

Aswaja Values and Forest Bioeconomy: A Conceptual Framework for Strengthening Value-Based Social Capital toward Indonesia Emas 2045

Mahfudz^{1)*}, Khulfi M. Khalwani²⁾, Dodi Sumardi³⁾, Farid A. U. Hamdani⁴⁾

¹⁾ Secretariat General of the Ministry of Forestry (MoF), Jakarta Pusat 10270 – Indonesia

²⁾ Defence Science Study Program, Indonesia Defense University, Jakarta Pusat 10440 – Indonesia

^{3,4)} Center for Social and Economic Development of Forest Communities, MoF, Bogor 16118 – Indonesia

*Corresponding Author

Email: mochtar_mahfudz@yahoo.com, khulfi.khalwani@doktoral.idu.ac.id

Abstract

The transition toward a sustainable forest bioeconomy requires not only technological innovation and institutional capacity but also ethical values that strengthen collaboration and collective action. This study aims to develop a conceptual framework that integrates Ahlussunnah wal Jama'ah (Aswaja) values into forest bioeconomy by positioning them as the normative foundation of value-based social capital. A qualitative approach was employed using an Integrative Literature Review (ILR), synthesizing 37 scientific publications and four Indonesian policy documents through content analysis and thematic synthesis. The findings indicate that Aswaja values—*tawassuʿ* (moderation), *tawāzun* (balance), *tasāmuḥ* (tolerance), *i'tidāl* (justice), and *maṣlahah* (public benefit)—provide an ethical basis for strengthening trust, reciprocity, institutional legitimacy, and collective action in community-based forest governance. Building on these findings, the study proposes a conceptual model in which Aswaja values function as the normative foundation, value-based social capital serves as the institutional mechanism, and forest bioeconomy acts as the strategic instrument for achieving sustainable development outcomes. The model extends existing forest bioeconomy literature by integrating ethical, institutional, and socio-economic dimensions into a unified analytical framework. It also offers practical insights for policymakers, Social Forestry practitioners, and community organizations seeking to promote inclusive, resilient, and sustainable forest-based development in support of Indonesia Emas 2045.

Keywords: Aswaja Values, Forest Bioeconomy, Value-Based Social Capital, Social Forestry, Sustainable Development

INTRODUCTION

The global transition toward a sustainable bioeconomy has fundamentally reshaped perspectives on the role of the forestry sector. Forests are no longer viewed merely as sources of timber commodities but as renewable biological resources capable of generating economic, social, and ecological value simultaneously. This transformation is supported by growing evidence demonstrating that the forestry sector contributes substantially to national value creation through its linkages with industrial development, trade, and regional economic growth (Ní Dhubháin et al., 2009).

Within the bioeconomy paradigm, forest resources are increasingly utilized to produce a wide range of value-added products and ecosystem services, including non-timber forest products, biomaterials, bioenergy, biopharmaceuticals, environmental services, and carbon trading. These developments enable forests to contribute simultaneously to low-carbon economic development and ecosystem sustainability (Artene et al., 2022; Holmgren et al., 2020; Zargar et al., 2022). Consequently, forest bioeconomy has emerged as a strategic pathway for promoting green economic growth, enhancing competitiveness, and strengthening sustainable development (Chamberlain & Smith-Hall, 2024; Linser & Lier, 2020).

These global developments have also influenced forestry policies in many countries, including Indonesia. Contemporary forestry development is no longer solely directed toward increasing forest production but increasingly emphasizes sustainable landscape management that integrates economic, social, and ecological objectives. Policies promoting Social Forestry, multiple forest enterprises, forest and land rehabilitation, non-timber forest products, and

environmental services represent key components of this transformation. This policy direction is consistent with Indonesia's Long-Term National Development Plan (Law No. 59 of 2024) and the National Medium-Term Development Plan (Presidential Regulation No. 12 of 2025), both of which identify the green economy, food security, energy security, water security, and bioeconomy as strategic pillars for achieving the vision of Indonesia Emas 2045. This commitment is further reflected in Indonesia's national forestry policies, which position sustainable forest management as a means of simultaneously improving community welfare and conserving the environment (Ministry of Environment and Forestry Republic of Indonesia, 2024; Nugroho et al., 2023).

