological autonomy with contemporary accountability structures in modern jurisprudence.

## CONCLUSIONS AND RECOMMENDATIONS

The accelerating development of autonomous systems and artificial intelligence has exposed fundamental limitations within contemporary legal systems in defining the ontological boundaries of legal subjectivity. This study demonstrates that existing legal frameworks, including Regulation (EU) 2024/1689 (Artificial Intelligence Act), Regulation (EU) 2016/679 (General Data Protection Regulation/GDPR), Law Number 1 of 2024 concerning Electronic Information and Transactions, and Law Number 27 of 2022 concerning Personal Data Protection, continue to position artificial intelligence as an object of regulation rather than a legally recognized autonomous entity. The findings reveal that the persistence of anthropocentric legal doctrines has generated accountability gaps, particularly when autonomous systems operate beyond direct human prediction and control. Through normative, philosophical, comparative, and conceptual analysis, this study identifies the emergence of an ontological accountability paradox in which autonomous systems increasingly perform quasi-independent legal and social functions while remaining excluded from existing categories of legal subjects. In response to this condition, the study proposes a functional legal personhood model based on degrees of autonomy, operational capacity, and legal impact as a reconstructive jurisprudential framework for future AI governance. The study therefore contributes theoretically to the development of AI jurisprudence, legal ontology, and digital governance law while practically offering conceptual guidance for the formulation of more adaptive, accountable, and technologically responsive legal policies in the era of autonomous systems.

## ADVANCED RESEARCH

Despite providing a comprehensive normative and philosophical analysis concerning the ontological boundaries of legal personhood for autonomous systems, this study remains limited to doctrinal legal analysis and conceptual jurisprudential interpretation. The research does not empirically examine the implementation of AI governance policies within specific industrial, governmental, or judicial institutions, nor does it quantitatively measure public, institutional, or regulatory perceptions regarding autonomous legal subjectivity. In addition, the study primarily focuses on European Union and Indonesian regulatory frameworks, thereby leaving comparative opportunities involving other jurisdictions such as the United States, China, South Korea, or transnational AI governance institutions. Future research is therefore recommended to adopt interdisciplinary approaches integrating empirical legal studies, comparative policy analysis, computational governance assessment, and socio-legal methodologies to evaluate the practical implications of functional legal personhood within real-world autonomous systems. Further studies may also explore the intersection between AI accountability, cyber liability, digital constitutionalism, and human rights governance in increasingly algorithmic societies.

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