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Artificial Intelligence in Public Governance: Ethical Opportunities and Challenges in Indonesia's Digital Transformation

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Abstract

Purpose: This study investigates the ethical opportunities and challenges of Artificial Intelligence (AI) adoption in Indonesia's public governance, where digital transformation has become a central agenda. It explores how global AI governance frameworks can be contextualized for developing countries with fragmented institutions, regulatory gaps, and limited capacities.

Design/methodology/approach: A systematic literature review (SLR) was conducted using Scopus, Web of Science, IEEE Xplore, ACM Digital Library, SpringerLink, and Google Scholar. Publications from 2020 to August 2025 were screened through PRISMA procedures, yielding 45 eligible studies. An adapted Critical Appraisal Skills Programme (CASP) tool was applied for quality assessment. Data were synthesized thematically across governance dimensions: accountability, lifecycle governance, regulation and standards, transparency and explainability, inclusivity and equity.

Findings: The review identifies both opportunities and risks of AI in Indonesia's public sector. Opportunities include bureaucratic efficiency, transparency, and citizen-centric services. However, challenges remain: algorithmic bias, data privacy risks, unequal digital access, and regulatory fragmentation. Comparative analysis shows that while developed nations employ enforceable technical standards and independent oversight, Indonesia's governance mechanisms remain largely normative and under-implemented.

Practical implications: The study proposes a governance checklist tailored to Indonesia, emphasizing multi-level accountability, lifecycle monitoring, algorithmic audits, and participatory oversight. These findings inform policy reforms for Indonesia's National AI Strategy (Stranas KA) and support more equitable, transparent, and accountable public sector innovation.

Originality/value: This article contributes by contextualizing global AI governance frameworks within a Southeast Asian developing country, bridging the knowledge gap between normative principles and enforceable practices. It highlights pathways for adaptive governance in resource-constrained settings, with implications for scholars, policymakers, and practitioners.

Keywords: Artificial intelligence, governance, ethics, public administration, Indonesia.

INTRODUCTION

Digital transformation has emerged as a defining feature of contemporary governance, reshaping how governments deliver services, make decisions, and interact with citizens. Within this transformation, Artificial Intelligence (AI) has been increasingly recognized as a catalyst for innovation in the public sector. From predictive analytics in healthcare to intelligent transport management systems and automated citizen services, AI technologies promise to improve efficiency, enhance transparency, and personalize governance outcomes (Mikalef & Gupta, 2021; Neumann et al., 2024). Governments across the globe are integrating AI into strategic policy frameworks, viewing it not only as a technological advancement but also as a driver of institutional modernization and economic competitiveness (Aneta et al., 2025).

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In developed contexts, such as Singapore, the United Kingdom, and the European Union, AI has been embedded within national strategies supported by ethical guidelines, regulatory frameworks, and oversight bodies (Desouza & Bhagwatwar, 2022; European Commission, 2021). Singapore's Smart Nation initiative and the United Kingdom's adoption of algorithmic transparency standards illustrate how advanced economies leverage AI to enhance accountability and build trust. These nations also emphasize participatory governance and public consultation, ensuring that AI deployment aligns with democratic values and societal expectations.

However, the picture is considerably different in developing countries. Limited technical capacity, fragmented regulation, bureaucratic inertia, and social inequalities hinder effective AI governance (Janowski et al., 2021; Cheng et al., 2023). For many low- and middle-income countries, AI adoption occurs within environments characterized by uneven digital infrastructure, weak institutional capacity, and underdeveloped legal safeguards. These conditions create risks of exacerbating digital divides, reinforcing algorithmic bias, and undermining public trust if AI systems are deployed without robust governance mechanisms.

Indonesia exemplifies this tension between opportunity and risk. As the fourth most populous country in the world and a rapidly digitizing economy, Indonesia has embraced AI within its national development agenda. The government launched the National Artificial Intelligence Strategy (Stranas KA 2020–2045) under the "Making Indonesia 4.0" framework, prioritizing sectors such as healthcare, education, public services, and mobility (Government of Indonesia, 2020), This is to achieve the government's expectations regarding the implementation of e-Government (Tohopi & Hulinggi, 2023). The strategy envisions AI as a cornerstone of digital transformation, capable of enhancing service delivery and improving bureaucratic efficiency. Complementing this, the Ministry of Communication and Information Technology issued Circular Letter No. 9/2023, outlining initial ethical guidelines for AI.

Despite these initiatives, the implementation of AI governance in Indonesia remains fragmented. As highlighted by Nugroho et al. (2023) and Santoso et al. (2024), this fragmentation stems from overlapping ministerial mandates, limited enforcement capacity, and the absence of a unified data protection authority. Unlike Singapore or the EU, Indonesia has yet to establish enforceable technical standards such as algorithmic audits, explainability requirements, or independent oversight mechanisms. Instead, governance remains largely normative, relying on policy visions without robust enforcement or institutional capacity. This raises questions about the extent to which global governance frameworks designed primarily for advanced economies can be meaningfully adapted to the Indonesian context.

