

Regulation Formulation of AI Utilization in Indonesia: The Dilemma between Certainty and Utility to Realize Golden Indonesia Vision

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Abstract

New regulation formulation methods are needed in the development and use of artificial intelligence (AI) in Indonesia. Therefore, this study aimed to argue how the current method of legislative development in Indonesia will need to consider the principles of legal certainty and utility for any future AI laws. These two principles were only elements of the puzzle that were influenced and shaped by other national and local policy needs, which needed considerations by

the government. Different from previous investigations that primarily examined AI based on existing rules, this study attempted to provide a different perspective, namely, the dilemma between certainty and utility in formulating AI regulations. A legal-normative method was adopted, and relevant national strategies were analyzed. The results showed that the absence of comprehensive regulations on the use of AI caused legal uncertainty, while opening opportunities for innovation that were not balanced with an adequate ethical and accountability framework. Any AI law needed to balance the considerations with innovation and community protection. Indonesia should also adopt jurisdictions of AI law early, such as the European Union (EU) and the United States (US), as well as international institutions, to inform the development of policy and law. The result of this study was expected to bridge the dilemma between certainty and utility to realize the vision of Golden Indonesia 2045, which was adaptive, responsive, and distinctive through the mastery of ethical and responsible science and technology.

KEYWORDS *Artificial Intelligence; Certainty; Golden Indonesia Vision; Regulation Formulation; Utility*

Introduction

The development of artificial intelligence (AI) technology is a key marker of the digital transformation era that is sweeping across all countries around the world, including Indonesia.¹ AI is now widely used in various strategic sectors, ranging from public service systems, the health sector, education, industry, to security and judicial systems.² The potential to enhance productivity is far from fully being understood or realized, and the technology is developing as an essential tool in supporting national development that will underpin Golden

¹ Hari Sutra Disemadi and Lu Sudirman, "Reassessing Legal Recognition of AI: Human Dignity and the Challenge of AI As a Legal Subject in Indonesia," *Masalah-Masalah Hukum* 54, no. 1 (March 2025): 1–12, <https://doi.org/10.14710/mmh.54.1.2025.1-12>.

² Ferry Silitonga and M. Falikul Isbah, "Artificial Intelligence and the Future of Work in the Indonesian Public Sector," *Jurnal Ilmu Sosial Dan Humaniora* 12, no. 2 (August 2023): 296–308, <https://doi.org/10.23887/jish.v12i2.62297>.

Indonesia 2045.³ In addition to the potential productivity gains that a nation-state could obtain from the rapid scaling of AI, businesses tend to experience increased efficiency and more accurate data through reduced human error. AI would also allow humans to focus on other areas of business operations. Minimizing human roles in repetitive work will make business operations more effective and efficient.

The use of AI carries substantial risks, particularly regarding commercial and personal data security, algorithmic discrimination and bias, abuse for criminal activities, degradation of human autonomy caused by automated decision-making, and the erosion of human accountability in decision-making processes.⁴ These risks are inherent issues and challenges in developing and using AI because, AI, as algorithm-based technology, will have gaps of imperfection. Furthermore, AI may increase transparency and accountability of human functions and behaviors. This is because the technology can accurately predict what tasks a human has to complete. The accuracy of AI technology is highly dependent on the quality of data and information. Higher data validity generally leads to greater prediction accuracy and more reliable outputs.⁵ This shows that AI cannot just produce accurate predictions when the data is invalid or unreliable.

The increase in AI has not been accompanied by comprehensive regulations governing the development, implementation, and oversight of AI systems. Generally, technology is not regulated by the government around the world. Most technologies have remained largely unregulated, with regulation primarily focused on users. However, a shift occurred with the implementation of Regulation 2024/1689 by the European Union (EU), which provided a pathway and benchmark for other nation-states to follow. A core feature of Regulation 2024/2689 is the establishment of ethical principles along with a high-level risk evaluation for the development and use of this technology.⁶

³ Amrin et al., "The Role of Youth Innovation and Collaboration in Driving National Economic Growth Towards Golden Indonesia 2045: A Legal Perspective," *Solo International Collaboration and Publication of Social Sciences and Humanities* 3, no. 03 (June 2025): 425–40, <https://doi.org/10.61455/sicopus.v3i03.352>.

⁴ Joshua Krook et al., "A Systematic Literature Review of Artificial Intelligence (AI) Transparency Laws in the European Union (EU) and United Kingdom (UK): A Socio-Legal Approach to AI Transparency Governance," *AI and Ethics* 5, no. 4 (August 2025): 4069–90, <https://doi.org/10.1007/s43681-025-00674-z>.

⁵ Md Aminul Islam, "Impact of Predictive Analytics and Ensemble Learning on Operational Efficiency and KPI Forecasting in U.S. Engineering Firms," *ASRC Procedia: Global Perspectives in Science and Scholarship* 1, no. 01 (April 2025): 2280–322, <https://doi.org/10.63125/r5s10176>.

⁶ European Union, "Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 Laying down Harmonised Rules on Artificial Intelligence and Amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144

Indonesia does not have specific regulations governing artificial intelligence, and existing governance remains limited to soft law instruments. These include Circular Letter No. 9 of 2023 issued by the Ministry of Communication and Digital on the Ethics of AI Utilization, as well as AI usage guidelines issued by the Ministry of Education and Culture. Recently, the Ministry of Communication and Digital issued a white paper on the national AI roadmap and the concept of AI ethics guidelines. The regulations provide a very high level of uncertainty, as the pattern is just a guideline or recommendation that could backfire in the future. This also serves as an initial signal that the direction of AI utilization regulation in Indonesia aims to provide a broader space for maximizing societal benefits. Therefore, AI regulation in Indonesia is not specifically in the form of rules issued by legislative or executive institutions that are binding.⁷ As a result of the absence of binding regulations, any user who misuses AI in Indonesia cannot be sanctioned, even when the action violates or abuses a person's privacy. In a situation where the use of AI leads to criminal acts that harm an individual, then the authorities can only be prosecuted for offenses related to general criminal acts, not for the misuse of AI specifically. This regulation remains sectoral in nature and does not directly regulate AI as a separate legal subject.⁸ For example, Indonesian Law No. 27 of 2022 on Personal Data Protection (PDP Law) is an important milestone in establishing the foundation for data protection, which is a key component in the operation of AI. However, this law is still limited to personal data aspects and does not cover the principles of algorithmic accountability, transparency of automation processes, auditing of AI utilization, or legal responsibility for decisions or recommendations generated by AI.⁹

and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act) (Text with EEA Relevance)," June 13, 2024, <http://data.europa.eu/eli/reg/2024/1689/oj>.

⁷ Rendy Pahrun Wadipalapa et al., "An Ambitious Artificial Intelligence Policy in a Decentralised Governance System: Evidence From Indonesia," *Journal of Current Southeast Asian Affairs* 43, no. 1 (April 2024): 65–93, <https://doi.org/10.1177/18681034231226393>.

⁸ Adnasohn Aqilla Respati, "Reformulasi UU ITE Terhadap Artificial Intelligence Dibandingkan Dengan Uni Eropa Dan China AI Act Regulation," *JURNAL USM LAW REVIEW* 7, no. 3 (December 2024): 1737–58, <https://doi.org/10.26623/julr.v7i3.10578>.

⁹ Rofi Aulia Rahman et al., "Constructing Responsible Artificial Intelligence Principles as Norms: Efforts to Strengthen Democratic Norms in Indonesia and European Union," *Padjadjaran Jurnal Ilmu Hukum (Journal of Law)* 9, no. 2 (August 2022): 231–52, <https://doi.org/https://doi.org/10.22304/pjih.v9n2.a5>; Lyytinen Lescrauwaet et al., "Adaptive Legal Frameworks and Economic Dynamics in Emerging Tech-Nologies: Navigating the Intersection for Responsible Innovation," *Law and Economics* 16, no. 3 (October 2022): 202–20, <https://doi.org/10.35335/laweco.v16i3.61>.

Other regulations related to digital technology include Law No. 11 of 2008 on Electronic Information and Transactions (ITE Law) and its amendments, as well as Presidential Regulation No. 95 of 2018 on Electronic-Based Government Systems (SPBE). These two regulations provide a general framework for the use of digital technology but do not substantially regulate intelligent systems capable of learning and making autonomous decisions.¹⁰ In the 2020-2045 National AI Master Plan Structure, the government states the importance of developing a legal and ethical framework for AI as a national priority.¹¹ However, there is currently no concrete form of law or government regulation that directly regulates the use, development, and legal responsibility of AI.

This reality shows that the state and government of Indonesia have not found the appropriate formulation for regulating the use of AI.¹² The need for regulations is now very urgent because the current utilization of AI leaves various problems, such as the prevalence of cybercrime, fraud or false information, and the unauthorized use of personal data for commercial or market sentiment purposes.¹³ Innovation and development of AI continue to be advanced by developers, who are generally from both within and outside Indonesia. The development of AI is intended to provide benefits in supporting human activities. However, there is a potential for misuse in certain criminal acts that harm victims.¹⁴ Criminal acts or violations that use this technology are a reason why AI must be strictly regulated to prevent crimes resulting from the

¹⁰ Feri Nugroho, "Artificial Intelligence Regulation and Political Ethics: An Analysis of Indonesia's Position in AI Governance," *Journal of Political Innovation and Analysis* 2, no. 1 (June 2025): 42–51, <https://doi.org/10.59261/jpia.v2i1.10>.

