Legal Autonomous Web-based Governance (LAW)
Vol. 1, No. 1, June 2026, pp. 29∼41
E-ISSN: 3164-6794 | P-ISSN: 3164-6697, DOI: 10.68012

Human Centered Legal Governance for Autonomous AI in Digital Societies

Untung Rahardja[1*], Mitra Terima Des Sincer Putri[2], Nanda Septiani[3*], Fhia Amelia[4], Ardivan Avandi[5], Richard Evans[6]
[1]Faculty of Economics and Business, Universiti Teknologi Malaysia, Malaysia
[2,3,5]Faculty of Economic and Business, University of Raharja , Indonesia
[4]Faculty of Science and Technology, University of Raharja, Indonesia
[6]Department of Digital Human Rights and Data Sovereignty, Adi-Journal Incorporation, United States
[1]untung@raharja.info, [2]mitra.dessincer@raharja.info, [3]nanda.septiani@raharja.info, [4]fhia@raharja.info, [5]ardivan@raharja.info, [6]vans.richard@adi-journal.org
***Corresponding Author**

Article Info

Article history:

Submission March 11, 2026
Revised March 11, 2026
Accepted March 12, 2026
Published March 13, 2026

Keywords:

AI Governance
Autonomous AI
Digital Governance
Web-Based-Societies

ABSTRACT

This study examines the legal governance challenges posed by autonomous AI operating within web-based-societies. The increasing integration of autonomous AI into digital platforms creates complex legal questions concerning accountability, transparency, data governance, and the protection of fundamental rights. Despite rapid technological development, existing regulatory approaches often struggle to balance innovation with the protection of human values. **This research aims to develop a human** centered legal framework capable of guiding responsible governance of autonomous AI in digital ecosystems. **The study adopts a qualitative** interdisciplinary methodology combining legal doctrinal analysis, comparative regulatory review, and policy evaluation of existing international AI governance initiatives. **The findings indicate** that effective governance of autonomous AI requires an integrated legal approach emphasizing human oversight, algorithmic transparency, ethical accountability, and adaptive regulatory institutions. Furthermore, participatory governance mechanisms involving regulators, digital platform operators, legal institutions, and civil society play a crucial role in ensuring legitimacy and trust in AI governance. **The study contributes to contemporary** debates on AI regulation by proposing a human centered legal governance framework that can support responsible technological development while safeguarding fundamental rights and strengthening institutional accountability in web-based-societies.

This is an open access article under the CC BY 4.0 license.

DOI: https://doi.org/10.68012/law.v1i1.81
This is an open access article under the CC BY license (https://creativecommons.org/licenses/by/4.0/)
©Authors retain all copyrights

1. INTRODUCTION

The rapid advancement of AI has significantly transformed digital societies, particularly through the integration of autonomous AI within web based platforms. This transformation introduces complex legal challenges related to accountability, regulatory oversight, and the governance of algorithmic decision making. While such transformations provide opportunities for efficiency, innovation, and enhanced public services, they also introduce substantial legal and governance challenges [1]. Autonomous AI systems can influence

social processes, public decision making, and digital participation in ways that are difficult to regulate using traditional legal frameworks. In many cases, existing legal structures were designed for human driven decision making rather than algorithmic autonomy [2]. Consequently, questions surrounding accountability, transparency, liability, and ethical responsibility have become central concerns in the governance of AI driven digital ecosystems. Within this context, the concept of human centered governance has emerged as an essential principle for ensuring that technological development remains aligned with human values, rights, and societal well being [3]. However, translating human centered principles into practical legal frameworks capable of governing autonomous AI in web-based-societies remains a complex challenge that requires interdisciplinary approaches integrating law, policy, technology, and digital governance studies. Despite growing international attention toward AI regulation, the development of effective governance frameworks continues to face significant structural challenges. Many countries and international institutions have begun to introduce regulatory initiatives aimed at addressing AI related risks, including ethical guidelines, regulatory principles, and policy recommendations [4]. Nevertheless, these initiatives often emphasize broad normative principles rather than operational legal frameworks capable of governing autonomous AI systems within dynamic web based environments. One major challenge lies in the evolving nature of AI technologies, which often outpace regulatory processes and create gaps between technological capability and legal oversight. Autonomous systems operating in digital platforms can produce decisions that affect individuals and communities without direct human supervision, raising concerns related to algorithmic bias, discrimination, privacy violations, and lack of transparency [5]. Furthermore, the distributed nature of web-based-societies complicates jurisdictional authority and regulatory enforcement, particularly when digital platforms operate across multiple legal systems and governance regimes. As a result, policymakers face difficulties in establishing regulatory mechanisms that are both flexible and enforceable. These conditions highlight the urgent need for governance models that integrate legal accountability, technological transparency, and human oversight while maintaining the capacity to adapt to rapidly evolving digital infrastructures. Existing academic literature has explored various aspects of AI governance, including ethical AI frameworks, algorithmic accountability mechanisms, and regulatory approaches for digital platforms [6]. Several studies emphasize the importance of ethical principles such as fairness, transparency, and explainability in guiding the development of responsible AI systems. Other research has examined policy initiatives related to AI governance at national and international levels, including regulatory proposals addressing algorithmic transparency, data protection, and automated decision making. However, a critical research gap remains in the development of comprehensive legal frameworks specifically designed to govern autonomous AI operating within web-based-societies [7]. Much of the existing research focuses either on technical design principles or on general policy guidelines rather than on integrated legal governance structures capable of addressing the complexity of autonomous systems in digital ecosystems [8]. Additionally, previous studies often treat governance from a single disciplinary perspective, limiting the ability to address the multidimensional nature of AI governance challenges that involve legal, technological, ethical, and societal considerations simultaneously [9]. The limitations of current research therefore include insufficient integration between legal doctrine and digital governance frameworks, limited attention to human centered regulatory design, and a lack of conceptual models that explicitly address the governance of autonomous AI within web based public environments [10]. This study seeks to address these limitations by proposing a human centered legal framework for governing autonomous AI in web-based-societies. Unlike previous research that primarily emphasizes ethical guidelines or technical governance mechanisms, this study focuses on the development of legal governance structures capable of integrating human centered values into regulatory design [11]. By combining legal doctrinal analysis with interdisciplinary perspectives on digital governance, the research aims to identify key principles and institutional mechanisms that can support responsible AI governance within web based systems. The novelty of this study lies in its effort to bridge the gap between legal theory, digital governance practices, and emerging autonomous technologies, thereby contributing to the development of more adaptive and accountable regulatory frameworks [12]. In comparison with prior studies that focus on either AI ethics or regulatory policy independently, this research emphasizes the integration of human centered governance principles into practical legal structures that address accountability, transparency, and societal impact in web based environments [13]. Nevertheless, this study is subject to several limitations, including the conceptual nature of the proposed framework and the reliance on qualitative legal and policy analysis rather than empirical system testing. Future research may expand this work through empirical validation, case studies, or comparative analysis across different governance systems. The remainder of this article is structured as follows. The next section presents a review of relevant literature on AI governance, human centered regulatory