Existing scholarship on AI governance has predominantly focused on developed nations, leaving a significant knowledge gap regarding how developing countries, particularly in Southeast Asia, are responding to the ethical and regulatory challenges of AI. Comparative studies often highlight best practices from the Global North but provide limited analysis of how these practices can be contextualized for countries with different institutional, cultural, and socio-economic conditions (Batool et al., 2025). As a result, there is limited empirical evidence on whether the principles of accountability, transparency, and inclusivity—commonly emphasized in global frameworks—translate effectively in environments marked by digital inequality and weak institutional capacity.

This article seeks to address this gap by systematically reviewing the ethical opportunities and challenges of AI adoption in Indonesia's public governance. By synthesizing 45 peer-reviewed

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studies and policy documents published between 2020 and 2025, the research highlights governance dimensions critical to responsible AI: stakeholder accountability, lifecycle governance (ex ante, in-use, ex post), regulation and standards, transparency and explainability, and inclusivity and equity. It also explores enabling factors such as Indonesia's national AI strategy and emerging ethical guidelines, alongside barriers including regulatory fragmentation, algorithmic bias, and limited institutional resources.

The significance of this study lies in its contribution to both theory and practice. Theoretically, it contextualizes global AI governance frameworks for developing countries, offering insights into how principles such as transparency, fairness, and accountability can be operationalized in resource-constrained settings. Practically, it provides tailored policy recommendations for Indonesia, including the establishment of enforceable technical standards, hybrid governance models integrating legal, technical, and participatory mechanisms, and stronger multi-stakeholder engagement. These recommendations aim to support the Indonesian government in refining its AI governance framework while also contributing to broader debates on digital transformation in the Global South.
Accordingly, this study addresses two central research questions:

1. What are the ethical opportunities and challenges of AI adoption in Indonesia's public governance?
2. How can AI governance frameworks addressing who, what, when, and how be contextualized for Indonesia's socio-political and institutional environment?

In this study, lifecycle governance refers to a comprehensive approach that embeds accountability, transparency, and ethical safeguards throughout the entire AI system lifecycle from design and data acquisition (ex ante), to deployment and monitoring (in use), and post-implementation evaluation (ex post). Meanwhile, hybrid governance denotes the integration of legal, technical, and participatory mechanisms that collectively ensure ethical compliance and adaptive oversight in dynamic policy environments.

By engaging these questions, the article not only expands the academic literature on AI governance in developing contexts but also informs policymakers and practitioners seeking to design adaptive, equitable, and transparent governance systems. The findings are particularly relevant at a time when Indonesia and other ASEAN countries are accelerating digital transformation, raising urgent questions about how to ensure that AI-driven governance enhances rather than undermines democratic legitimacy and social equity.

LITERATURE REVIEW

1. AI in Public Governance: Global Developments

Artificial Intelligence (AI) has been widely heralded as a game changer in modern governance. The ability of AI to process vast datasets, recognize patterns, and provide predictive insights has enabled governments to reimagine service delivery, decision-making, and regulatory oversight. Applications include chatbots for administrative services, predictive analytics for public health, smart mobility systems, fraud detection in taxation, and automated social service assessments (Neumann et al., 2024).

Countries such as Singapore, the United Kingdom, Canada, and the European Union have taken proactive steps to institutionalize AI governance within their public administration. Singapore's Smart

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Nation strategy includes AI applications in transport management, digital identity, and personalized citizen services, supported by the Model AI Governance Framework launched in 2020. Similarly, the UK has introduced transparency standards for algorithmic decision-making and established the Centre for Data Ethics and Innovation (CDEI) as an independent oversight body (Desouza & Bhagwatwar, 2022). The European Union's Artificial Intelligence Act, proposed in 2021, sets harmonized rules for risk-based AI regulation, including requirements for high-risk systems such as biometric identification, healthcare, and critical infrastructure (European Commission, 2021).

These global developments illustrate the dual movement of AI in governance: technological adoption accompanied by ethical and regulatory frameworks. Advanced economies emphasize not only efficiency gains but also accountability, fairness, and citizen trust. This alignment between innovation and governance safeguards reflects lessons from earlier waves of digital transformation, where technological adoption without adequate regulation often generated social risks and inequalities.

2. Ethical Challenges: Bias, Privacy, and the Digital Divide

Despite the promises of efficiency and innovation, AI in governance introduces significant ethical challenges. One of the most pressing issues is **algorithmic bias**. Since AI models are trained on historical data, they may replicate or even amplify existing social inequalities. For example, predictive policing algorithms in the United States have been found to disproportionately target minority communities (Almasoud & Idowu, 2024). Similarly, automated education assessments risk disadvantaging students from underrepresented backgrounds if training data lacks diversity (Mehrabi et al., 2021).

Another major challenge is **data privacy**. Public sector AI applications often rely on sensitive personal information, from health records to biometric identifiers. Without robust safeguards, mass data collection may lead to surveillance overreach, unauthorized data sharing, or security breaches (Wirtz et al., 2022a). This is especially concerning in contexts where data protection laws are underdeveloped or poorly enforced.