¹¹ Ishtiaque Ahmed, "Navigating Ethics and Risk in Artificial Intelligence Applications within Information Technology: A Systematic Review," *American Journal of Advanced Technology and Engineering Solutions* 1, no. 01 (April 2025): 579–601, <https://doi.org/10.63125/590d7098>.

¹² Teguh Cahya Yudiana, Sinta Dewi Rosadi, and Enni Soerjati Priowirjanto, "The Urgency of Doxing on Social Media Regulation and the Implementation of Right to Be Forgotten on Related Content for the Optimization of Data Privacy Protection in Indonesia," *Padjadjaran Jurnal Ilmu Hukum (Journal of Law)* 9, no. 1 (April 2022): 24–45, <https://doi.org/10.22304/pjih.v9n1.a2>.

¹³ Taís Fernanda Blauth, Oskar Josef Gstrein, and Andrej Zwitter, "Artificial Intelligence Crime: An Overview of Malicious Use and Abuse of AI," *IEEE Access* 10 (2022): 77110–22, <https://doi.org/10.1109/ACCESS.2022.3191790>.

¹⁴ Andreas Georg Scherer and Christian Voegtlin, "Corporate Governance for Responsible Innovation: Approaches to Corporate Governance and Their Implications for Sustainable Development," *Academy of Management Perspectives* 34, no. 2 (May 2020): 182–208, <https://doi.org/10.5465/amp.2017.0175>.

use of AI.¹⁵ However, strict regulation will directly impact the restriction of creativity and innovation.¹⁶

The situation creates a regulatory dilemma between two fundamental legal principles, namely legal certainty and utility. Legal certainty is essential to provide industry players, policymakers, and the public with clear guidelines for the safe, fair, and responsible use of AI.¹⁷ Its absence raises doubts about the application of the technology, particularly in sectors related to public safety and human rights.¹⁸ Meanwhile, the principle of utility requires the law to be adaptive and not overly restrictive of rapidly developing technological innovation.¹⁹ Strict or rigid regulations could hinder the growth of national digital innovation and investment in the technology sector.²⁰

The absence of a specific and holistic legal framework related to AI makes it difficult to apply ethical principles, such as algorithmic fairness, non-discrimination, transparency, and human oversight. This is a serious challenge, considering that public decision-making is increasingly reliant on algorithm-based systems, such as in e-budgeting systems, facial recognition for public safety, and chatbots for public services.²¹ Therefore, this study is important to outline and analyze the normative dilemma that arises in the process of formulating AI regulations in Indonesia. It particularly examines how the state can balance the need for legal certainty with the demands for social

¹⁵ Nandhini Swaminathan and David Danks, "Application of the NIST AI Risk Management Framework to Surveillance Technology," ArXiv:2403.15646, March 22, 2024, <https://doi.org/10.48550/arXiv.2403.15646>.

¹⁶ Victor Jiawei Zhang and Boris Paal, "A Three-Layered Framework: An AI Governance Guide for Global Policymakers," Available at SSRN 5241351, Social Science Research Network, December 31, 2024, <https://doi.org/10.2139/ssrn.5241351>.

¹⁷ Anton Sigfrids et al., "How Should Public Administrations Foster the Ethical Development and Use of Artificial Intelligence? A Review of Proposals for Developing Governance of AI," *Frontiers in Human Dynamics* 4 (May 2022), <https://doi.org/10.3389/fhumd.2022.858108>.

¹⁸ Medha Garg and Shravani Lanka, "Automating the State: Public Sector AI in India and the Challenge of Rights-Based Regulation," *Indian Journal of Law and Technology* 21, no. 1 (April 2026), <https://doi.org/10.55496/XXVR5911>.

¹⁹ Ramak Molavi Vasse'i, "The AI Act – The Epitome of Outdated Tech Governance — Exploring the Need for Innovative Regulation and Pathways to Modern Tech Governance," *Computer Law Review International* 25, no. 3 (June 2024): 72–78, <https://doi.org/10.9785/crl-2024-250302>.

²⁰ Yanhui Wei et al., "Research on the Impact of Hard Technology Innovation on the High-Quality Development of SRDI Enterprises: Based on the Moderating Role of Digital Transformation," *Asia Pacific Journal of Innovation and Entrepreneurship* 19, no. 1 (July 2024): 24–41, <https://doi.org/10.1108/APJIE-04-2024-0069>.

²¹ Karl de Fine Licht and Jenny de Fine Licht, "Artificial Intelligence, Transparency, and Public Decision-Making," *AI & SOCIETY* 35, no. 4 (December 2020): 917–26, <https://doi.org/10.1007/s00146-020-00960-w>.

utility and economic benefits from the use of AI. Previous studies have generally focused more on the limitations or absence of binding regulations in the use of AI in Indonesia. Rasyidah et al. (2024) showed the need for higher standards to ensure the responsible use of AI. The study also found that current legal limitations depend solely on the Electronic Information and Transactions Law (ITE Law) and its derivatives, which are unable to address the legal and ethical risks of AI use, such as the spread of hoaxes, copyright infringement, and personal data manipulation.²²

Padmanaban (2024) argued that AI could increase and improve efficiency in the drafting of regulations while opening up new challenges related to fairness and transparency. AI serves as a tool for analyzing big data related to legislation, but it can erode the role of humans in decision-making. The study suggests the establishment of algorithmic audit procedures, ethical evaluations, and public feedback mechanisms as integral parts of AI regulatory design.²³ Vargas-Murillo et al. (2024) also identified risks of fairness and privacy gaps when AI regulations were not designed inclusively and ethically. The study showed that current AI regulations in Indonesia were fragmented and did not sufficiently address AI implications, such as algorithmic bias, privacy violations, and data misuse.²⁴ Therefore, this study differs significantly from previous results, as it analyzes the dilemma or tension between certainty and utility in AI regulation in Indonesia. The analysis also focused on how AI regulation in Indonesia can contribute to realizing the vision of Golden Indonesia 2045.²⁵ Based on the description, this study argued that it is time for the Indonesian Government to develop specific regulations for the development and use of AI throughout the state. The main question is how the regulation of AI utilization in Indonesia should be structured to bridge legal certainty and legal utility. It will be further argued that this study provides the basis to develop a conceptual framework to assist policymakers in developing AI regulation that is agile, pragmatic, and underpins the rule of law.

²² Nur Aliya Rasyidah, Muhammad Aksay, and Muhammad Firdaus Akmal, "Urgensi Pembuatan Regulasi Penggunaan AI (Artificial Intelligence) Di Indonesia," *Jurnal Penegakan Hukum Indonesia* 5, no. 1 (October 2024): 42–51, <https://doi.org/10.51749/jphi.v5i1.142>.

²³ Harish Padmanaban, "Revolutionizing Regulatory Reporting through AI/ML: Approaches for Enhanced Compliance and Efficiency," *Journal of Artificial Intelligence General Science (JAIGS)* ISSN:3006-4023 2, no. 1 (February 2024): 71–90, <https://doi.org/10.60087/jaigs.v2i1.98>.

²⁴ Alfonso Renato Vargas-Murillo et al., "Transforming Justice: Implications of Artificial Intelligence in Legal Systems," *Academic Journal of Interdisciplinary Studies* 13, no. 2 (March 2024): 433, <https://doi.org/10.36941/ajis-2024-0059>.

²⁵ Amrin et al., "The Role of Youth Innovation and Collaboration in Driving National Economic Growth Towards Golden Indonesia 2045."

In this study, a legal-normative method was used as the main basis for analysis, supported by AI utilization regulations in several countries around the world.²⁶ A conceptual method was also used to understand legal certainty and utility in the context of modern legal theory, as well as how these principles form a normative framework in AI regulation.²⁷ The analysis of legislation was carried out through a study of specific legal instruments by examining the suitability, legal gaps, and interrelationships of existing regulations in the context of AI development and utilization.²⁸ This study uses comparative analysis with various regulations that already exist in several countries to provide a conceptual framework for the direction of AI regulation in Indonesia.²⁹ A balanced model was also formulated for AI regulation that balances certainty and utility.³⁰ An analysis and discussion are presented on how the regulation of AI utilization in Indonesia can be structured to bridge legal certainty and legal utility. These include (1) a description of the forms of AI regulation in several countries for comparison, (2) the direction of AI regulation formulation in Indonesia, (3) the forms of dilemma in AI regulation in Indonesia, and (4) discussing the concept of AI regulation formulation in Indonesia.

Regulation of AI Utilization in Several Countries in the World

Countries around the world are currently racing to formulate regulatory models for the use of AI to address the ethical, legal, economic, and social

²⁶ Mochammad Rizky Eka Aditya et al., "The Problem of Interfaith Marriage in Indonesia: A Juridical-Normative Approach," *El-Usrah: Jurnal Hukum Keluarga* 6, no. 2 (December 2023): 456–70, <https://doi.org/10.22373/ujhk.v6i2.20059>.

²⁷ Andrew Agapiou, "A Systematic Review of the Socio-Legal Dimensions of Responsible AI and Its Role in Improving Health and Safety in Construction," *Buildings* 14, no. 5 (May 2024): 1469, <https://doi.org/10.3390/buildings14051469>.

²⁸ Andreas Holzinger et al., "Digital Transformation for Sustainable Development Goals (SDGs) - A Security, Safety and Privacy Perspective on AI," in *Machine Learning and Knowledge Extraction*, ed. Andreas Holzinger et al. (Cham: Springer International Publishing, 2021), 1–20, https://doi.org/10.1007/978-3-030-84060-0_1.