principles, and digital governance frameworks [14]. The subsequent section explains the research methodology employed in the study. This is followed by the results and discussion section, which elaborates the proposed legal governance framework and its implications for governing autonomous AI in web-based- societies. Finally, the article concludes by summarizing the key findings and outlining directions for future research in the field of legal autonomous web based governance [15]. This study offers a distinct contribution to the literature on AI governance by proposing a human centered legal governance framework specifically designed for autonomous AI operating in web-based- societies. Unlike previous studies that primarily emphasize ethical guidelines or technical governance mechanisms, this research integrates legal accountability, regulatory adaptability, and institutional governance principles within a unified legal framework [16]. The novelty of this research lies in the development of a normative legal governance model that connects human rights protection, algorithmic accountability, and regulatory enforcement mechanisms within digital ecosystems characterized by autonomous decision making technologies. By positioning human values as the central foundation of AI governance, this framework provides a legal perspective that strengthens the capacity of regulatory institutions to respond to emerging challenges posed by autonomous AI systems [17]. This study aims to develop a human centered legal governance framework for regulating autonomous AI operating within web-based- societies. While technological innovation continues to reshape digital ecosystems, legal institutions often struggle to ensure that such developments remain aligned with fundamental human values, accountability mechanisms, and societal welfare [18]. Accordingly, this research addresses the following questions. First, what legal and governance challenges arise from the deployment of autonomous AI in web-based- societies. Second, how can a human centered legal framework be designed to ensure accountability, transparency, and protection of fundamental rights within digital ecosystems. Third, what governance principles and institutional mechanisms are necessary to support responsible and sustainable regulation of autonomous AI in contemporary web based environments [19].

2. LITERATURE REVIEW

2.1. Human Centered Legal Governance in Digital Societies

The rapid expansion of digital technologies has transformed the relationship between legal governance and societal development. In web-based-societies, governance processes are increasingly mediated through digital platforms that facilitate communication, economic transactions, and social participation. Within this context, human centered legal governance has emerged as a critical paradigm that emphasizes the protection of human rights, dignity, and autonomy in technologically mediated environments [20]. Rather than focusing solely on technical efficiency, human centered governance prioritizes societal values and ethical considerations in the development and regulation of emerging technologies. Human centered legal governance is closely linked with the principle that technological innovation should remain accountable to human interests and democratic institutions. As AI systems gain greater autonomy in decision making processes, concerns arise regarding algorithmic bias, discrimination, and the erosion of human oversight. Legal frameworks must therefore establish mechanisms that ensure transparency, accountability, and fairness in the operation of autonomous technologies [21]. Such mechanisms include algorithmic auditing, regulatory oversight institutions, and participatory governance models that involve public stakeholders in decision making processes. In web-based-societies, these governance principles become particularly important because digital platforms often operate beyond traditional institutional boundaries. As a result, legal governance must evolve to address cross jurisdictional challenges while maintaining strong protections for fundamental rights. The development of human centered legal frameworks thus represents an essential step in ensuring that digital transformation benefits society while minimizing potential harms associated with autonomous technologies [22].

2.2. Autonomous AI and Regulatory Complexity

Autonomous AI refers to systems capable of performing tasks, making decisions, and adapting to changing environments with limited or no direct human intervention. Advances in machine learning, natural language processing, and data analytics have significantly enhanced the capabilities of these systems, enabling their integration into various sectors including finance, healthcare, governance, and digital services [23]. While these technologies offer substantial benefits, they also introduce complex regulatory challenges. One of the primary concerns associated with autonomous AI is the issue of accountability. When an AI system produces outcomes that negatively affect individuals or communities, determining legal responsibility becomes increas-

ingly difficult [24]. Traditional legal doctrines were designed to address human actions rather than algorithmic decision making processes. Consequently, regulators must develop new legal approaches capable of addressing shared responsibility between developers, platform operators, and institutional actors. Another important aspect of regulatory complexity relates to transparency and explainability. Autonomous AI systems often rely on complex computational models that can be difficult for users and regulators to understand. This opacity creates challenges for legal oversight, particularly when automated decisions influence access to services, financial opportunities, or public resources [25]. Scholars have therefore emphasized the importance of explainable AI and transparent algorithmic governance as essential components of responsible regulatory frameworks. Furthermore, the integration of autonomous AI into web based environments amplifies governance challenges because digital platforms operate at global scales. Legal frameworks must therefore address issues such as data governance, cross border jurisdiction, and digital platform accountability while ensuring that technological development remains aligned with public interest [26].