A third ethical concern is the **digital divide**. The benefits of AI-driven governance are not equally distributed. Urban populations with better internet connectivity and higher digital literacy may enjoy advanced services, while rural or marginalized communities face exclusion (Cheng et al., 2023). This inequality not only undermines the legitimacy of AI adoption but also risks exacerbating existing socio-economic disparities. In developing countries, where infrastructural gaps remain significant, the digital divide is a central governance issue that cannot be ignored.

3. Comparative Perspectives: Developed vs. Developing Countries

The divergence between developed and developing contexts is a recurring theme in AI governance. In developed nations, regulatory frameworks emphasize accountability, transparency, fairness, and explainability. Singapore has established an AI Ethics and Governance Advisory Council, while the UK mandates algorithmic transparency audits across government agencies (Desouza & Bhagwatwar, 2022). The EU's risk-based regulatory model further reflects an institutionalized approach that balances innovation with societal safeguards (European Commission, 2021).

By contrast, developing countries face challenges of limited infrastructure, insufficient digital literacy, and fragmented regulatory frameworks. Studies highlight that in these contexts, AI adoption often outpaces governance mechanisms, resulting in risks such as unchecked bias, weak accountability,

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and limited citizen participation (Janowski et al., 2021). Indonesia, for example, has developed the National AI Strategy (Stranas KA 2020–2045), signaling a strong policy vision. However, implementation remains hampered by bureaucratic fragmentation, resource constraints, and the absence of enforceable technical standards (Nugroho et al., 2023).

This contrast underscores the importance of contextualizing AI governance. Best practices from advanced economies cannot be directly transplanted into developing settings without considering local socio-political realities. For instance, while algorithmic transparency audits may be feasible in the UK due to independent oversight institutions, similar mechanisms may be difficult to establish in contexts where regulatory agencies lack capacity or political independence.

4. Governance Frameworks for AI

Scholars and policymakers have proposed multiple frameworks to guide ethical and effective AI adoption. Batool et al. (2025) outline a **four-dimensional model** addressing:

a) **Who** is responsible for AI outcomes (e.g., government, public agencies, private developers, civil society).

b) **What** should be regulated (e.g., fairness, transparency, privacy, technical standards).

c) **When** regulation should occur (e.g., ex ante design, in-use monitoring, ex post evaluation).

d) **How** governance should be implemented (e.g., legal frameworks, technical standards, participatory oversight).

Floridi (2020) emphasizes that transparency, accountability, fairness, and privacy form the ethical pillars of AI governance. Wirtz et al. (2022) propose a risk- and guideline-based integrative framework that incorporates legal, technical, and organizational dimensions. Similarly, UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021) highlights inclusivity, human rights, and cultural diversity as global guiding principles. In Southeast Asia, ASEAN has recently developed the *Guide on AI Governance and Ethics* (ASEAN, 2024), emphasizing regional collaboration, harmonization of standards, and capacity building. However, the translation of these frameworks into actionable policies remains uneven. Many countries in the region, including Indonesia, still lack comprehensive data protection laws, independent oversight institutions, and mechanisms for public participation in AI policymaking.

The literature therefore suggests that while global frameworks provide valuable benchmarks, their effectiveness in developing contexts depends on adaptive governance. This requires hybrid models that combine legal frameworks with technical standards and participatory mechanisms. Importantly, governance must be lifecycle-based, addressing AI systems from design to deployment and evaluation.

METHODOLOGY

1. Research Design

This study adopts a **Systematic Literature Review (SLR)** approach to synthesize existing knowledge on AI governance in public administration. SLR is particularly suitable for emerging topics such as AI governance, where conceptual fragmentation and diverse methodological approaches

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require a structured synthesis (Snyder, 2019). By applying a transparent and replicable protocol, SLR reduces bias, ensures comprehensiveness, and enables cross-study comparison.

The review follows the **PRISMA 2020** (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which provides detailed guidelines for systematic reviews in social science and interdisciplinary fields (Page et al., 2021). The PRISMA flow diagram was used to document identification, screening, eligibility, and inclusion stages.

2. Search Strategy

A comprehensive search was conducted across major scholarly databases:

1) Scopus
2) Web of Science (WoS)
3) IEEE Xplore
4) ACM Digital Library
5) SpringerLink
6) ScienceDirect
7) Google Scholar (for complementary coverage, including grey literature)

The search period was restricted to **1 January 2020 – 31 August 2025** to capture the most recent developments in AI governance, coinciding with the surge of national AI strategies and ethical guidelines worldwide.

Boolean strings combined terms such as:

- ("artificial intelligence" OR "AI" OR "machine learning")
  AND
- ("public governance" OR "public administration" OR "public sector" OR "government")
  AND
- (ethic* OR regulation OR governance OR accountability OR bias OR privacy OR transparency)
  AND
- (Indonesia OR "developing country" OR ASEAN)
  This combination ensured the retrieval of studies addressing AI governance both globally and within the Indonesian and Southeast Asian contexts.