²⁹ Fernanda Pirie, "Global Comparative Law?," *Oxford Journal of Legal Studies* 45, no. 2 (June 2025): 506–24, <https://doi.org/10.1093/ojls/gqae038>; Cosmina Dorobantu, "EU and UK Approaches to AI Regulation: A World Apart?," *FST JOURNAL* 23, no. 8 (June 2024): 139–64, <https://doi.org/10.53289/RFPS4564>.

³⁰ Tshilidzi Marwala, "Introduction to the Artificial Intelligence Balancing Problem," in *The Balancing Problem in the Governance of Artificial Intelligence*, ed. Tshilidzi Marwala (Singapore: Springer Nature, 2024), 1–16, https://doi.org/10.1007/978-981-97-9251-1_1.

challenges posed by this technology.³¹ The EU is leading the way in developing comprehensive AI regulations through the AI Act Regulation 2024/1679 (EU AI Act). This regulation adopts a risk-based method, categorizing AI systems into four, namely minimal, limited, high, and unacceptable risk.³² AI systems categorized as high-risk are required to meet documentation, transparency, social impact assessment, and full accountability obligations. Meanwhile, systems that directly violate human rights (such as social scoring systems) are strictly prohibited. The United States (US) does not have specific federal regulations on AI, but promotes a principle-based framework outlined by the National Institute of Standards and Technology (NIST), known as AI Risk Management Framework (AI RMF).³³ This framework focused on transparency, reliability, fairness, and bias mitigation. The US federal government also issued the Executive Order on the Development and Use of Safe, Secure, and Trustworthy AI in 2023. The order promotes collaboration between government agencies and the private sector to ensure the safety and accountability of AI systems without hindering innovation.³⁴ This executive order provides an important foundation for the development of broader regulations and regulatory tools.

The People's Republic of China has adopted a highly centralized and state-controlled regulatory model. Through the Cyberspace Administration of China (CAC), the government regulates the use of AI, particularly in relation to recommendation algorithms, mass surveillance systems, and generative AI. CAC was established to centralize internet regulation, enforce cyber-sovereignty, enhance cybersecurity, coordinate regulatory functions across ministries, and maintain regime stability through content control, data protection, and oversight of digital infrastructure.³⁵ Regulations on the

³¹ Robert Walters, "Cross-Border Data Flows: An Evolving Multi-Layered Regulatory Approach Required!," *Global Privacy Law Review* 3, no. 1 (February 2022), <https://kluwerlawonline.com/api/Product/CitationPDFURL?file=Journals\GPLR\GPLR2022004.pdf>.

³² European Union, "Proposal for a Regulation of the European Parliament and the Council Laying down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts," EUR-Lex-52021PC0206, 2021, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206>.

³³ National Institute of Standards and Technology (NIST), "AI Risk Management Framework," National Institute of Standards and Technology, U.S. Department of Commerce, January 12, 2023, <https://nvlpubs.nist.gov/nistpubs/ai/NIST.AI.100-1.pdf>.

³⁴ Joseph Biden, "Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence," Copyright, Fair Use, Scholarly Communication, Etc., October 30, 2023, <https://digitalcommons.unl.edu/scholcom/263>.

³⁵ Samson Yuen, "Becoming a Cyber Power: China's Cybersecurity Upgrade and Its Consequences," *China Perspectives* 2015, no. 2 (June 2015): 53–58, <https://doi.org/10.4000/chinaperspectives.6731>.

Management of Deep Synthesis Internet Information Services (2022) and guidelines for algorithm development on digital platforms aim to maintain social stability, public morality, and socialist values. China's method is significantly oriented toward national security and data sovereignty, with little room for civil society participation.³⁶ In Southeast Asia, Singapore stands out as a country with a pragmatic and inclusive AI governance model through the publication of the AI Governance Framework Model by Infocomm Media Development Authority (IMDA) since 2019. This model focused on the principles of transparency, human oversight, and system auditability, and was developed through a multi-stakeholder method including the public, private, and academic sectors. Singapore has also introduced AI Verify, a voluntary technical and ethical assessment tool, to help organizations assess the compliance of AI systems with responsible governance principles.³⁷ For Singapore, being an island state, the legal framework has been developed to enhance its status as an economy and business-friendly hub in the region.

After leaving the EU, the UK adopted a pro-innovation, sector-based method. Regulatory bodies, including the Information Commissioner's Office (ICO) and Competition and Markets Authority (CMA), developed sector-specific guidelines. The UK also established the AI Safety Institute in 2023 to assess risks associated with advanced AI systems.³⁸ The UK AI Safety Institute focuses on evaluating advanced AI models through technical testing, identifying systemic risks, and developing safety benchmarks. Although its goals are consistent broadly with the EU AI Act, the UK's framework is non-binding, sector-driven, and more flexible, lacking the EU's strict legal obligations. Canada has also developed the Artificial Intelligence and Data Act (AIDA) as part of the Digital Charter Implementation Act, which focuses on regulating high-risk AI systems, algorithm transparency, and protection against automated discrimination.³⁹ Japan, with its Society 5.0 philosophy, places AI in a

³⁶ Graham Webster et al., "Full Translation: China's 'New Generation Artificial Intelligence Development Plan' (2017)," *DigiChina*, August 1, 2017, <https://digichina.stanford.edu/work/full-translation-chinas-new-generation-artificial-intelligence-development-plan-2017/>.

³⁷ Gregory Falco et al., "Governing AI Safety through Independent Audits," *Nature Machine Intelligence* 3, no. 7 (July 2021): 566–71, <https://doi.org/10.1038/s42256-021-00370-7>.

³⁸ Akash Wasil et al., "AI Emergency Preparedness: Examining the UK Government's Ability to Detect and Respond to AI-Related National Security Threats," SSRN Scholarly Paper no. 4896801 (Rochester, NY: Social Science Research Network, July 16, 2024), <https://doi.org/10.2139/ssrn.4896801>.

³⁹ Aoun E. Muhammad and Kin-Choong Yow, "Demystifying Canada's Artificial Intelligence and Data Act (AIDA): The Good, the Bad and the Unclear Elements," *2023 IEEE Canadian Conference on Electrical and*

human-centered societal development framework and promotes the development of policies that promote innovation alongside the principles of safety, trust, and transparency, as outlined in its AI Governance Guidelines.⁴⁰ Canada's AIDA focuses on regulating high-risk AI through legal obligations on transparency, accountability, and protection from algorithmic harm. However, Japan's Community Governance 5.0 and AI Governance Guidelines adopt a softer, human-centered method, promoting innovation through voluntary principles of trust, safety, and inclusiveness. Canada focuses on enforceable safeguards, while Japan prioritizes ethical consistency and societal harmony in AI applications.

South Korea followed a similar path by releasing a National AI Strategy that covers regulatory, investment, and data policy aspects, as well as strengthening the Intelligent Informatization Framework Act as the national legal basis for AI development.⁴¹ The regulation of AI in several countries reflects that there are diverse methods according to the legal, economic, and cultural priorities. The EU adopted the most comprehensive method through its legally binding EU AI Act, with risk-based classification and explicit prohibition of high-risk AI systems. The US relies on a sectoral, non-centralized method with a focus on innovation and the principle of responsibility through agencies, such as NIST, without a single national legal framework. The post-Brexit UK adopts a flexible and pro-innovation sector-based method, with institutions, such as the AI Safety Institute, for technical testing of AI risks. China prioritizes state control, social stability, and digital sovereignty through strict regulation of algorithms and public AI use. Singapore developed a voluntary Model AI Governance Framework that promotes trust and accountability and provides practical guidance for industry. Canada, through AIDA, targets high-risk AI systems with a legal framework for accountability and non-discrimination. Japan, with its Society 5.0 philosophy, places AI in an inclusive and ethical society-building framework. Meanwhile, South Korea combines ethical and strategic methods through AI Ethical Standards and a national roadmap to ensure a balance between innovation and security.

Computer Engineering (CCECE), September 2023, 510–15, <https://doi.org/10.1109/CCECE58730.2023.10288878>.

⁴⁰ Tomoko Takeda et al., "Governance of Artificial Intelligence in Water and Wastewater Management: The Case Study of Japan," *Hydrology* 8, no. 3 (September 2021): 120, <https://doi.org/10.3390/hydrology8030120>.

⁴¹ Dageom Lee et al., "Informatics and Artificial Intelligence (AI) Education in Korea: Situation Analysis Using the Darmstadt Model," *JOIV: International Journal on Informatics Visualization* 6, no. 2 (June 2022): 427–44, <https://doi.org/10.30630/joiv.6.2.1000>.

The current trend of AI regulation in Indonesia leans toward a non-regulative, soft law method, as reflected in the Ethical Guidelines for AI published by Komdigi in 2023. This method is consistent with the Singapore, Japan, and UK models, which prioritize ethical principles, voluntary governance, and encourage innovation without the burden of rigid regulations. Different from the EU, which implements the EU AI Act, characterized by risk-based regulation and strict legal obligations, Indonesia does not have a binding substantive legal framework related to AI. This shows a tendency to gradually build an adaptive, inclusive, and prudent AI ecosystem. However, challenges in personal data protection, algorithm transparency, and accountability of AI systems demand future regulatory strengthening, consistent with the principles of human rights protection and technological sustainability. Based on this comparison, there are three main patterns in global AI regulatory models, as shown in Table 1.