Recent developments in the forest-based bioeconomy literature indicate that successful forestry transformation depends not only on technological innovation, investment, and public policy but also on governance quality, institutional resilience, and the social sustainability of local communities. Contemporary studies increasingly recognize forest bioeconomy as a multidimensional development paradigm that integrates economic competitiveness, ecological sustainability, social inclusion, and collaborative governance rather than merely promoting the efficient utilization of renewable biological resources (Kleinschmit et al., 2025; Luhas & Mikkilä, 2025). Within this perspective, the capacity of communities to participate, cooperate, and collectively manage forest resources has become a critical determinant of long-term sustainability. Numerous studies demonstrate that social capital—expressed through trust, shared norms, social networks, local leadership, and collective action—constitutes a strategic governance resource capable of strengthening institutional legitimacy, reducing transaction costs, and enhancing adaptive capacity in community-based forest management (Halonen et al., 2022; Harbi et al., 2023; Riyanto et al., 2025; Suwanto et al., 2026).

In Indonesia, studies on Social Forestry consistently show that successful community-based forest management is strongly influenced by institutional quality, actor collaboration, tenure security, and collaborative governance capable of simultaneously strengthening forest conservation and improving local livelihoods (Erbaugh, 2019; Gunawan et al., 2022; Myers et al., 2022; Sahide et al., 2020; Santika et al., 2019). Accordingly, social capital has become one of the fundamental pillars supporting the development of forest bioeconomy.

Despite these important advances, existing scholarship continues to conceptualize governance and social capital primarily from institutional and managerial perspectives. Comparatively little attention has been devoted to the ethical and normative foundations that shape trust, reciprocity, collective responsibility, and institutional legitimacy within local communities. In socially embedded societies such as Indonesia, where religious values and local wisdom continue to influence patterns of cooperation and natural resource management, ethical value systems are not merely cultural attributes but may function as institutional resources capable of reinforcing collaboration, strengthening social cohesion, and sustaining collective action over time (Kleinschmit et al., 2025; Riyanto et al., 2025). This limitation becomes particularly significant because the effectiveness of community-based forest governance depends not only on institutional arrangements but also on the moral values that guide interactions among individuals, communities, and natural resources.

Within the Indonesian context, the values of Ahlussunnah wal Jama'ah (Aswaja) have evolved as an integral component of Nahdlatul Ulama, emerging through the interaction between Islamic teachings, local culture, and indigenous wisdom. Rather than functioning solely as a theological doctrine, Aswaja constitutes a normative framework that shapes social ethics, religious practices, and human relationships with the natural environment (Zamroji et al., 2026). Its core principles—*tawassuṭ* (moderation), *tawāzun* (balance), *tasāmuḥ* (tolerance), *i'tidāl* (justice), and *maṣlaḥah* (public benefit)—provide ethical guidance for balancing economic productivity, environmental sustainability, and community welfare.

Previous studies demonstrate that these values have been implemented through community-based conservation initiatives, environmental education in Islamic boarding schools (pesantren), ecological preaching, and the strengthening of ethical natural resource management, particularly within Nahdlatul Ulama (Amri, 2012; Barizi & Kosbhandono, 2021; Basri et al., 2024; Firnando & Setiawati, 2025; Huda, 2023; Maksum et al., 2025; Munandar & Susanti, 2025). Nevertheless, existing scholarship has largely examined Aswaja from the perspectives of environmental ethics or socio-religious movements. Its integration into a forest bioeconomy framework as the normative foundation of value-based social capital remains insufficiently explored. Addressing this gap, the present study develops an integrated conceptual model that positions Aswaja values as the ethical foundation of value-based social capital and forest bioeconomy as the strategic instrument for promoting inclusive, resilient, and sustainable development toward Indonesia Emas 2045.

RESEARCH METHODS

This study employed a qualitative research approach because its primary objective was to understand, interpret, and integrate diverse theoretical perspectives and empirical findings in order to develop a conceptual model (Creswell & Creswell, 2018). The study adopted an Integrative Literature Review (ILR) design, which enables the synthesis of theoretical knowledge, empirical evidence, and policy documents into a comprehensive conceptual framework (Torraco, 2005). This approach was considered appropriate because the research sought not merely to summarize previous studies but to generate a new conceptual model explaining how Aswaja values function as a normative foundation for strengthening social capital within the context of forest bioeconomy.