3.Inclusion and Exclusion Criteria

To ensure relevance and quality, strict inclusion and exclusion criteria were applied:

Inclusion criteria:

a) Peer-reviewed journal articles, conference papers, or official policy documents.
b) Published between 2020 and 2025.
c) Focus on governance, ethics, regulation, or policy of AI in the public sector.
d) Available in English or Bahasa Indonesia.
e) Methodological diversity allowed (empirical, theoretical, case study, review, policy analysis).

Exclusion criteria:

a) Articles focusing exclusively on private sector or commercial applications of AI.
b) Studies with purely technical discussions (e.g., algorithm design) without governance/ethical relevance.

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c) Non-scholarly opinion pieces without empirical or theoretical grounding.
d) Publications before 2020.

4. Screening and Selection Process

All retrieved records were imported into reference management software (Zotero and Mendeley). After automatic and manual duplicate removal (~350 records), two independent reviewers conducted **title and abstract screening** for relevance. Studies that passed screening underwent **full-text review**. Disagreements were resolved through discussion until consensus was achieved.

From an initial pool of **2,500 records**, approximately **2,150** remained after duplicate removal. Following screening, **120 articles** were assessed in full text, resulting in **45 studies** that met all inclusion and quality criteria.

The **PRISMA flow diagram** (presented in the Results section) visually documents this process, ensuring transparency and replicability.

5. Quality Appraisal

To assess the methodological rigor of included studies, an adapted version of the **Critical Appraisal Skills Programme (CASP)** tool was applied. Key appraisal dimensions included:

a) Clarity of aims and research questions.
b) Appropriateness of methodology and design.
c) Transparency in data collection and analysis.
d) Consideration of bias and limitations.
e) Relevance to AI governance and ethics.

Each study was independently scored by two reviewers (high, medium, or low quality). Only studies with **medium or high quality** were included in the synthesis. In borderline cases, a third reviewer was consulted.

6. Data Extraction and Synthesis

For each included study, the following information was extracted into a structured data matrix:

- Author(s), year, country/region.
- Domain of application (health, mobility, e-government, policy).
- Governance mechanisms discussed (regulation, accountability, transparency, inclusivity).
- Ethical issues addressed (bias, privacy, equity, digital divide).
- Lifecycle stage(s) of AI considered (ex ante, in-use, ex post).
- Stakeholder roles (government, agencies, civil society, private sector).
- Evidence type (empirical, theoretical, case-based, policy analysis).

The data were analyzed using **thematic synthesis**. Codes were developed inductively, clustered into broader categories, and mapped onto the four governance dimensions: **Who, What, When, How** (Batool et al., 2025). Comparative analysis was also conducted to identify differences between developed and developing country contexts, with a focus on Indonesia and ASEAN.

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RESULTS

1. Overview of Included Studies

The systematic review identified **45 studies** published between 2020 and August 2025 that met the inclusion criteria. These studies represent a diverse set of methodologies, including empirical case studies, policy analyses, theoretical frameworks, and systematic reviews. The geographic scope of included studies is predominantly from developed contexts (Europe, North America, Singapore, UK), but a growing number of contributions focus on developing and middle-income countries, including Indonesia, India, Brazil, and selected ASEAN states.

Thematically, the studies addressed three clusters:

1. **Governance mechanisms** (regulation, accountability, transparency, inclusivity).
2. **Ethical challenges** (bias, privacy, digital divide, fairness).
3. **Implementation practices** (national strategies, institutional capacities, participatory models).

These findings confirm the fragmented yet rapidly evolving nature of AI governance literature.

2. PRISMA Flow of Study Selection

The PRISMA process illustrates the transparency of study selection:

- Records identified through database searching: **2,500**
- Duplicates removed: **~350**
- Records after duplicate removal: **2,150**
- Title and abstract screening: **2,150**
- Full-text assessed for eligibility: **120**
- Studies included in synthesis: **45**

This progression highlights the rigor of the screening process, where only about **1.8%** of the initial pool qualified for final synthesis. The high exclusion rate reflects both the rapid proliferation of technical AI studies without governance focus and the scarcity of empirical analyses in Southeast Asia.

3. Thematic Dimensions of AI Governance

These dimensions were not derived from a single framework but synthesized from multiple studies, ensuring that both global and developing-country perspectives are represented. The synthesis revealed **four key governance dimensions** that structure the global discourse on AI in public governance. These are summarized in **Table 1** below.

These dimensions provide a holistic framework that balances normative principles with actionable mechanisms. To organize the findings, the reviewed studies were coded thematically according to the "Who, What, When, and How" framework proposed by Batool et al. (2025). Each dimension was further refined through cross-comparison of the 45 included studies. Table 1 summarizes these synthesized dimensions along with illustrative sources that best represent each category.