2.3. Digital Governance and Sustainable Development Goals

The concept of digital governance has become increasingly relevant as societies adopt digital infrastructures to manage public services, economic activities, and social interactions. Digital governance refers to the use of information and communication technologies to enhance transparency, efficiency, and participation in governance processes [27]. Within the broader context of technological development, digital governance plays an important role in supporting global development agendas such as the Sustainable Development Goals (SDGs). The SDGs emphasize the importance of inclusive, equitable, and sustainable development across multiple dimensions including economic growth, social justice, environmental sustainability, and institutional integrity. In particular, SDGs 9 (Industry, Innovation, and Infrastructure), SDGs 16 (Peace, Justice, and Strong Institutions), and SDGs 17 (Partnerships for the Goals) are closely related to the governance of digital technologies and AI. The integration of AI into digital governance systems has the potential to improve policy making processes, enhance public service delivery, and support data driven decision making for sustainable development [28]. However, the benefits of AI driven governance can only be realized if appropriate legal and regulatory frameworks are in place. Without adequate safeguards, autonomous technologies may exacerbate social inequalities, reinforce algorithmic biases, or undermine democratic accountability. For this reason, scholars increasingly emphasize the importance of aligning AI governance frameworks with the principles of sustainable development. Human centered legal frameworks can play a crucial role in ensuring that AI technologies contribute positively to SDGs objectives while protecting human rights and promoting ethical technological innovation. In this sense, legal governance is not merely a regulatory instrument but also a strategic mechanism for guiding technological transformation toward sustainable societal outcomes. By integrating human centered principles with sustainable development objectives, policymakers can establish governance structures that balance innovation with social responsibility [29].

2.4. Legal Institutional Design for Governing AI in Web Based Environments

The governance of autonomous AI in web-based-societies requires legal institutions that are capable of adapting to rapidly evolving technological landscapes. Institutional design refers to the creation of regulatory structures, policies, and governance mechanisms that guide the development and deployment of emerging technologies. In the context of AI governance, institutional design must address multiple dimensions including accountability, transparency, risk management, and ethical oversight [30]. Several governance models have been proposed to address these challenges. Regulatory sandbox frameworks, for example, allow policymakers to experiment with new regulatory approaches while monitoring the societal impacts of emerging technologies. Similarly, algorithmic accountability frameworks emphasize the need for auditing mechanisms that evaluate the fairness and transparency of AI systems. These institutional approaches reflect an increasing recognition that traditional legal frameworks alone may not be sufficient to govern autonomous technologies operating within complex digital ecosystems [31]. Another important aspect of institutional design involves multi stakeholder collaboration. Effective governance of AI technologies requires cooperation between governments, technology developers, academic institutions, and civil society organizations. Such collaboration can facilitate knowledge exchange and support the development of more adaptive governance mechanisms capable of addressing the dynamic nature of digital innovation [32]. In web-based-societies, legal governance must therefore evolve toward hybrid regulatory models that combine formal legal institutions with flexible governance mechanisms. By integrating human centered values into institutional design, policymakers can develop regulatory systems that

support responsible innovation while maintaining strong protections for individuals and communities affected by autonomous technologies [33].

Table 1. Summary of Previous Studies on AI Governance and Legal Frameworks

Author	Research Focus	Method	Key Findings
Smith	Ethical governance of AI	Conceptual analysis	Emphasized fairness and transparency principles
Lee	AI regulatory policy	Policy analysis	Highlighted need for adaptive regulation
Kumar	AI accountability frameworks	Comparative study	Proposed algorithmic audit mechanisms
Rodriguez	Digital governance and AI	Qualitative research	Identified governance challenges in digital platforms
Hassan	AI regulation and public policy	Literature review	Suggested integration of ethical standards in AI governance

Table 1 reviews prior studies on AI governance and legal frameworks, highlighting their research focus, methodologies, and key findings. Existing literature largely concentrates on ethical guidelines, policy recommendations, and technical governance mechanisms aimed at improving accountability and transparency [34]. While ethical governance models emphasize fairness and transparency, and regulatory studies examine legal and institutional dimensions, many approaches remain sector-specific and prioritize technological innovation and market competitiveness over fundamental rights and social protection. The comparison reveals a gap in comprehensive, human-centered legal frameworks that integrate accountability, digital rights, institutional oversight, and societal values, particularly within web-based societies. Although significant contributions have been made, limited research operationalizes human-centered principles in decentralized digital platforms and autonomous decision-making systems [35]. Addressing this gap, the study proposes an integrated human-centered legal framework that combines legal accountability, ethical standards, and institutional oversight to ensure balanced AI governance in digital environments.

3. RESEARCH METHODS

3.1. Research Design and Approach

This study employs a qualitative research approach to examine the development of a human-centered legal governance framework for autonomous AI in web-based societies. By integrating qualitative content analysis with legal doctrinal interpretation, it analyzes legal documents, policy materials, and academic literature to understand the regulatory principles, institutional dynamics, and ethical considerations shaping AI governance [36]. The approach emphasizes the interaction between technological innovation, legal institutions, and societal values, addressing both normative legal foundations and broader social implications. Beyond theoretical contribution, the proposed framework offers practical guidance for strengthening algorithmic transparency, institutional oversight, and liability mechanisms in cases of harmful AI outcomes. It also identifies regulatory challenges related to accountability, transparency, digital rights protection, and cross-jurisdictional governance, ultimately aiming to support policymakers and scholars in designing adaptive, responsible, and human-centered AI governance structures [37].

3.2. Data Sources and Data Collection

The data used in this study are primarily derived from secondary sources, including academic journal articles, legal policy documents, international regulatory guidelines, and institutional reports related to AI governance [38]. Secondary data are particularly valuable for qualitative research in the field of legal and policy studies because they provide comprehensive insights into existing theoretical frameworks and regulatory developments across different jurisdictions. Academic literature serves as the primary source for identifying scholarly perspectives on AI governance, human centered regulation, and digital governance systems. In addition, policy documents from international organizations and governmental institutions are analyzed to understand contemporary regulatory approaches toward AI and autonomous technologies [39]. These sources

include policy guidelines related to responsible AI, algorithmic accountability, and ethical technology governance. The data collection process follows a systematic review strategy in which relevant publications are identified based on thematic relevance to AI governance, legal regulatory frameworks, and digital governance structures. Publications selected for analysis are primarily drawn from recent scholarly discussions in order to capture current developments in AI governance research [40]. Through this process, the study gathers a diverse body of knowledge that supports a comprehensive understanding of the legal and institutional challenges associated with autonomous AI systems in web-based-societies.