TABLE 1. Patterns AI Regulatory Models in Global

No.	Model	Patterns	Countries
1	Normative and rights-based	Focuses on the principles of precaution, protection of human rights, and algorithmic fairness.	European Union and Canada
2	Pragmatic and participatory sector	Encourage multi-stakeholder collaboration and policy flexibility.	US, UK, Japan, South Korea, and Singapore
3	Centralistic and instrumental	Place AI within the framework of political stability and national security	China

Sources: Authors (2026)

The models are shaped by each country's institutional configuration, legal traditions, and ideological orientation. AI regulation at the global level is highly diverse and reflects different paradigms between rights protection, innovation efficiency, and national interests. This comparison is important as a reflection in formulating a contextual, fair, and visionary AI regulatory framework in Indonesia. Analysis of AI regulation in the EU, the US, China, Singapore, the United Kingdom, Japan, Canada, and South Korea shows a normative conflict between legal certainty and legal utility. Based on Hans Kelsen's theory of legal certainty, law must be formed systematically, hierarchically, and with clear norms to create predictability, protection of rights, and legitimacy in AI

oversight. However, Jeremy Bentham's utilitarianism theory shows that law should produce the greatest benefit for society through efficiency, innovation, and digital economic growth. The EU tends to apply a strict risk-based regulatory method, while the US, Singapore, Japan, and South Korea are more adaptive to increase AI industry innovation. China integrated AI regulation with political stability, data control, and national security interests.⁴²

Direction of Formulation of Regulation of AI Utilization in Indonesia

The direction of AI regulation in Indonesia currently follows a framework that lacks systematization and does not match the rapid development of technology. Government efforts to provide legal certainty for AI use have not reached a framework consistent with the socio-cultural patterns of Indonesian society. This direction is still arguably in the development phase.⁴³ In the initial phase, the government's efforts are evident in the issuance of the National AI Strategy (Stranas KA) 2020-2045, initiated by the Agency for the Assessment and Application of Technology (BPPT, now part of BRIN) in collaboration with the Ministry of Communication and Digital Affairs (Komdigi).⁴⁴ This document shows the use of AI in five national priority sectors, namely healthcare, bureaucracy, education, food security, and mobility.⁴⁵ However, Stranas KA does not have a legally binding force and remains visionary in nature.⁴⁶ In December 2023, Komdigi issued Circular Letter No. 9 of 2023 on AI Ethics, which outlines principles for AI use, such as transparency,

⁴² Stanley Greenstein and Mauro Zamboni, "Navigating the Legislative Dilemma: Evaluating the EU AI Act's Approach to Regulating Emerging Technologies," *The Theory and Practice of Legislation* 13, no. 3 (September 2025): 312–52, <https://doi.org/10.1080/20508840.2025.2513177>.

⁴³ Sinta Dewi Rosadi and Garry Gumelar Pratama, "Urgensi Perlindungan Data Privasi Dalam Era Ekonomi Digital Di Indonesia," *Veritas et Justitia* 4, no. 1 (June 2018): 88–110, <https://doi.org/10.25123/vej.v4i1.2916>.

⁴⁴ Yudiana, Rosadi, and Priowirjanto, "The Urgency of Doxing on Social Media Regulation and the Implementation of Right to Be Forgotten on Related Content for the Optimization of Data Privacy Protection in Indonesia."

⁴⁵ Sinta Dewi Rosadi, "Konsep Perlindungan Hukum Atas Privasi Dan Data Pribadi Dikaitkan Dengan Penggunaan Cloud Computing Di Indonesia," *Yustisia* 5, no. 1 (April 2016): 35–53, <https://doi.org/10.20961/yustisia.v5i1.8712>.

⁴⁶ Bella Thalia Winardi and Evelyne Julian Halim, "The Impact of Artificial Intelligence and Regulatory Strategies on The Economics: Learning From Indonesia, China, and Europe," *Jurnal Bisnis Dan Manajemen (JBM)*, September 30, 2024, 150–63, <https://doi.org/10.23960/jbm.v20i3.3437>.

accountability, non-discrimination, and respect for copyright and privacy.⁴⁷ The circular letter does not fall in the category of positive legal norms because it does not produce legal consequences in cases of violations. The government's policy direction remains within the realm of soft law.⁴⁸ In this situation, the dilemma between certainty and utility becomes increasingly prominent, as the use of AI continues to grow across various sectors without clear legal guarantees. These initial steps are important as a normative basis for the formation of stronger and more binding formal regulations. Furthermore, the pattern of AI regulation in Indonesia is potentially influenced by two poles of global methods. It could adopt a strict and centralized model similar to the EU AI Act or the state-control-based regulation of China. Indonesia can also follow the flexible and pro-innovation method adopted by Japan, Singapore, the UK, and the US, which focuses on ethics, voluntary governance, and multi-sector collaboration in AI development and utilization.

The government has shown further seriousness in forming a more robust legal framework by announcing plans to draft formal regulations for the use of AI⁴⁹, both in the form of Presidential Regulation (Perpres) and sectoral regulations through relevant ministries and agencies. Komdigi has been the main actor leading a series of public consultations since early 2024, including various stakeholders from academia, civil society, the technology industry, and vulnerable groups. This shows a shift from a top-down model to a participatory policy formulation that is responsive to social and technological values. Furthermore, the government has partnered with UNESCO through the AI Readiness Assessment (AI RAM) project to measure Indonesian readiness in terms of infrastructure, legal governance, public literacy, and ethical frameworks for AI use.⁵⁰ This step is also consistent with national regulations and international standards, such as UNESCO's Ethical AI Guidelines and OECD

⁴⁷ Kementerian Komunikasi dan Digital (Komdigi), "Surat Edaran Menteri Nomor 9 Tahun 2023 Tentang Etika Kecerdasan Artifisial," December 2023, https://jdih.komdigi.go.id/produk_hukum/unduh/id/883/t/surat+edaran+menteri+komunikasi+dan+informatika+nomor+9+tahun+2023.

⁴⁸ Bella Thalia Winardi and Evelyne Julian Halim, "The Impact of Artificial Intelligence and Regulatory Strategies on The Economics: Learning From Indonesia, China, and Europe," *Jurnal Bisnis Dan Manajemen (JBM)* 20, no. 3 (September 2024): 150–63, <https://doi.org/10.23960/jbm.v20i3.3437>.

⁴⁹ Zico Junius Fernando and Ariesta Wibisono Anditya, "AI on The Bench: The Future of Judicial Systems in The Age of Artificial Intelligence," *Jurnal Hukum Dan Peradilan* 13, no. 3 (November 2024): 523–50, <https://doi.org/10.25216/jhp.13.3.2024.523-550>.

⁵⁰ Vasse'i, "The AI Act – The Epitome of Outdated Tech Governance — Exploring the Need for Innovative Regulation and Pathways to Modern Tech Governance."

principles.⁵¹ The Indonesian government is monitoring the development of AI regulations in the EU AI Act, which is known for its risk-based method. In this case, the use of AI is classified based on its level of danger to human rights and public safety.⁵² Although Indonesia may not necessarily adopt the European model, there are efforts to adapt several principles, such as data protection, algorithm auditing, and the prohibition of AI use in discriminatory activities.⁵³

The implementation of AI in the public sector has become a concrete laboratory for the government to assess the effectiveness and challenges of this technology on a national scale. For example, in the information and communications sector, Komdigi uses AI based on Natural Language Processing (NLP) to detect hoaxes and harmful content circulating on the internet.⁵⁴ This technology improves the detection of false information, but also raises issues related to possible misclassification (false positives) that may affect freedom of expression.⁵⁵ In the field of taxation, the Directorate General of Taxes has developed an AI chatbot to answer taxpayer questions, which has proven to reduce the burden of manual services and improve administrative efficiency.⁵⁶ In the health sector, the Ministry of Health uses AI in radiological image analysis to detect cancer and lung disease.⁵⁷ This technology increases the diagnostic process and introduces legal risks when errors occur and cannot be verified for accuracy due to the absence of algorithm audit mechanisms. The use of AI by the National Disaster Management Agency (BNPB) for disaster detection through a chatbot platform shows that the technology can support

⁵¹ Thiago Moraes, "Ethical AI Regulatory Sandboxes: Insights from Cyberspace Regulation and Internet Governance," *Proceedings of the Second International Symposium on Trustworthy Autonomous Systems* (New York, NY, USA), TAS '24, September 16, 2024, 1–10, <https://doi.org/10.1145/3686038.3686049>.

⁵² Bruno Zeller et al., "The Right to Be Forgotten—The EU and Asia Pacific Experience (Australia, Indonesia, Japan and Singapore)," SSRN Scholarly Paper no. 3320860 (Rochester, NY: Social Science Research Network, January 1, 2019), <https://doi.org/10.2139/ssrn.3320860>.

⁵³ Union, "Proposal for a Regulation of the European Parliament and the Council Laying down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts."

⁵⁴ Hari Murti et al., "Design of Intelligent Model for Text-Based Fake News Detection Using K-Nearest Neighbor Method," *Sinkron: Jurnal Dan Penelitian Teknik Informatika* 9, no. 1 (January 2025): 1–7, <https://doi.org/10.33395/sinkron.v9i1.14306>.

⁵⁵ Vita Dwi Lestari, Kartika Ayu Kinanti, and Nur Khusmiyah Afrilia, "Re-Evaluating the Quality of Public Services in Malang City: A Comparative Analysis of Taxpayer Satisfaction," *PANGRIPTA* 7, no. 2 (August 2024): 174–90, <https://doi.org/10.58411/rrc09m19>.

⁵⁶ Alberto Isgut, Alfonso Pellegrino, and UN.ESCAP, *Increasing Domestic Resource Mobilization through the Digitalization of Tax Administrations in Asia and the Pacific: Progress, Challenges, and Opportunities*, April 24, 2024, <https://hdl.handle.net/20.500.12870/6992>.