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Table 1. AI Governance Dimensions and Key Findings

Dimension	Key Findings	Example Sources
Who	Governance requires multi-level responsibility: central governments for regulation, public agencies for implementation, private sector for innovation, and civil society for oversight.	Batool et al. (2025); Neumann et al. (2024)
What	Regulation must address ethics (fairness, transparency, privacy), technical processes (data governance, bias audits, explainable AI), and social outcomes (trust, equity).	Wirtz et al. (2022a); Mehrabi et al. (2021)
When	Governance must be lifecycle-based: ex ante (design and validation), in-use (monitoring, audits), ex post (impact evaluation, reskilling).	Adams (2023); Papagiannidis et al. (2025)
How	Effective governance combines legal frameworks, technical standards, and participatory oversight in hybrid models.	Floridi (2020); Almasoud & Idowu (2024)

Source: Analysis of AI Governance Dimensions and Key Findings

4. Indonesia in Comparative Perspective

The synthesis shows that Indonesia has made progress by launching the **National AI Strategy (Stranas KA 2020–2045)**and introducing preliminary ethical guidelines (Circular Letter No. 9/2023). However, the implementation gap remains substantial. Compared with Singapore's enforceable AI governance framework or the EU's legally binding Artificial Intelligence Act, Indonesia's framework is still at the **policy vision stage**.

Key limitations identified in the literature include:

- Absence of **binding technical standards** such as algorithmic audits.
- Weak enforcement of **data protection laws**.
- Limited capacity in government agencies to evaluate and monitor AI systems.
- Fragmentation across ministries and agencies, with overlapping mandates.
- Risks of widening **digital inequality** due to uneven access.

Nevertheless, opportunities exist. Indonesia can leverage its demographic advantage, growing digital economy, and regional frameworks such as the ASEAN Guide on AI Governance and Ethics (ASEAN, 2024) to strengthen its AI governance ecosystem.

5. Governance Checklist

From thematic synthesis, a **governance checklist** was developed to guide public agencies adopting AI. This is presented in **Table 2** below.

Building upon the thematic synthesis and comparative analysis, this study develops a governance checklist tailored to Indonesia's public sector. The checklist integrates key principles from major AI governance frameworks (Batool et al., 2025; Wirtz et al., 2022a; Floridi, 2020; UNESCO, 2021) and adapts them to the contextual realities of Indonesia's public administration. It is therefore a novel, author-developed synthesis designed to guide policymakers in implementing responsible and inclusive AI governance practices. This checklist is not prescriptive but offers a practical guide for Indonesian policymakers to contextualize global best practices.

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Table 2. Proposed Governance Checklist for AI in the Public Sector

Element	Description
Accountability & Responsibility	Clear roles for central authorities, agencies, private developers, and oversight bodies.
Lifecycle Governance	Mechanisms for ex ante validation, in-use monitoring, and ex post evaluation.
Regulation & Legal Frameworks	Existence of binding regulations, certification systems, and enforcement capacity.
Transparency & Explainability	Mechanisms for algorithmic explainability, documentation, audits, and disclosure.
Inclusivity & Equity	Measures to mitigate bias, ensure fairness, and extend benefits to marginalized groups.
Privacy & Data Protection	Strong safeguards for data rights, consent, and cybersecurity.
Ethical Values Integration	Embedding principles of dignity, fairness, and accountability into design and deployment.
Institutional Capacity	Availability of technical expertise, resources, and infrastructure.
Monitoring & Evaluation	Ongoing oversight with measurable indicators and remediation processes.
Stakeholder Engagement	Regular consultations with civil society, academia, and private sector actors.

Note: Developed by the authors based on synthesis of global AI governance frameworks (Batool et al., 2025; Wirtz et al., 2022a; Floridi, 2020; UNESCO, 2021) and contextual adaptation to Indonesia's institutional and policy environment.

6. Key Findings Summary

This checklist is not directly adopted from existing frameworks but represents a contextual adaptation of globally recognized principles. It aims to operationalize ethical AI governance within Indonesia's public administration, balancing legal enforceability with institutional capacity and participatory oversight. Overall, the results highlight three major insights:

1. **Global vs Local Gap**- While global governance frameworks emphasize enforceability, transparency, and fairness, Indonesia's governance remains aspirational and under-institutionalized.
2. **Lifecycle Importance** -AI governance cannot be restricted to post-deployment interventions. Effective safeguards must be embedded across design, deployment, and evaluation stages.
3. **Hybrid Governance Model** – Legal frameworks alone are insufficient. Effective governance requires a combination of laws, technical standards, and participatory oversight.

These insights collectively highlight the structural and ethical dimensions that shape AI governance in Indonesia. Building on these findings, the following discussion interprets their implications through the lens of collaborative governance theory, emphasizing how shared accountability can bridge existing policy gaps.

DISCUSSION

1. Reinterpreting AI Governance Through Collaborative Governance Theory

The results demonstrate that effective AI governance in the public sector requires distributed responsibility among multiple stakeholders, including government agencies, private sector actors,

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civil society, and international bodies. This aligns with **collaborative governance theory**, which emphasizes joint problem-solving, interdependence, and shared accountability in addressing complex societal issues (Ansell & Gash, 2008).