Table 2. Data Sources and Analytical Focus in the Study

Data Source	Type of Document	Analytical Focus
Academic Journals	Peer reviewed articles on AI governance	Concepts of human centered AI regulation
Policy Reports	Institutional and governmental reports	Regulatory strategies and governance models
Legal Documents	Laws and policy frameworks	Legal accountability and compliance mechanisms
International Guidelines	Global governance recommendations	Ethical standards and responsible AI principles

Table 2 illustrates the primary sources of data used in this study and the analytical focus associated with each category. Academic journal articles provide theoretical perspectives and conceptual frameworks related to AI governance. Policy reports and legal documents contribute insights into regulatory strategies and institutional practices adopted by governments and international organizations [41]. Meanwhile, international guidelines offer broader normative principles related to ethical AI and responsible technology governance. By integrating these different sources, the research is able to analyze the governance of autonomous AI from multiple perspectives, including legal, policy, and ethical dimensions.

3.3. Data Analysis Technique

This study applies qualitative content analysis combined with legal doctrinal interpretation to examine governance frameworks for AI and autonomous systems. The qualitative approach is used to identify key patterns, themes, and conceptual relationships within academic literature and policy documents, focusing on areas such as legal accountability, algorithmic transparency, digital governance frameworks, and human-centered regulation [42]. Each thematic category is analyzed to compare governance models and policy recommendations, highlighting similarities, differences, and gaps in the current regulatory landscape. Complementing this, legal doctrinal analysis is employed to assess regulatory principles and the normative foundations of AI governance, including responsibility, institutional authority, and rights protection [43]. Through the integration of these methods, the study develops a conceptual model of human-centered legal governance that addresses both theoretical and practical dimensions of AI regulation in web-based societies.

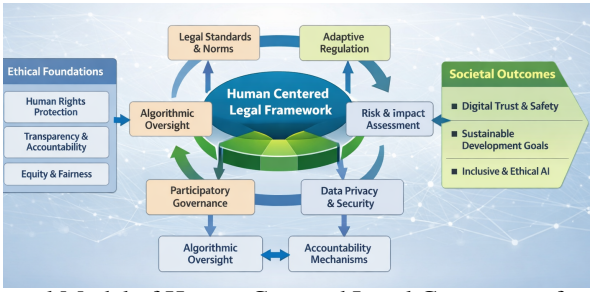


Figure 1. Conceptual Model of Human Centered Legal Governance for Autonomous AI

Figure 1 presents a conceptual model of human-centered legal governance for autonomous AI, outlining an integrated regulatory structure for AI systems in web-based societies. The model positions human-centered principles as the foundation linking technological innovation, legal frameworks, and societal values. It explains that AI operates within digital infrastructures such as web platforms, online services, and data

systems, which require governance mechanisms including algorithmic accountability, transparency, data protection, and ethical decision-making. Key regulatory pillars legal accountability structures, ethical standards, regulatory oversight institutions, and participatory governance work together to ensure AI systems align with human rights and social interests [44]. The framework also emphasizes multi-stakeholder collaboration among policymakers, technology developers, legal experts, and civil society to balance innovation with human oversight and ethical safeguards, ultimately proposing that effective AI governance depends on dynamic interaction between legal institutions and autonomous technologies.

3.4. Research Framework and Validity

To ensure the reliability and analytical rigor of the research, the study applies a structured research framework that integrates data sources, analytical methods, and conceptual interpretation. The framework guides the research process from the identification of relevant literature to the development of governance recommendations for autonomous AI systems. Validity in qualitative research is strengthened through triangulation, which involves comparing insights derived from multiple data sources and analytical perspectives. By analyzing academic literature, policy documents, and international governance guidelines, the study is able to cross examine different viewpoints regarding AI regulation and digital governance. This triangulation process helps reduce interpretative bias while improving the credibility of the findings [45]. In addition, the research framework emphasizes the integration of human centered governance principles with broader societal objectives such as ethical technology development and sustainable digital transformation. The proposed framework therefore serves not only as an analytical tool but also as a conceptual foundation for designing legal governance systems that can effectively regulate autonomous AI in web-based-societies. Through this methodological approach, the study aims to produce a comprehensive analysis that contributes to both academic discourse and policy development in the field of legal autonomous web based governance.

4. RESULTS AND DISCUSSION

4.1. Governance Challenges of Autonomous Artificial Intelligence (AI) in Web-Based-Societies

Current regulatory approaches to AI often emphasize ethical principles but lack enforceable legal obligations, creating uncertainty around algorithmic decision-making and accountability in AI development and deployment [46]. In web-based societies, autonomous AI systems operate within complex digital infrastructures such as online platforms and automated services where they analyze large datasets and influence economic, social, and public service activities. These systems generate governance challenges, particularly due to opaque algorithmic processes, evolving machine learning models, and difficulties in assigning legal responsibility for harmful or discriminatory outcomes. Additional concerns include the protection of digital rights, data privacy, and the risk of bias or inequality without adequate oversight [47]. The cross-border nature of digital platforms further complicates regulatory enforcement, limiting the effectiveness of single-jurisdiction authorities . Therefore, effective governance of autonomous AI requires transparent, accountable, and human-centered regulatory frameworks supported by collaborative institutional arrangements and adaptive legal mechanisms capable of responding to rapidly evolving technological ecosystems.