⁵⁷ Teuku Rizky Noviany et al., *Explainable Artificial Intelligence in Medical Imaging: A Case Study on Enhancing Lung Cancer Detection through CT Images | Indonesian Journal of Case Reports*, n.d., accessed June 4, 2026, <https://heca-analitika.com/ijcr/article/view/150>.

real-time disaster mitigation systems.⁵⁸ However, cases, such as the government's plan to build an AI center in Papua, have faced criticism for allegedly not considering the readiness of human resources and digital infrastructure.⁵⁹ This criticism shows the importance of the principle of distributive justice in technology policy.⁶⁰ AI policies that do not consider equitable distribution of benefits and access will result in benefits being enjoyed by a limited group, while other groups remain excluded. In this context, regulations must ensure that AI is not only legally compliant but also fair and socially functional.⁶¹

The relationship between government policy and academic results shows a converging trend toward the importance of strengthening legal certainty without undermining the utility of technology.⁶² Rasyidah et al. (2024) showed how the principle of algorithmic audit and human oversight must form the foundation of AI regulation to prevent the dominance of unaccountable automated systems.⁶³ This principle is already evident in the framework of Komdigi circular and Financial Services Authority (OJK) guidelines, which show the need for regular evaluations of AI use in the financial sector and consumer protection.⁶⁴ George et al. (2024) also showed that AI in the legislative process (law-making AI) must be subject to ethical evaluation and open to public input. This idea is consistent with the public consultation process conducted by the government in drafting AI regulations.⁶⁵ Meanwhile,

⁵⁸ Hidayat Chusnul Chotimah and Tiffany Setyo Pratiwi, "Digital Humanitarian Spaces In The Disaster Management Process: A Case Study of Indonesia," *JASSP* 2, no. 2 (October 2022): 47–60, <https://doi.org/10.23960/jassp.v2i2.68>.

⁵⁹ Atik Ul Mussanadah and Muhammad Adlin Saputra, "Is Papuan Local Governments' Digital Transformation Encouragement for the Greater Good? An Indigenous Youth Perspective," *International Journal of Sociology and Social Policy*, October 28, 2025, 1–13, <https://doi.org/10.1108/IJSSP-12-2024-0643>.

⁶⁰ Ita Hartati, "Strategi Pembangunan SDM Kementerian Keuangan Republik Indonesia Dalam Menghadapi Tantangan Era Disrupsi 4.0," *Jurnal BPPK: Badan Pendidikan Dan Pelatihan Keuangan* 13, no. 1 (July 2020): 109–29, <https://doi.org/10.48108/jurnalbppk.v13i1.493>.

⁶¹ Yusuf Firinci, "Decolonial Artificial Intelligence; Algorithmic Fairness in Alignment with Turkish and Islamic Values," *Marmara Üniversitesi İlahiyat Fakültesi Dergisi* 67, no. 67 (December 2024): 250–79, <https://doi.org/10.15370/maruiid.1565884>.

⁶² Mujtaba Dena F. and Nihar R. Mahapatra, "Fairness in AI-Driven Recruitment: Challenges, Metrics, Methods, and Future Directions," *arXiv:2405.19699*, May 18, 2025, 1–17, <https://doi.org/10.48550/arXiv.2405.19699>.

⁶³ Rasyidah, Aksay, and Akmal, "Urgensi Pembuatan Regulasi Penggunaan AI (Artificial Intelligence) Di Indonesia."

⁶⁴ Clara Ignatia Tobing et al., "Juridical Review of Indonesian Banking Consumer Services (Commercial Banks and BPR) in the Digitalization Era," *Jurnal Hukum Sasana* 10, no. 2 (December 2024): 152–70, <https://doi.org/10.31599/sasana.v10i2.3227>.

⁶⁵ A. Shaji George, T. Baskar, and P. Balaji Srikanth, "The Erosion of Cognitive Skills in the Technological Age: How Reliance on Technology Impacts Critical Thinking, Problem-Solving, and Creativity," *Partners*

Mufti and other scholars showed the importance of an inclusive method in technology regulation, including the participation of indigenous people, disabled individuals, and minority groups in policy formulation to ensure that regulations were not socially biased.⁶⁶ This study has informed government initiatives that begin to include civil society and academics in the formulation of regulations. Based on the results of these three studies, it can be concluded that the direction of AI regulation in Indonesia cannot depend solely on a normative-legalistic method but must combine ethical, participatory, and impact-based strategies. This method may bridge the dilemma between legal certainty and legal utility in a balanced manner, resulting in inclusive, adaptive, and visionary AI governance for the Indonesian future.⁶⁷ The step is also important for Indonesia because populations across the archipelago are at different stages in understanding, using, and adopting AI.

1. The Legal Certainty Dilemma: Between Rigidity and Flexibility

Legal certainty in the context of AI utilization requires clear, written, and consistently applicable legal norms. This concept is part of fundamental principles, as reflected in Article 28D Paragraph (1) of the 1945 Constitution, which guarantees that every individual has the right to recognition, security, protection, and fair legal certainty.⁶⁸ However, the characteristics of AI utilization, which are based on complex algorithms, adaptive machine learning, and big data, are often black box in nature.⁶⁹ This shows that the results or recommendations of AI systems are difficult to explain transparently to the

Universal Innovative Research Publication (UIRP) 02, no. 03 (June 2024): 147–63, <https://doi.org/10.5281/zenodo.11671150>.

⁶⁶ Daniel Susser, “Invisible Influence: Artificial Intelligence and the Ethics of Adaptive Choice Architectures,” *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society* (New York, NY, USA), AIES ’19, January 27, 2019, 403–8, <https://doi.org/10.1145/3306618.3314286>; William Villegas-Ch et al., “Optimizing Automated Educational Systems: Adaptive Syllabus Generation and Precise Assessment Using Artificial Intelligence,” *IEEE Access* 12 (2024): 173390–409, <https://doi.org/10.1109/ACCESS.2024.3503532>.

⁶⁷ Susser, “Invisible Influence”; Lescrauwaet et al., “Adaptive Legal Frameworks and Economic Dynamics in Emerging Tech-Nologies.”

⁶⁸ Indra Lorenly Nainggolan, “Legal Politics of Regional Head Offices for The 2019-2024 Period After The Constitutional Court Decision Based on Constitutional Theory,” *Siber International Journal of Advanced Law (SIJAL)* 2, no. 1 (September 2024): 23–31, <https://doi.org/10.38035/sijal.v2i1.71>.

⁶⁹ Vikas Hassija et al., “Interpreting Black-Box Models: A Review on Explainable Artificial Intelligence,” *Cognitive Computation* 16, no. 1 (January 2024): 45–74, <https://doi.org/10.1007/s12559-023-10179-8>.

public or legal authorities. The application of the principle becomes problematic, as conventional legal norms are not able to respond to the rapidly changing dynamics of AI.⁷⁰ Privacy rights violations due to automated decision-making by AI lead to confusion when regulations do not explicitly regulate liability mechanisms.⁷¹

The dilemma of legal certainty in regulating AI in Indonesia reflects the tension between the need for clear rules and the rigidity of regulations amid the rapid development of AI. Legal certainty is needed to provide clear boundaries regarding permitted and prohibited actions for technology industry players, users, and the government. This certainty is crucial to ensure adequate legal protection of individual rights, such as privacy, non-discrimination, and personal data protection. However, regulations that are too strict and rigid can hinder innovation, limit creativity, and slow down adaptation to new and evolving technologies. Regulations, such as ITE Law, Personal Data Protection Law (PDP Law)⁷², Presidential Regulation on SPBE, and Komdigi Circular on AI Ethics (SE Etika AI), show efforts to respond to AI developments.⁷³ The regulations do not comprehensively regulate AI and tend to be reactive in nature. For example, PDP Law does not address technical issues, such as algorithm audits, data bias, and legal responsibility for decisions made by autonomous AI systems. This shows a gap between the expectation of legal certainty and the flexibility of regulations required to prevent the law from lagging behind the rapid development of AI.⁷⁴

Rasyidah et al. (2024) showed that a rigid legal method in the use of AI actually risked being counterproductive.⁷⁵ Several developing countries, including Indonesia, tend to apply a rigid legalistic method, which is unable to

⁷⁰ Rasyidah, Aksay, and Akmal, "Urgensi Pembuatan Regulasi Penggunaan AI (Artificial Intelligence) Di Indonesia."

⁷¹ Moraes, "Ethical AI Regulatory Sandboxes."

⁷² Rosadi, "Konsep Perlindungan Hukum Atas Privasi Dan Data Pribadi Dikaitkan Dengan Penggunaan Cloud Computing Di Indonesia."

⁷³ Robert Walters and Sinta Dewi Rosidi, "Transnational Flow of Personal Data in Home and Office Devices," *International Journal of Intelligent Information Systems*, Science PG, July 18, 2022, <https://www.sciencepublishinggroup.com/journal/paperinfo?journalid=135&doi=10.11648/j.ijis.20221103.12>.

⁷⁴ Robert Walters and Bruno Zeller, "Transnational Contract Law: Artificial Intelligence, Data, Cybersecurity and the Legal Landscape - Business Law Review Kluwer Law Online," SSRN Scholarly Paper no. 4378864 (Rochester, NY: Social Science Research Network, March 5, 2023), <https://papers.ssrn.com/abstract=4378864>.