AI governance is inherently a **multi-actor, multi-level challenge**. National governments may design overarching strategies, but implementation occurs across agencies with varying capacities, while oversight often requires civil society participation to ensure legitimacy. In the Indonesian case, this distributed governance remains underdeveloped. Ministries and agencies operate in silos, leading to fragmented initiatives rather than coordinated action. Collaborative governance theory suggests that Indonesia must establish institutionalized mechanisms for cross-sectoral coordination and stakeholder consultation.

2. Global Best Practices and the Indonesian Gap

The comparative analysis highlights stark differences between developed and developing contexts. In **Singapore**, AI governance benefits from strong state capacity, centralized coordination, and an explicit emphasis on trust-building through transparent frameworks such as the *Model AI Governance Framework*. Similarly, the **United Kingdom** has institutionalized algorithmic transparency audits and established the *Centre for Data Ethics and Innovation* as an independent body. The **European Union**'s Artificial Intelligence Act further illustrates how binding regulations can provide clarity and enforcement across member states.

By contrast, Indonesia's governance mechanisms remain largely aspirational. The **National AI Strategy (Stranas KA 2020–2045)** articulates long-term goals but lacks enforceable standards and monitoring mechanisms. Circular Letter No. 9/2023 provides ethical guidelines, but compliance is voluntary, and enforcement is weak. The comparison underscores a persistent **implementation gap**: while developed countries operationalize governance principles through binding instruments and independent oversight, Indonesia remains at the stage of policy visioning.

This gap is not merely technical but institutional. Indonesia faces limited bureaucratic capacity, overlapping mandates among ministries, and political fragmentation that hampers policy coherence. Unlike Singapore's streamlined governance structure, Indonesia's decentralized system complicates national-level coordination.

It is also important to acknowledge counterarguments suggesting that overly rigid governance frameworks could stifle innovation and slow AI adoption. However, the proposed hybrid governance model aims to balance ethical safeguards with innovation flexibility, ensuring that accountability mechanisms do not inhibit experimentation and adaptive policy learning.

3. Ethical Dilemmas in the Indonesian Context

The Indonesian context illustrates how ethical dilemmas manifest differently in developing countries:

- **Algorithmic Bias**: Predictive models risk reproducing socio-economic inequalities, particularly in education and healthcare, where disparities are already pronounced. Without bias audits or diverse datasets, AI may reinforce rather than reduce inequity.
- **Data Privacy**: The absence of comprehensive data protection legislation exposes citizens to risks of misuse and surveillance. This is compounded by weak enforcement capacity and limited public awareness of digital rights.

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- **Digital Divide**: Unequal access to internet infrastructure and digital literacy means that AI-driven services disproportionately benefit urban elites, marginalizing rural populations.

These dilemmas require context-sensitive responses. For example, while transparency audits may be feasible in the UK, Indonesia must first address basic infrastructural inequalities and establish baseline legal protections for data privacy.

4. The Case for Lifecycle Governance

One of the most important findings is the necessity of **lifecycle governance**, whereby safeguards are embedded across the entire AI lifecycle:

- **Ex ante (design phase):** Ensuring diverse datasets, ethical impact assessments, and stakeholder consultations before deployment.
- **In-use (deployment):** Continuous monitoring, algorithmic audits, and transparency mechanisms to detect unintended consequences.
- **Ex post (post-deployment):** Impact evaluation, redress mechanisms, and capacity-building programs for affected communities.

Indonesia's current approach tends to emphasize ex post interventions, often reacting to problems after they arise rather than proactively preventing risks. Embedding lifecycle governance would shift AI policy from reactive to preventive, aligning with international best practices and reducing systemic risks.

5. Hybrid Governance as a Path Forward

The literature and results indicate that **hybrid governance models**—integrating legal frameworks, technical standards, and participatory oversight—are the most effective approach to AI governance. For Indonesia, this means combining:

1. **Legal Instruments:** Establishing binding regulations on algorithmic transparency, data protection, and accountability.
2. **Technical Standards:** Requiring algorithmic audits, explainability protocols, and certification systems for high-risk applications.
3. **Participatory Mechanisms:** Institutionalizing consultation with civil society, academia, and affected communities to ensure inclusivity and legitimacy.

Hybrid governance addresses the limitations of relying solely on top-down regulation, especially in contexts with limited enforcement capacity. By involving multiple stakeholders, it distributes responsibility and enhances both legitimacy and effectiveness.

For example, lifecycle-based monitoring can be applied to Indonesia's national e-Government initiatives such as the digital ID and e-KTP systems, where algorithmic audits could ensure fairness and prevent exclusion. Participatory oversight could be implemented through civil society involvement in evaluating AI-based public service platforms, fostering transparency and citizen engagement.