4.2. Legal Accountability and Liability in Autonomous AI Governance

A critical legal issue surrounding autonomous AI concerns the attribution of responsibility when algorithmic decision making results in legal harm. In this context, accountability mechanisms must address the roles of developers, platform operators, and institutional regulators in supervising AI behavior [48]. Liability attribution becomes particularly complex when autonomous systems operate with limited human intervention. Therefore, legal governance must incorporate layered accountability structures that combine developer responsibility, platform governance obligations, and regulatory oversight mechanisms [49]. Enforceability also represents a key dimension of AI regulation, as legal norms must be supported by monitoring institutions, compliance requirements, and sanction mechanisms capable of ensuring that AI deployment aligns with legal and ethical standards.

4.3. Human Centered Legal Principles for Autonomous AI Governance

The findings emphasize that effective governance of autonomous AI requires integrating human centered legal principles into regulatory frameworks. This approach prioritizes human rights, ethical accountability, and societal well being, ensuring that AI development aligns with democratic values rather than focusing

solely on technological efficiency [50]. Key principles include algorithmic transparency to enable oversight and detect bias, clear legal accountability defining the responsibilities of developers, platform operators, and regulators, participatory governance that incorporates diverse stakeholders, and strong data protection safeguards to prevent misuse of personal information. Together, these principles support governance systems that maintain human oversight while fostering responsible innovation, positioning human centered legal frameworks as both regulatory instruments and ethical foundations for AI systems in web-based-societies.

Table 3. Key Governance Challenges in Autonomous AI Systems

Governance Issue	Description	Governance Implication
Algorithmic Opacity	AI decision processes are difficult to interpret	Limits regulatory oversight
Accountability Gap	Unclear responsibility for automated decisions	Requires legal liability frameworks
Data Governance Risk	Extensive use of personal and behavioral data	Needs strong privacy regulations
Cross Border Platforms	AI services operate across jurisdictions	Requires international regulatory cooperation

Table 3 presents the primary governance challenges associated with the deployment of autonomous AI in web based environments. The findings show that algorithmic opacity, accountability gaps, and data governance risks are among the most significant obstacles to effective AI regulation. Additionally, the cross border nature of digital platforms complicates regulatory enforcement because different legal systems may apply conflicting rules to the same technological systems. Addressing these governance issues requires integrated legal frameworks that combine regulatory oversight, transparency mechanisms, and collaborative governance approaches across institutions.

4.4. Legal Institutional Mechanisms for Responsible AI Governance

The analysis further reveals that institutional mechanisms play a crucial role in implementing effective legal governance for autonomous AI. Institutional mechanisms refer to the regulatory structures, policy tools, and governance institutions responsible for overseeing the development and deployment of AI technologies. Without strong institutional capacity, legal frameworks may remain largely symbolic and fail to produce meaningful governance outcomes. One key institutional mechanism identified in this study is algorithmic auditing. Algorithmic audits involve systematic evaluations of AI systems to assess their fairness, transparency, and compliance with regulatory standards. These audits can be conducted by independent regulatory bodies or certified third party organizations to ensure that AI systems operate in accordance with ethical and legal requirements. Another important mechanism is the establishment of adaptive regulatory frameworks capable of responding to technological change [51]. Traditional regulatory models often struggle to keep pace with rapid technological innovation, leading to regulatory gaps. Adaptive governance approaches, such as regulatory sandboxes and iterative policy development, allow regulators to experiment with new regulatory models while monitoring their effectiveness in real world technological environments. Institutional collaboration also emerges as a key element of responsible AI governance. Effective governance requires cooperation between governments, technology companies, research institutions, and civil society organizations. Such collaboration facilitates knowledge exchange and promotes the development of governance mechanisms that reflect diverse perspectives and expertise. Institutional effectiveness also depends on the clarity of legal mandates, coordination among regulatory bodies, and the availability of technical expertise to assess complex AI systems. Clear regulatory authority reduces overlapping responsibilities and enhances enforcement capacity, while specialized expertise enables institutions to evaluate algorithmic systems, data governance practices, and risk management frameworks more effectively. In addition, continuous capacity building and cross border regulatory cooperation are essential in addressing the transnational nature of digital platforms and AI services. By strengthening institutional coordination, technical competence, and international collaboration, governance systems can better ensure accountability, transparency, and the responsible deployment of autonomous AI in rapidly evolving digital ecosystems.

In addition to regulatory instruments and institutional arrangements, responsible AI governance also requires the integration of technical oversight and continuous monitoring mechanisms throughout the lifecycle

of AI systems. Governance practices should therefore incorporate risk assessment procedures, documentation requirements, and accountability mechanisms that ensure AI developers and operators remain responsible for the impacts generated by their systems. By embedding transparency, explainability, and auditability into governance structures, regulators and stakeholders can strengthen public trust while ensuring that AI technologies operate in accordance with legal norms and ethical standards.

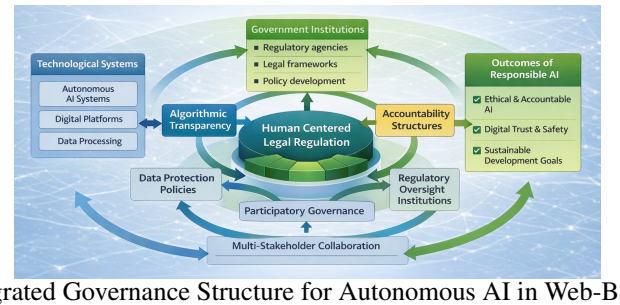


Figure 2. Integrated Governance Structure for Autonomous AI in Web-Based-Societies

Figure 2 illustrates an integrated governance framework for human centered AI regulation in web-based-societies, showing how autonomous AI systems are governed through coordinated interaction among technological systems, legal institutions, and societal stakeholders. The framework positions human centered legal regulation as the core mechanism ensuring that AI technologies operate in line with ethical standards, legal accountability, and social values. It incorporates key regulatory instruments such as algorithmic transparency, accountability structures, data protection policies, regulatory oversight, and participatory governance, supported by the roles of government institutions and policy developers. Emphasizing multi stakeholder collaboration among governments, technology developers, academia, and civil society, the model aims to produce responsible AI outcomes, including ethical and accountable systems, digital trust and safety, and sustainable development. Overall, the framework demonstrates that effective AI governance requires the integration of legal mechanisms, institutional cooperation, and human centered principles to guide innovation toward socially beneficial outcomes.