⁷⁵ Rasyidah, Aksay, and Akmal, "Urgensi Pembuatan Regulasi Penggunaan AI (Artificial Intelligence) Di Indonesia."

anticipate technological disruption in the long term. According to the analysis result, AI regulations should adopt the principle of adaptive legal design, namely a regulatory model that is open, experimental, and can be adjusted gradually along with technological developments and community needs. AI is not a final technological product but an evolutionary and complex system. Deterministic regulation without sufficient flexibility poses significant risks. Another study found that countries, such as Singapore, adopted a hybrid method, namely combining principle-based regulation with technology testing through a regulatory sandbox.⁷⁶ This method allows the government to test the social, legal, and technical impacts of AI before implementation. Indonesia can adopt a similar method as a solution to avoid regulatory rigidity and provide legal certainty gradually through limited trials under government supervision and community participation.⁷⁷

The dilemma supports the view that legal certainty in AI regulation should not take the form of absolute certainty but progressive certainty. Progressive certainty recognizes the need for a legal structure and provides room for interpretation and adaptation to technological realities.⁷⁸ This is reflected in the results of a previous study, which focused on the importance of reflexive legal governance in AI governance. Reflexive governance shows that the law not only regulates normatively, but also opens up space for social and institutional learning from the impact of AI implementation.⁷⁹ In this context, the role of independent supervisory institutions, algorithm audit mechanisms, and community participation is important to maintain accountability without having to wait for rigid formal regulations. Examples of tax chatbot implementation and facial recognition systems at airports show that AI practices can systemically violate individual rights without a flexible and responsive legal framework.⁸⁰ Therefore, the dilemma of certainty between rigidity and flexibility should not be understood as a binary choice, but as a spectrum that requires a synthesis of methods. This shows that the law must be

⁷⁶ Zeller et al., “The Right to Be Forgotten—The EU and Asia Pacific Experience (Australia, Indonesia, Japan and Singapore).”

⁷⁷ Jaime Ubilla, “Legal Forms and Reflexive Legal Forms: A New Approach to Reflexive Law,” *Soziale Systeme* 29, nos. 1–2 (December 2024): 268–310, <https://doi.org/10.1515/sosys-2024-0011>.

⁷⁸ Robert Walters and Bruno Zeller, “The Internet of Things: And Its Current Status in the Role of Justice - Computer and Telecommunications Law Review,” SSRN Scholarly Paper no. 4386452 (Rochester, NY: Social Science Research Network, March 12, 2023), <https://papers.ssrn.com/abstract=4386452>.

⁷⁹ Ubilla, “Legal Forms and Reflexive Legal Forms.”

⁸⁰ David Freeman Engstrom et al., “Government by Algorithm: Artificial Intelligence in Federal Administrative Agencies,” SSRN Scholarly Paper no. 3551505 (Rochester, NY: Social Science Research Network, February 1, 2020), <https://doi.org/10.2139/ssrn.3551505>.

certain enough to protect the public, but also flexible enough to evolve with technology. In this case, Indonesia is in the early stages of regulatory experimentation and needs to immediately build an AI legal framework that is not only normative but also transformative and dynamic.⁸¹

2. The Legal Utility Dilemma: Between Innovation and Abuse

The principle of utility, often referred to as benefit, in the utilitarian legal tradition developed by Jeremy Bentham and John Stuart Mill, supports a pragmatic view of law. Law should produce the greatest benefit for society through efficiency, innovation, and digital economic growth.⁸² The formulation of regulations on the use of AI should not only guarantee rights and certainty, but also promote optimal use for the welfare of society. This utility is reflected in the national vision, such as the Vision of Golden Indonesia 2045, which places technology, including AI, as the main driver of economic growth and digital governance.⁸³ In the context of the Vision for Golden Indonesia 2045, the positive utility of AI can be measured through the increase in digital economic productivity, efficiency of public services, growth in technology investment, and the creation of job opportunities based on skills and digital innovation.⁸⁴ AI also contributes to the improvement of education quality through adaptive learning, optimization of data-based healthcare services, and the acceleration of national industrial transformation. Based on a social aspect, the indicators of AI utility can be viewed through the reduction of gaps in access to public services, the increase in digital literacy among the community, and the strengthening of data-driven governance toward Indonesia Gold 2045. This

⁸¹ C. S. Ajmal et al., “Innovative Approaches in Regulatory Affairs: Leveraging Artificial Intelligence and Machine Learning for Efficient Compliance and Decision-Making,” *The AAPS Journal* 27, no. 1 (January 2025): 22, <https://doi.org/10.1208/s12248-024-01006-5>.

⁸² Greg Cote and Andrew D. Hathaway, “Jeremy Bentham on Drugs,” *Journal of Bentham Studies* 22, no. 1 (December 2024), <https://doi.org/10.14324/111.2045-757X.057>.

⁸³ Amrin et al., “The Role of Youth Innovation and Collaboration in Driving National Economic Growth Towards Golden Indonesia 2045.”

⁸⁴ Lu Sudirman et al., “Intellectual Property Challenges for AI-Driven Creativity: A Focus on Copyright and Patents in Emerging Economies,” *Lex Scientia Law Review* 9, no. 1 (May 2025): 1285–312, <https://doi.org/10.15294/lslr.v9i1.20611>.

result shows that the utilization of AI can enhance innovation, which improves the economic and social quality of Indonesian society.

The National Strategy for Artificial Intelligence (Stranas KA), launched by the Agency for the Assessment and Application of Technology (BPPT) in 2020, shows the Indonesian government's focus on artificial intelligence use in health, bureaucratic reform, education, security, and food security.⁸⁵ However, this development requires regulatory flexibility so innovation is not constrained by legal norms that are not adaptive. For example, through sandboxing policy carried out through technological experimentation procedures in a limited and supervised legal framework is one strategy in bridging the interests of innovation and regulation.⁸⁶ This certainly requires the principles of transparency, accountability, user consent, personal data protection, and independent oversight to ensure that the regulatory sandbox does not violate human rights. Each AI test must be proportionally limited, risk-based, and provide complaint mechanisms and ethical evaluations to prevent discrimination, data misuse, and privacy violations. Without normative clarity, this method carries potential for discrimination, violations, and abuse when not balanced with principles of caution and public participation.⁸⁷

The dilemma of AI use in Indonesia reflects tension between technological innovation and the potential for misuse in criminal activity. AI promises increased efficiency in various sectors, such as public services, education, health, and security. However, this great usefulness is overshadowed by the potential for misuse, such as privacy violations, data manipulation, mass surveillance without accountability, and unclear legal responsibility for AI decisions. Normatively, the use of AI that is not accompanied by a strong ethical and legal framework can pose serious risks to human rights and democratic structures. Through the responsive legal theory framework of Philippe Nonet and Philip Selznick, the law should be able to direct innovation without being repressive. The law must accommodate social and technological dynamics, not just become a rigid or overly permissive control device.⁸⁸ Therefore, this implies the urgency of the

⁸⁵ Winardi and Halim, "The Impact of Artificial Intelligence and Regulatory Strategies on the Economics," September 2024.

⁸⁶ Shanghai Jiao Tong et al., "The Sandbox Approach to FinTech Regulation: A Case Study of China," *Revista Chilena de Derecho* 49, no. 2 (2022): 193–232, <https://doi.org/10.7764/R.492.8>.

⁸⁷ Thiago Moraes, "Lessons from Cyberspace Regulation and Internet Governance for Implementing Artificial Intelligence Regulatory Sandboxes," SSRN Scholarly Paper no. 4782654 (Rochester, NY: Social Science Research Network, January 30, 2024), <https://doi.org/10.2139/ssrn.4782654>.

⁸⁸ Martin Krygier, "The Rule of Law and Its Rivals," *Hague Journal on the Rule of Law* 9, no. 1 (April 2017): 19–27, <https://doi.org/10.1007/s40803-016-0043-9>.

need to establish adaptive, accountable, and human rights-based AI regulations.⁸⁹ Based on a governance perspective, government action must include collaborative oversight, algorithmic transparency, ethical audits, and participatory mechanisms. AI innovation can support democracy, prevent misuse of digital power, and maintain public trust in the system toward Golden Indonesia 2045.

A study by Villegas-Ch et al. (2024) showed that an AI system used to rank students on several online education platforms reproduces social bias.⁹⁰ The result showed that non-transparent algorithms cause unfairness in the evaluation of students' learning abilities. This is because students do not consider socio-economic and psychological variables or factors. The use of AI in promoting learning efficiency can turn into a discriminatory tool when not supervised ethically. In the financial sector, a study by Siraj et al. (2024) found that all financial technology companies in Indonesia have integrated AI for credit profiling.⁹¹ Although this system increases the speed of loan disbursement, there is a tendency to reject users from marginalized groups without a transparent process. The use of AI in crime prediction has also been tested by law enforcement officers, but has drawn criticism because it has the potential to discriminate against certain groups based on historical data that is not neutral.⁹² In the Indonesian context, the usefulness of AI is highly dependent on a governance framework that can ensure that the technology is used responsibly, fairly, and does not cause social exclusion.

The dilemma between innovation and abuse of AI in Indonesia can be analyzed through the dual-use technology theory. This theory states that advanced technology, such as AI, has dual potential, both for beneficial purposes and harm. The function of regulation is not only to prevent harm, but also to direct technology to a path that is consistent with ethical and legal

⁸⁹ Andry Setiawan et al., "The Urgency of Legal Profession Regulation Amidst The Integration of Artificial Intelligence," *Lex Scientia Law Review* 9, no. 2 (November 2025): 1484–516, <https://doi.org/10.15294/lslr.v9i2.26448>.

⁹⁰ Villegas-Ch et al., "Optimizing Automated Educational Systems."