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6. Implications for Indonesia's National AI Strategy

The findings of this study directly complement the five pillars of Indonesia's National AI Strategy (Stranas KA 2020–2045), particularly the pillars on governance and ethics and ecosystem and talent development. The proposed governance checklist aligns with these pillars by operationalizing ethical standards through enforceable regulations, capacity building for public institutions, and participatory mechanisms that enhance citizen trust.

The study's findings have direct implications for the refinement of **Indonesia's National AI Strategy (Stranas KA)**. First, the strategy must move beyond aspirational goals to operational frameworks. This includes the adoption of measurable indicators, monitoring mechanisms, and independent oversight structures. Second, the strategy should prioritize inclusivity, ensuring that AI adoption reduces rather than exacerbates inequality. Third, capacity-building is essential. Without trained personnel, robust infrastructure, and adequate funding, even the most sophisticated governance frameworks will remain on paper.

Regional collaboration through ASEAN also presents opportunities. The **ASEAN Guide on AI Governance and Ethics (2024)** can serve as a regional benchmark for harmonizing standards, facilitating knowledge exchange, and building collective capacity. For Indonesia, alignment with ASEAN frameworks not only strengthens domestic governance but also enhances regional competitiveness.

7. Theoretical and Practical Contributions

Theoretically, the findings contribute to the contextualization of global AI governance frameworks for developing countries. While principles such as transparency, accountability, and fairness are universal, their operationalization must reflect local institutional realities. This study demonstrates that governance models developed in advanced economies cannot be transplanted wholesale; instead, they must be adapted through hybrid and lifecycle approaches that account for infrastructural gaps and socio-political constraints.

Practically, the governance checklist developed in this study provides policymakers with a concrete tool for operationalizing AI governance. By clarifying roles, embedding safeguards across the lifecycle, and institutionalizing participatory mechanisms, the checklist offers a pragmatic pathway for Indonesia to translate global principles into actionable policies.

CONCLUSION AND FUTURE RESEARCH

This study examined the ethical opportunities and challenges of Artificial Intelligence (AI) adoption in Indonesia's public governance through a **Systematic Literature Review (SLR)** of 45 studies published between 2020 and 2025. The findings confirm that while AI offers significant opportunities to enhance bureaucratic efficiency, transparency, and citizen engagement, its adoption also raises profound ethical and regulatory challenges. In the Indonesian context, these challenges include algorithmic bias, weak data protection, unequal access to digital infrastructure, and fragmented institutional responsibilities.

The analysis highlighted four core dimensions of AI governance—**Who, What, When, and How**—which provide a holistic framework for responsible adoption. Effective governance requires distributed accountability across stakeholders, lifecycle-based safeguards from design to deployment and evaluation, enforceable technical standards, and hybrid governance models that combine legal,

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technical, and participatory mechanisms. While developed countries such as Singapore, the UK, and the EU operationalize these dimensions through binding regulations and independent oversight, Indonesia's governance mechanisms remain largely aspirational, situated at the policy vision stage.

Theoretically, this study contributes by contextualizing global governance frameworks within a developing country setting, demonstrating that universal principles such as transparency, accountability, and inclusivity must be adapted to local socio-political and institutional realities. Practically, the proposed **governance checklist** offers a tool for policymakers and practitioners in Indonesia to translate abstract principles into concrete actions. This includes clarifying institutional roles, embedding algorithmic audits, establishing robust data protection mechanisms, and ensuring multi-stakeholder engagement.

The study has several limitations. First, it relies exclusively on secondary literature, limiting empirical validation of governance mechanisms in practice. Second, while the review included regional perspectives, the majority of the literature remains dominated by studies from advanced economies, leaving Southeast Asian contexts underrepresented. Third, the rapidly evolving nature of AI governance means that findings may quickly become outdated as new regulations and technologies emerge. Moreover, the limited representation of Indonesian and ASEAN-based empirical studies within the current literature may introduce contextual bias. Future research should therefore prioritize locally grounded investigations, possibly through collaborative projects with institutions such as BRIN and the Ministry of Communication and Information Technology.

Future research should therefore pursue three directions. First, **empirical case studies** of AI implementation in Indonesian government agencies are needed to assess how governance frameworks function in practice. Second, **comparative studies** across ASEAN countries can provide insights into regional patterns, opportunities for harmonization, and lessons from neighboring contexts. Third, **longitudinal studies** are essential to evaluate the sustainability and long-term impact of governance mechanisms, especially in dynamic policy environments where political priorities and institutional capacities evolve.

In conclusion, AI has the potential to become a transformative force in Indonesian public governance, but only if accompanied by comprehensive, inclusive, and adaptive governance frameworks. By embedding safeguards across the AI lifecycle, adopting hybrid governance models, and prioritizing equity and citizen trust, Indonesia can ensure that digital transformation serves as a catalyst for democratic legitimacy and social justice rather than a driver of inequality and exclusion. By institutionalizing hybrid and lifecycle governance principles, Indonesia can transform AI into a foundation for ethical, transparent, and citizen-centered public administration.