4.5. Components of the Human Centered Legal Framework for AI Governance

The development of a human-centered legal framework for autonomous AI requires the integration of key institutional and regulatory components to ensure responsible technological deployment in web-based-societies. Based on qualitative analysis, essential elements include algorithmic transparency, legal accountability, data protection, and participatory governance. Transparency mechanisms such as explainable AI models, documentation, and independent audits enhance oversight and legitimacy in automated decision-making. Legal accountability establishes clear liability structures for stakeholders, including developers, operators, and regulators, particularly when AI systems cause harm. Strong data protection safeguards are also necessary to address privacy risks and large-scale data processing in digital environments. Additionally, participatory governance involving regulators, private sector actors, and civil society fosters inclusive and democratic oversight. Together, these components form a comprehensive regulatory structure that aligns AI innovation with ethical principles, fundamental rights, and broader societal interests.

Table 4. Human Centered Legal Framework Components for AI Governance

Governance Component	**Institutional Role**	**Expected Outcome**
Algorithmic Transparency	Oversight by regulatory authorities	Increased trust in AI systems
Legal Accountability	Clear liability mechanisms	Responsible AI development
Data Protection Policies	Protection of personal data	Strengthened digital rights
Participatory Governance	Stakeholder involvement in policy making	Inclusive technology governance

Table 4 summarizes the main governance components that form the foundation of the proposed human centered legal framework for autonomous AI. The table illustrates how each governance component is associated with a specific institutional role and expected outcome within the regulatory ecosystem. Algorithmic transparency improves regulatory supervision and increases public trust in AI technologies. Legal accountability ensures that developers and operators remain responsible for the decisions generated by autonomous systems. Data protection policies safeguard individual privacy and reinforce digital rights protections. Finally, participatory governance strengthens inclusivity by encouraging collaboration between policymakers, researchers, and technology stakeholders in shaping AI governance structures.

5. MANAGERIAL IMPLICATIONS

The proposed human centered legal framework offers practical guidance for governing autonomous AI in web-based-societies. It calls on regulators to adopt adaptive mechanisms that prioritize oversight, transparency, and accountability, while policymakers should design flexible regulatory instruments responsive to technological change.

Courts and legal institutions can use the framework to address disputes related to algorithmic accountability, liability, and digital rights, whereas digital platforms and developers are encouraged to integrate ethical design, transparency measures, and responsible data governance into AI systems.

Civil society also plays a key role through participatory governance and public oversight to ensure alignment with human rights and societal values.

However, the study acknowledges limitations, as it relies primarily on qualitative legal and policy analysis, may not fully reflect real world regulatory implementation, and focuses largely on major international initiatives, potentially overlooking regional variations.

6. CONCLUSION

This study examines the development of a human centered legal framework for governing autonomous AI in web-based-societies, aiming to establish governance principles that balance technological innovation with societal values. The findings highlight key challenges including accountability, transparency, data protection, and institutional oversight, and emphasize the need to integrate legal accountability mechanisms, algorithmic transparency, participatory governance, and strong data protection into a coherent regulatory structure.

The proposed framework places ethical principles, human rights, and social participation at the core of AI governance, promoting inclusive digital ecosystems and adaptive legal mechanisms capable of responding to rapidly evolving technologies. Although the study offers important conceptual and practical contributions, it acknowledges limitations due to its reliance on qualitative and doctrinal analysis and therefore calls for empirical validation and comparative research across jurisdictions.

Future research is encouraged to explore interdisciplinary collaboration, emerging technologies such as blockchain and explainable AI, and the role of legal frameworks in supporting sustainable development. Overall, the framework advances a resilient and adaptive model of AI governance that connects normative legal principles with practical oversight to ensure responsible innovation in digital environments.

7. DECLARATIONS

7.1. About Authors

Untung Rahardja (UR) https://orcid.org/0000-0002-2166-2412

Mitra Terima Des Sincer Putri (MP) https://orcid.org/0009-0007-2493-3808

Nanda Septiani (NS) https://orcid.org/0009-0005-8150-6963

Fhia Amelia (FA) https://orcid.org/0009-0001-9222-2879

Ardivan Avandi (AA) https://orcid.org/0009-0007-2360-0999

Richard Evans (RE) https://orcid.org/0009-0007-7280-8323

7.2. Author Contributions

Conceptualization: UR, NS; Methodology: MP, RE; Software: FA, UR; Validation: AA, NS and MP, UR; Formal Analysis: FA, NS and RE, UR; Investigation: MP, AA; Resources: NS, FA; Data Curation: AA, RE; Writing Original Draft Preparation: UR and AA; Writing Review and Editing: NS, MP; Visualization: AA, NS; All authors, UR, MP, NS, FA, and AA, RE have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

7.4. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7.5. Institutional Review Board Statement

Not applicable.

7.6. Informed Consent Statement

Not applicable.

7.7. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

[1] N. Nuryani, A. B. Mutiara, I. M. Wiryana, D. Purnamasari, and S. N. W. Putra, "Artificial intelligence model for detecting tax evasion involving complex network schemes," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 6, no. 3, pp. 339–356, 2024.

[2] D. R. Amariles and P. M. Baquero, "Promises and limits of law for a human-centric artificial intelligence," *Computer Law & Security Review*, vol. 48, p. 105795, 2023.

[3] J. Juanda, R. J. Riansyah, A. Arsadi, and L. Bethany, "Towards entrepreneurial campus sustainability: Integrating artificial intelligence for resource allocation in business management," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 6, no. 3, pp. 314–323, 2024.