⁹¹ Muh Rizal S et al., "Understanding Financial Risk Dynamics: Systematic Literature Review Inquiry into Credit, Market, and Operational Risks: (A Long-Life Lesson From Global Perspective to Indonesia Market Financial Strategy)," *Atestasi: Jurnal Ilmiah Akuntansi* 7, no. 2 (August 2024): 1186–213, <https://doi.org/10.57178/atestasi.v7i2.927>.

⁹² Zico Junius Fernando et al., "Robot Lawyer in Indonesian Criminal Justice System: Problems and Challenges for Future Law Enforcement," *Lex Scientia Law Review* 7, no. 2 (November 2023): 489–528, <https://doi.org/10.15294/lesrev.v7i2.69423>.

values.⁹³ Therefore, AI regulation must not only be preventive against misuse but also proactive in creating incentives for ethical innovation. The absence of binding regulations in Indonesia has caused many technology companies to operate in a legal gray area, allowing innovation to occur without accountability. The case of the leak of biometric data of users of digital applications equipped with AI for facial recognition is a clear illustration that AI can be used for commercial gain without adequate protection for citizens.⁹⁴ This dilemma requires a smart regulatory method. Law should not hinder technological growth, but must also prevent AI use from becoming a tool for crime or criminal activity. Indonesia requires a governance model that strengthens public trust in technology through independent oversight, algorithm audits, and community participation in a more inclusive policy process.⁹⁵

3. The Regulator's Dilemma: Between Prescriptive and Responsive

Law generally faces a methodological dilemma regarding AI regulation. An option includes prescriptive regulation, with detailed rules established before technological development. Another option is responsive regulation, with rules developed alongside technological change. Prescriptive regulation offers legal certainty but risks becoming obsolete quickly.⁹⁶ Responsive regulation supports utility and adaptation but may generate uncertainty for businesses and users. Philippe Nonet and Philip Selznick's theory of responsive law supports a legal framework responsive to social needs. Law functions not only as a mechanism of state authority but also as a means to balance rights, participation, and

⁹³ Corinne Cath, "Governing Artificial Intelligence: Ethical, Legal and Technical Opportunities and Challenges," *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 376, no. 2133 (October 2018): 20180080, <https://doi.org/10.1098/rsta.2018.0080>.

⁹⁴ Robert Walters, Leon Trakman, and Bruno Zeller, "Data Protection Law A Comparative Analysis of Asia Pacific and European Approaches," SSRN Scholarly Paper no. 3463731 (Rochester, NY: Social Science Research Network, October 1, 2019), <https://doi.org/10.2139/ssrn.3463731>.

⁹⁵ Rasyidah, Aksay, and Akmal, "Urgensi Pembuatan Regulasi Penggunaan AI (Artificial Intelligence) Di Indonesia."

⁹⁶ Patricia Gomes Rêgo de Almeida, Carlos Denner dos Santos, and Josivania Silva Farias, "Artificial Intelligence Regulation: A Framework for Governance," *Ethics and Information Technology* 23, no. 3 (September 2021): 505–25, <https://doi.org/10.1007/s10676-021-09593-z>.

innovation.⁹⁷ Responsive law theory remains relevant in AI regulation because technological development progresses faster than legislative processes. The Personal Data Protection Law covers data processing aspects that form the foundation of AI systems. The legal framework does not regulate algorithmic accountability, technological bias, or ethical oversight.⁹⁸

The dilemma faced by regulators in responding to the use of AI across Indonesia can be understood through the tension between prescriptive and responsive regulatory models. Prescriptive regulatory models set detailed, standardized, and binding rules for all possible scenarios and provide strong legal certainty. However, these models become rigid and difficult to adapt to rapid technological change in AI as a dynamic and disruptive field. Responsive regulatory models prioritize flexibility, adaptability, and openness to social dialogue and technological development. In this context, responsive law theory presents law as a mechanism of state control and a system that responds to social needs and changing values.⁹⁹ A practical regulatory recommendation includes a hybrid regulatory model that combines prescriptive rules based on minimum standards with a risk-based responsive framework. Government institutions can establish a national AI oversight agency with responsibilities covering certification, algorithm audits, ethical review of systems, data protection supervision, and evaluation of social impact. Implementation mechanisms include regulatory sandboxes, mandatory risk assessments, transparency requirements for AI use, and periodic reporting obligations for technology companies. Hybrid regulatory governance permits continuous technological development within the boundaries of legal accountability, human rights protection, data security, and sustained public interest.

The authority to oversee and regulate the implementation of digital technology normatively is more relevant to be under the Ministry of Komdigi. This institution has authority in the fields of digital transformation, technology infrastructure, data governance, and the national information ecosystem. Therefore, an AI regulation model can be implemented through the

⁹⁷ Krygier, "The Rule of Law and Its Rivals"; Philippe Nonet, Philip Selznick, and Robert A. Kagan, *Law and Society in Transition: Toward Responsive Law* (New York: Routledge, 2017), <https://doi.org/10.4324/9780203787540>.

⁹⁸ Sinta Dewi Rosadi, "Protecting Privacy on Personal Data in Digital Economic Era : Legal Framework in Indonesia," *Brawijaya Law Journal* 5, no. 1 (April 2018): 143–57, <https://doi.org/10.21776/ub.blj.2018.005.01.09>.

⁹⁹ Teja Sukmana, Zahrah Salsabillah Ashari, and Yadi Darmawan, "Responsive Law and Progressive Law: Examining the Legal Ideas of Philip Nonet, Philip Selznick, and Sadjipto Raharjo," *Peradaban Journal of Law and Society* 2, no. 1 (June 2023): 92–106, <https://doi.org/10.59001/pjls.v2i1.82>.

establishment of a special unit or agency under the ministry that functions to certify AI, audit algorithms, oversee personal data protection, and coordinate across sectors. This mechanism allows for the creation of regulations that are responsive to digital innovation while ensuring legal certainty, cybersecurity, human rights protection, and accountability in the use of AI in Indonesia.¹⁰⁰

A previous study by Adnan and Rahman (2022) showed the tendency for digital technology regulation in Indonesia to remain predominantly prescriptive, as evident by the Electronic Information and Transactions - ITE Law and several rigid communications sector regulations, including in the use of AI for content moderation and hoax detection. This prescriptive method fails to anticipate the exponential growth of AI applications, such as in health prediction systems, public service chatbots, and recommendation systems on digital platforms.¹⁰¹ According to studies by Han & Hu (2022) and Moraes (2024), the sandbox model was considered capable of balancing consumer protection and support for innovation.¹⁰² Similar methods have been widely adopted in the broader AI sector. For example, the case of AI utilization by a digital education platform that automatically assesses students without algorithmic transparency shows that the absence of a swift regulatory response leads to violations of the right to fair treatment, without any corrective mechanisms in place.¹⁰³

The dilemma can be explained through the smart regulation model proposed by Neil Gunningham, in which technological regulation combines government, industry, and civil society with command and control, incentive-based, and participatory legal strategies to achieve optimal results.¹⁰⁴ The balance between sovereignty, innovation, and protection of society remains under constant tension across multiple directions. In this study, the proposed model supports a non-monolithic legal structure, with dialogic and layered

¹⁰⁰ Sigfrids et al., "How Should Public Administrations Foster the Ethical Development and Use of Artificial Intelligence?"

¹⁰¹ Rahman et al., "Constructing Responsible Artificial Intelligence Principles as Norms."

¹⁰² Moraes, "Ethical AI Regulatory Sandboxes"; Tong et al., "The Sandbox Approach to FinTech Regulation"; Nicolas Petit and Jerome De Cooman, "Models of Law and Regulation for AI," in *The Routledge Social Science Handbook of AI* (Routledge, 2021).

¹⁰³ Maria Kasinidou et al., "Educating Computer Science Students about Algorithmic Fairness, Accountability, Transparency and Ethics," *Proceedings of the 26th ACM Conference on Innovation and Technology in Computer Science Education V. 1* (New York, NY, USA), ITiCSE '21, June 26, 2021, 484–90, <https://doi.org/10.1145/3430665.3456311>.

¹⁰⁴ Neil Gunningham, "Can Climate Activism Deliver Transformative Change? Extinction Rebellion, Business and People Power," in *From Student Strikes to the Extinction Rebellion* (Edward Elgar Publishing, 2020), 10–31, <https://doi.org/10.4337/9781800881099.00005>.

characteristics.¹⁰⁵ Government cannot depend solely on normative top-down regulation but must build a responsive space that allows continuous evaluation and correction. For example, the drafting of AI ethics regulations by Komdigi in 2023 took the form of a circular letter and showed a responsive orientation, but the instrument did not carry prescriptive legal authority that could enforce accountability. The dilemma between prescriptive and responsive methods should not be viewed as an absolute contradiction but as a need for proportional integration. Therefore, the law should not merely serve as a protective tool but also as an instrument guiding the ethical, fair, and sustainable development of AI.¹⁰⁶ Indonesia requires a high level of legal certainty for any proposed AI law. At the same time, any law must remain pragmatic and agile in a modern regulatory context. This provides a level of tension between technology innovators and the general community and government to be minimized. A key question concerns how Indonesia will develop laws for these technologies and which jurisdictions will inform legislative proposals.