REFERENCES

Adams, J. (2023). Defending explicability as a principle for the ethics of artificial intelligence in medicine. Medicine, Health Care and Philosophy, 26(4), 615–623. https://doi.org/10.1007/s11019-023-10175-7

Almasoud, A. S., & Idowu, J. A. (2024). Algorithmic fairness in predictive policing. AI and Ethics, 5(3), 2323–2337. https://doi.org/10.1007/s43681-024-00541-3

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1338

Aneta, Y., Akib, H., Pakaya, R., & Hulinggi, P. A. (2025). The Impact of Digital Transformation and Artificial Intelligence on Bureaucratic Culture Between Efficiency and Discretion. KnE Social Sciences, 10(4), 1-20. https://doi.org/10.18502/kss.v10i4.18019

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. Journal of Public Administration Research and Theory, 18(4), 543–571. https://doi.org/10.1093/jopart/mum032

ASEAN. (2024). ASEAN guide on AI governance and ethics. ASEAN. https://asean.org/wp-content/uploads/2024/02/ASEAN-Guide-on-AI-Governance-and-Ethics.pdf

Batool, A., Zowghi, D., & Bano, M. (2025). AI governance: A systematic literature review. AI and Ethics, 5(3), 3265–3279. https://doi.org/10.1007/s43681-024-00653-w

Cheng, Y., Yu, J., & Hu, J. (2023). Digital inequality in the age of artificial intelligence. Government Information Quarterly, 40(2), 101727. https://doi.org/10.1016/j.giq.2023.101727

Desouza, K. C., & Bhagwatwar, A. (2022). AI in government: Opportunities and challenges. Public Management Review, 24(12), 1845–1862. https://doi.org/10.1080/14719037.2022.2024235

European Commission. (2021). Proposal for a regulation laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). European Commission. https://artificialintelligenceact.eu

Floridi, L. (2020). Artificial intelligence as a public service: Learning from Amsterdam and Helsinki. Philosophy & Technology, 33(4), 541–558. https://doi.org/10.1007/s13347-020-00434-3

Government of Indonesia. (2020). National artificial intelligence strategy (Strategi Nasional Kecerdasan Artifisial, Stranas KA 2020–2045). Ministry of Research and Technology, Republic of Indonesia. https://ai-indonesia.or.id

Janowski, T., Estevez, E., & Ojo, A. (2021). AI adoption in developing countries: Challenges and opportunities. Information Polity, 26(4), 441–456. https://doi.org/10.3233/IP-210320

Jobin, A., Ienca, M., & Vayena, E. (2019). The global landscape of AI ethics guidelines. Nature Machine Intelligence, 1(9), 389–399. https://doi.org/10.1038/s42256-019-0088-2

Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2021). A survey on bias and fairness in machine learning. ACM Computing Surveys, 54(6), Article 115. https://doi.org/10.1145/3457607

Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. Information & Management, 58(3), 103434. https://doi.org/10.1016/j.im.2021.103434

Neumann, O., Guirguis, K., & Steiner, R. (2024). Exploring artificial intelligence adoption in public organizations: A comparative case study. Public Management Review, 26(1), 114–141. https://doi.org/10.1080/14719037.2022.2048685

Nugroho, A., Santoso, B., & Yuliana, E. (2023). National AI strategy in Indonesia: Progress and challenges. Journal of Asian Public Policy, 16(2), 221–239. https://doi.org/10.1080/17516234.2023.2184501

OECD. (2019). Recommendation of the Council on artificial intelligence. Organisation for Economic Co-operation and Development. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449

Page, M. J., et al. (2021). PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. BMJ, 372, n160. https://doi.org/10.1136/bmj.n160

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1338

Papagiannidis, S., Harris, J., & Bourlakis, M. (2025). Governance of AI in smart cities: Lessons from Europe. Government Information Quarterly, 42(1), 101800. https://doi.org/10.1016/j.giq.2025.101800

Santoso, B., Nugroho, A., & Putri, R. (2024). Ethical challenges of AI adoption in Indonesian public administration. AI and Society, 39(2), 445–462. https://doi.org/10.1007/s00146-023-01577-9

UNESCO. (2021). Recommendation on the ethics of artificial intelligence. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000381137

Tohopi, R., dan Hulinggi, P (2023). "Penerapan E- Government Melalui Kebijakan Teknologi, Informasi dan Komunikasi Berbasis Website Desa di Kecamatan Lemito Kabupaten Pohuwato". PUBLIKA:Jurnal Ilmu Administrasi Publik, 9 (1),1424.https://doi.org/10.25299/jiap.2023.vol9(1).11130.

Wirtz, B. W., Weyerer, J. C., & Kehl, I. (2022a). Governance of artificial intelligence: A risk and guideline-based integrative framework. Government Information Quarterly, 39(3), 101685. https://doi.org/10.1016/j.giq.2022.101685

Wirtz, B. W., Weyerer, J. C., & Kehl, I. (2022b). AI in government: Risks, opportunities, and the need for governance. Government Information Quarterly, 39(4), 101686. https://doi.org/10.1016/j.giq.2022.101686