[4] N. Lutfiani, I. Sembiring, I. Setyawan, A. Setiawan, U. Rahardja, and S. Sulistio, "Exploring the relationship between artificial intelligence and business performance," *IJCCS (Indonesian Journal of Computing and Cybernetics Systems)*, vol. 19, no. 1, pp. 1–12, 2025.

[5] D. S. S. Wuisan, R. A. Sunardjo, Q. Aini, N. A. Yusuf, and U. Rahardja, "Integrating artificial intelligence in human resource management: A smartpls approach for entrepreneurial success," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 334–345, 2023.

[6] L. Carranza, A. Demir, and G. Nikolaidis, "Human-centered ai and legal ethics: A framework for responsible innovation," *Legal Studies in Digital Age*, vol. 2, no. 2, pp. 49–60, 2023.

[7] D. Manongga, U. Rahardja, I. Sembiring, Q. Aini, and A. Wahab, "Improving the air quality monitoring framework using artificial intelligence for environmentally conscious development," *HighTech and Innovation Journal*, vol. 5, no. 3, pp. 794–813, 2024.

[8] B. Bhima, A. R. A. Zahra, T. Nurtino, and M. Z. Firli, "Enhancing organizational efficiency through the integration of artificial intelligence in management information systems," *APTISI Transactions on Management*, vol. 7, no. 3, pp. 282–289, 2023.

[9] R. Ahmad, S. Saleem, and S. Hussain, "Ethical and legal challenges of artificial intelligence: Implications for human right," *Journal of Law, Society and Policy Review*, vol. 2, no. 01, pp. 10–25, 2025.

[10] C. Lukita, G. A. Pangilinan, M. H. R. Chakim, D. B. Saputra *et al.*, "Examining the impact of artificial intelligence and internet of things on smart tourism destinations: A comprehensive study," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 2sp, pp. 135–145, 2023.

[11] R. Salam, Q. Aini, B. A. A. Laksminingrum, B. N. Henry, U. Rahardja, and A. A. Putri, "Consumer adoption of artificial intelligence in air quality monitoring: A comprehensive utaut2 analysis," in *2023 Eighth International Conference on Informatics and Computing (ICIC)*. IEEE, 2023, pp. 1–6.

[12] G. Nicola and R. Setiawan, "Creating competitive advantage through digital innovation: Insights from startupreneurs in e-commerce," *Startupreneur Business Digital (SABDA Journal)*, vol. 3, no. 2, pp. 131–140, 2024.

[13] O. Ozmen Garibay, B. Winslow, S. Andolina, M. Antona, A. Bodenschatz, C. Coursaris, G. Falco, S. M. Fiore, I. Garibay, K. Grieman *et al.*, "Six human-centered artificial intelligence grand challenges," *International Journal of Human–Computer Interaction*, vol. 39, no. 3, pp. 391–437, 2023.

[14] S. Watini, N. Ramadhona *et al.*, "Predicting patient satisfaction levels using artificial intelligence technology for food service at eri soedewo rspad gatot soebroto," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 2sp, pp. 124–134, 2023.

[15] T. Rochefort and Z. Ndlovu, "Digital marketing strategies in building brand awareness and loyalty in the online era," *startupreneur business digital (sabda journal)*, vol. 3, no. 2, pp. 107–114, 2024.

[16] D. Mhlanga, "Human-centered artificial intelligence: The superlative approach to achieve sustainable development goals in the fourth industrial revolution," *Sustainability*, vol. 14, no. 13, p. 7804, 2022.

[17] N. Lutfiani, S. Wijono, U. Rahardja, A. Iriani, Q. Aini, and R. A. D. Septian, "A bibliometric study: Recommendation based on artificial intelligence for ilearning education," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 2, pp. 109–117, 2023.

[18] C. H. Kan *et al.*, "Artificial intelligence (ai) in the age of democracy and human rights: normative challenges and regulatory perspectives," *International Journal of Eurasian Education and Culture*, vol. 9, no. 25, pp. 145–166, 2024.

[19] H. A. Winata and F. Simon, "Influence of profitability, audit quality, and corporate governance on earnings management," *APTISI Transactions on Management*, vol. 8, no. 2, pp. 93–104, 2024.

[20] R. Rarmizi, I. Y. Nasaruddin, N. Hidayah *et al.*, "Analysis of the influence of corporate governance on the financial performance of islamic banks in indonesia 2016-2021," *APTISI Transactions on Management*, vol. 7, no. 2, pp. 179–190, 2023.

[21] N. Tomaževič, D. Ravšelj, and A. Aristovnik, "Artificial intelligence for human-centric society: The future is here." European Liberal Forum EUPF, 2023.

[22] L. Meria, S. Fabian, T. Mariyanti *et al.*, "Digital transformation and blockchain technology: A viewpoint from emerging markets," *Blockchain Frontier Technology*, vol. 4, no. 1, pp. 50–57, 2024.

[23] B. Martini, D. Bellisario, and P. Coletti, "Human-centered and sustainable artificial intelligence in industry 5.0: Challenges and perspectives. sustainability 2024, 16, 5448," 2024.

[24] D. Brand, "Responsible artificial intelligence in government: Development of a legal framework for south africa," *JeDEM-eJournal of eDemocracy and Open Government*, vol. 14, no. 1, pp. 130–150, 2022.

[25] A. Rizky, R. W. Nugroho, W. Sejati, O. Sy *et al.*, "Optimizing blockchain digital signature security in driving innovation and sustainable infrastructure," *Blockchain Frontier Technology*, vol. 4, no. 2, pp. 183–192, 2025.

[26] S. Schmager, I. O. Pappas, and P. Vassilakopoulou, "Understanding human-centred ai: a review of its defining elements and a research agenda," *Behaviour & Information Technology*, vol. 44, no. 15, pp. 3771–3810, 2025.