AI Regulatory Formulation in Indonesia: The Middle Way Between Certainty and Utility

The formulation of AI regulations in Indonesia faces a major challenge in achieving a middle ground between two extremes, namely legal certainty and usability. Legal certainty requires clear, binding, and enforceable norms to ensure that AI users and developers understand limitations and responsibilities. Meanwhile, the utility of AI promotes flexibility and innovation to allow the technology to develop and provide maximum benefits to strategic sectors such as health, education, agriculture, and public administration. A regulatory method that is too prescriptive risks hindering technology adoption, while those that are too lax open the door to misuse and violations of individual rights. The formulation of AI regulations as a middle ground must combine a normative structure that ensures protection and fairness with adaptive mechanisms, allowing for a quick response to technological developments.¹⁰⁷ The Ministry of

¹⁰⁵ Falco et al., “Governing AI Safety through Independent Audits.”

¹⁰⁶ Lescrauwaet et al., “Adaptive Legal Frameworks and Economic Dynamics in Emerging Tech-Nologies.”

¹⁰⁷ Susser, “Invisible Influence.”

Communication and Information Technology, now Komdigi, drafted the 2023 AI ethics framework as an initial step in this direction, although the instrument remains soft law without binding force.

A previous study by Pratama et al. (2025) showed that the success of AI regulation was largely determined by the ability to create legal certainty without stifling technological usability. In the study, AI regulatory models in Europe (precautionary principle) were compared to those in Japan (regulatory sandboxes), and concluded that Indonesia should adopt a hybrid model.¹⁰⁸ The hybrid model combines a method based on ethical principles and human rights with limited experimentation space for technology developers through a sandbox mechanism. An example was evident in the steps taken by OJK in implementing a sandbox for AI-based financial technology, where innovations were tested in a controlled environment before being granted operational permits.¹⁰⁹ This method was adopted more broadly in other sectors that use AI, such as public services, agritech, and education systems. A study by Sargiotis (2024) showed the importance of multi-stakeholder participation in the AI policy formulation process, including the participation of academics, civil society, industry players, and people with disabilities who were vulnerable to algorithmic bias.¹¹⁰ This participation was to ensure that the law reflected not only the interests of the state or industry but also more inclusive and fair social values.¹¹¹

Theoretically, the middle ground between certainty and utility in AI regulation can be explained through the reflexive law theory method developed by Gunther Teubner. This theory explains law as a flexible, dynamic, and reflective mechanism of social interaction with socio-technological realities, rather than a vertical control instrument that imposes norms from the top

¹⁰⁸ Andistya Pratama, Dwi Ratna Indri Hapsari, and Listiyani Wulandari, "Bridging Regulation and Reality: Comparative Study of Artificial Intelligence Regulation in the Financial Sectors," *Legality: Jurnal Ilmiah Hukum* 33, no. 2 (April 2025): 307–33, <https://doi.org/10.22219/ljih.v33i2.38908>.

¹⁰⁹ Arief Fahruri et al., "Mapping the Research Landscape of Robo Advisor Adoption: A Bibliometric Analysis," *Journal of System and Management Sciences* 14, no. 1 (December 2023), <https://doi.org/10.33168/JSMS.2024.0103>.

¹¹⁰ Dimitrios Sargiotis, "Fostering Ethical and Inclusive AI: A Human-Centric Paradigm for Social Impact," SSRN Scholarly Paper no. 4879372 (Rochester, NY: Social Science Research Network, June 10, 2024), <https://papers.ssrn.com/abstract=4879372>.

¹¹¹ Sakiko Fukuda-Parr and Elizabeth Gibbons, "Emerging Consensus on 'Ethical AI': Human Rights Critique of Stakeholder Guidelines," *Global Policy* 12, no. S6 (2021): 32–44, <https://doi.org/10.1111/1758-5899.12965>.

down.¹¹² Reflexive law does not issue direct commands but promotes social actors (AI developers, regulators, users) to formulate standards and evaluation mechanisms based on the general values established by law.¹¹³ This method is suitable for the complex, rapidly changing, and multidimensional context of AI. Systematically, the dilemma between legal certainty and legal utility in AI regulation can be examined through Gunther Teubner's reflexive law theory by analyzing the tension between rigid legal control and flexible technological innovation. Reflexive law explains that overly prescriptive regulation may hinder innovation, while excessive flexibility risks legal uncertainty and human rights violations. Therefore, adaptive governance, self-regulation, ethical oversight, and participatory accountability become essential mechanisms for balancing innovation, legal protection, and social interests in rapidly evolving AI ecosystems.¹¹⁴ The middle ground is not a weak compromise but a smart regulatory method that harmoniously combines legal certainty and the utility of AI for justice and sustainable technological progress.

Addressing the dilemma between certainty and utility required a hybrid regulatory method, combining hard and soft law, such as legislation, ethical guidelines, technical standards, and AI governance frameworks.¹¹⁵ Some steps can be taken, including (1) the establishment of a National AI Authority, an independent body that oversees the development and application of AI to ensure consistency with principles of fairness, accountability, and transparency.¹¹⁶ (2) Risk-based regulation, where not all AI applications require strict oversight. Systems with significant impact on fundamental human rights, including judicial and health, require strict regulation, while low-risk systems follow technical standards.¹¹⁷ (3) Digital ethics as a normative guide, where Pancasila values, human rights principles, religious norms, and societal norms in Indonesia form the basis for a national AI code of ethics that complements legal

¹¹² Gunther Teubner, "My Numerous Detours – Toward Private Law as Society's Constitution," *Zeitschrift Für Rechtssoziologie* 44, no. 1 (May 2024): 213–40, <https://doi.org/10.1515/zfrs-2023-1006>.

¹¹³ Ubilla, "Legal Forms and Reflexive Legal Forms."

¹¹⁴ Anna Lena Hunkenschroer and Christoph Luetge, "Ethics of AI-Enabled Recruiting and Selection: A Review and Research Agenda," *Journal of Business Ethics* 178, no. 4 (July 2022): 977–1007, <https://doi.org/10.1007/s10551-022-05049-6>.

¹¹⁵ Eleanore Hickman and Martin Petrin, "Trustworthy AI and Corporate Governance: The EU's Ethics Guidelines for Trustworthy Artificial Intelligence from a Company Law Perspective," *European Business Organization Law Review* 22, no. 4 (December 2021): 593–625, <https://doi.org/10.1007/s40804-021-00224-0>.

¹¹⁶ Falco et al., "Governing AI Safety through Independent Audits."

¹¹⁷ Martin Ebers, "Truly Risk-Based Regulation of Artificial Intelligence How to Implement the EU's AI Act," *European Journal of Risk Regulation* 16, no. 2 (June 2025): 684–703, <https://doi.org/10.1017/err.2024.78>.

regulation.¹¹⁸ (4) Multistakeholder engagement, where AI regulation is developed through the participation of academics, industry actors, civil society, and vulnerable groups affected by algorithmic discrimination.¹¹⁹ Therefore, the formulation of AI regulations in Indonesia to support the vision and mission of Golden Indonesia 2045 is regulatory and uses a hybrid risk-based method. This regulation combined binding legal rules with flexible mechanisms, such as regulatory sandboxes, algorithm audits, and ethical guidelines. Legal certainty is realized through accountability standards and rights protection. Utility is achieved through support for innovation, technology adaptation, and the sustainable development of the national digital economy.

Conclusion

In conclusion, the dilemma between legal certainty and legal utility in regulating AI in Indonesia should not be resolved by prioritizing one principle over the other. A hybrid and reflexive regulatory model that integrates legal protection with adaptive innovation governance can become very useful. Indonesia should adopt a responsive AI regulatory framework that combines hard law mechanisms, such as binding obligations on accountability, transparency, data protection, algorithmic audits, and human rights safeguards, with soft law instruments, including ethical guidelines, industry self-regulation, regulatory sandboxes, and adaptive governance standards. This method reflects Gunther Teubner's reflexive law theory, where law functions not only as a rigid command structure but as a dynamic mechanism capable of guiding technological development while accommodating social and economic transformation. Furthermore, the method allows law and technology to play a strategic role as facilitators of innovation and protectors of public interests. In a final salutary point, these efforts contribute to the responsible, fair, and sustainable use of AI, consistent with the national digital transformation vision outlined in the Golden Indonesia 2045 Vision to become a mature nation in science, technology, innovation, and digital transformation.

Operationally, Indonesia should direct AI regulation toward a risk-based governance model supervised by Komdigi through a specialized national AI oversight body responsible for certification, ethical audits, algorithmic

¹¹⁸ Nugroho, "Artificial Intelligence Regulation and Political Ethics."

¹¹⁹ Fukuda-Parr and Gibbons, "Emerging Consensus on 'Ethical AI.'"

accountability, and regulatory evaluation. The implementation of regulatory sandboxes is necessary to facilitate innovation while ensuring proportional supervision and public protection. In this context, legal certainty is maintained through clear legal standards and institutional accountability. Meanwhile, legal utility is achieved through technological flexibility, economic growth, digital investment, public service efficiency, and national competitiveness. This model is particularly relevant to support the realization of Golden Indonesia 2045 by strengthening digital transformation, technological sovereignty, and sustainable AI governance aligned with ASEAN (Association of Southeast Asian Nations) legal harmonization and democratic values. Future studies need to delve deeper into the effectiveness of AI regulatory sandbox implementation in Indonesia, particularly concerning oversight mechanisms, human rights protection, and algorithm accountability in cross-sector practices. There is also a need to analyze the institutional readiness of Komdigi in carrying out the national AI oversight function, including inter-agency coordination, digital human resource capacity, and regulatory harmonization with the countries of ASEAN members.

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All authors declared that this work is original and has never been published in any form and in any media, nor is it under consideration for publication in any journal, and all sources cited in this work refer to the basic standards of scientific citation.

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