[27] A. Faturahman, N. S. Lubis, N. P. L. Santoso, A. Adiwijaya, M. Madisson *et al.*, "Impact of blockchain enhanced digital marketing on brand awareness of solar panels," *Blockchain Frontier Technology*, vol. 5, no. 1, pp. 1–12, 2025.

[28] S. Li and X. Gu, "A risk framework for human-centered artificial intelligence in education," *Educational Technology & Society*, vol. 26, no. 1, pp. 187–202, 2023.

[29] C. J. Costa, M. Aparicio, S. Aparicio, and J. T. Aparicio, "The democratization of artificial intelligence: Theoretical framework," *Applied Sciences*, vol. 14, no. 18, p. 8236, 2024.

[30] B. Lund, Z. Orhan, N. R. Mannuru, R. V. K. Bevara, B. Porter, M. K. Vinaih, and P. Bhaskara, "Standards, frameworks, and legislation for artificial intelligence (ai) transparency," *AI and Ethics*, vol. 5, no. 4, pp. 3639–3655, 2025.

[31] O. Bakiner, "The promises and challenges of addressing artificial intelligence with human rights," *Big Data & Society*, vol. 10, no. 2, p. 20539517231205476, 2023.

[32] T. Saheb and T. Saheb, "Mapping ethical artificial intelligence policy landscape: A mixed method analysis," *Science and engineering ethics*, vol. 30, no. 2, p. 9, 2024.

[33] A. Faturahman, S. Rahayu, S. Wijaya, Y. P. A. Sanjaya *et al.*, "Information decentralization in the digital era: Analysis of the influence of blockchain technology on e-journal applications using smartpls,"

Blockchain Frontier Technology, vol. 4, no. 1, pp. 7–14, 2024.
[34] N. Ahmad, A. W. Ali, and M. H. B. Yussof, "The challenges of human rights in the era of artificial intelligence," *UUM Journal of Legal Studies (UUMJLS)*, vol. 16, no. 1, pp. 150–169, 2025.
[35] A. Arora, "Building responsible artificial intelligence models that comply with ethical and legal standards," *Available at SSRN 5268172*, 2025.
[36] T. Herrmann and S. Pfeiffer, "Keeping the organization in the loop: a socio-technical extension of human-centered artificial intelligence," *Ai & Society*, vol. 38, no. 4, pp. 1523–1542, 2023.
[37] N. Wang and M. Y. Tian, ""intelligent justice": human-centered considerations in china's legal ai transformation," *AI and Ethics*, vol. 3, no. 2, pp. 349–354, 2023.
[38] N. Lutfiani, N. Fauziyah, F. P. Oganda, R. Setyaningrum, E. A. Natalia *et al.*, "The role of globalization in indonesian evolution influence on media digital literacy language ai," *International Transactions on Artificial Intelligence*, vol. 3, no. 2, pp. 192–200, 2025.
[39] R. Raman, R. Kowalski, K. Achuthan, A. Iyer, and P. Nedungadi, "Navigating artificial general intelligence development: societal, technological, ethical, and brain-inspired pathways," *Scientific Reports*, vol. 15, no. 1, p. 8443, 2025.
[40] J. Duberry, "Artificial intelligence and democracy: risks and promises of ai-mediated citizen–government relations," in *Artificial intelligence and democracy*. Edward Elgar Publishing, 2022.
[41] A. Kristian, A. Supriyadi, R. Sean, A. Husain *et al.*, "Exploring the relationship between financial competence and entrepreneurial ambitions in digital business education," *APTISI Transactions on Management*, vol. 8, no. 2, pp. 139–145, 2024.
[42] N. Van Berkel, B. Tag, J. Goncalves, and S. Hosio, "Human-centred artificial intelligence: a contextual morality perspective," *Behaviour & Information Technology*, vol. 41, no. 3, pp. 502–518, 2022.
[43] P. Casanovas and P. Noriega, "Governance of artificial agency and ai value chains: A few remarks on autonomy from a legal and ethical approach," 2025.
[44] D. E. Rose, J. Van Der Merwe, and J. Jones, "Digital marketing strategy in enhancing brand awareness and profitability of e-commerce companies," *APTISI Transactions on Management*, vol. 8, no. 2, pp. 160–166, 2024.
[45] T. Jiang, Z. Sun, S. Fu, and Y. Lv, "Human-ai interaction research agenda: A user-centered perspective," *Data and Information Management*, vol. 8, no. 4, p. 100078, 2024.
[46] R. Tarmizi, N. Septiani, P. A. Sunarya, and Y. P. A. Sanjaya, "Harnessing digital platforms for entrepreneurial success: A study of technopreneurship trends and practices," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 278–290, 2023.
[47] S. Shivadekar, *Artificial Intelligence for Cognitive Systems: Deep Learning, Neuro-symbolic Integration, and Human-Centric Intelligence*. Deep Science Publishing, 2025.
[48] S. Kosasi, U. Rahardja, N. Lutfiani, E. P. Harahap, and S. N. Sari, "Blockchain technology-emerging research themes opportunities in higher education," in *2022 international conference on science and technology (ICOSTECH)*. IEEE, 2022, pp. 1–8.
[49] D. Chhillar and R. V. Aguilera, "An eye for artificial intelligence: Insights into the governance of artificial intelligence and vision for future research," *Business & Society*, vol. 61, no. 5, pp. 1197–1241, 2022.
[50] R. Widayanti, B. Tjahjono, N. Lutfiani, G. P. Cesna, and S. Santoso, "A bibliometrics study: Enhancing management education using blockchain technology," in *2022 IEEE Creative Communication and Innovative Technology (ICCIT)*. IEEE, 2022, pp. 1–6.
[51] Admin INP. (2025, Feb.) Indonesia committed to build ai inclusive governance. Online article. [Online]. Available: https://inp.polri.go.id/artikel/indonesia-committed-to-build-ai-inclusive-governance