The literature search was conducted using Scopus, ScienceDirect, and Google Scholar, complemented by an examination of key Indonesian policy documents related to sustainable forestry and bioeconomy development. These documents included Law No. 59 of 2024 concerning the National Long-Term Development Plan (RPJPN) 2025–2045, Presidential Regulation No. 12 of 2025 concerning the National Medium-Term Development Plan (RPJMN) 2025–2029, Minister of Forestry Regulation No. 18 of 2025 on the Ministry of Forestry Strategic Plan 2025–2029, and The State of Indonesia's Forest 2024. Literature retrieval employed combinations of the following keywords: forest bioeconomy, bioeconomy, social capital, social forestry, forest governance, Aswaja, Nahdlatul Ulama, and Islamic environmental ethics.

The initial search identified 59 publications. Following a systematic screening process based on thematic relevance, source quality, duplication, and consistency with the research objectives, 37 scientific publications and four national policy documents, published between 2009 and 2025, were selected for inclusion in the conceptual synthesis. Priority was given to peer-reviewed studies addressing forest bioeconomy, social capital, Social Forestry, Islamic environmental ethics, religious organizations, and sustainable forest governance in Indonesia.

The selected literature was analyzed using content analysis to identify key concepts, recurring themes, and relationships among variables (Krippendorff, 2013). Subsequently, thematic synthesis was employed to integrate findings across studies into three overarching conceptual dimensions: forest bioeconomy, social capital, and Aswaja values. The synthesis followed an iterative process involving repeated comparison, conceptual refinement, and cross-study integration until a coherent conceptual framework was established. This process resulted in the proposed Conceptual Model of Integrating Aswaja Values into Forest Bioeconomy, which positions Aswaja values as the normative foundation, social capital as the institutional mechanism, and forest bioeconomy as the strategic instrument for promoting inclusive, equitable, and sustainable real-sector development toward Indonesia Emas 2045.

To enhance the credibility of the conceptual findings, triangulation was conducted by comparing evidence derived from scientific literature and national policy documents. Consistency across theoretical arguments, empirical findings, and policy directions was continuously evaluated throughout the analytical process to ensure the robustness and internal coherence of the proposed conceptual model.

RESULTS AND DISCUSSION

Results

Findings from the Integrative Literature Review

The integrative literature review indicates that the transition toward a sustainable forest bioeconomy has fundamentally transformed the paradigm of forestry development. Rather than emphasizing the extraction of timber resources, contemporary forest bioeconomy promotes the sustainable utilization of renewable biological resources capable of generating economic, social, and ecological value simultaneously. Within this perspective, forests are no longer viewed merely as sources of timber (timber-based economy), but as multifunctional ecosystems providing biomass, non-timber forest products, bioenergy, biomaterials, biopharmaceutical resources, ecosystem services, and carbon sequestration that collectively support green economic development. This transition reflects a broader shift from an extractive economic model toward a regenerative economy in which sustainability becomes an integral component of long-term economic growth (Artene et al., 2022; Holmgren et al., 2020; Zargar et al., 2022). Furthermore, the literature indicates that forest bioeconomy is increasingly understood as a governance-oriented development paradigm integrating ecological sustainability, community participation, institutional capacity, and equitable value creation. Consequently, the success of forest bioeconomy depends not only on the availability of biological resources but also on institutional arrangements capable of balancing conservation objectives with economic productivity and social welfare (Chamberlain & Smith-Hall, 2024; Holmgren et al., 2020).

The literature synthesis further identifies social capital as one of the most critical enabling factors in the implementation of forest bioeconomy. Existing studies consistently demonstrate that trust, social networks, shared norms, reciprocity, and collective action facilitate collaboration among stakeholders, reduce transaction costs, and improve institutional effectiveness in managing forest resources (Halonen et al., 2022; Harbi et al., 2023; Myers et al., 2022). Rather than functioning solely as a social attribute, social capital operates as an institutional mechanism that enables communities to coordinate collective action, resolve conflicts, and maintain long-term cooperation in community-based forest management. Within the Indonesian context, the importance of social capital is clearly reflected in the implementation of the Social Forestry program. Previous studies have shown that community participation, local leadership, institutional legitimacy, and collaborative governance significantly influence the sustainability of Social Forestry initiatives (Gunawan et al., 2022; Sahide et al., 2020; Santika et al., 2019). These findings indicate that successful forest bioeconomy implementation depends not only on technological innovation and policy interventions but also on the presence of strong social institutions capable of mobilizing local communities and maintaining collective commitment toward sustainable forest management.

The literature review also reveals an important conceptual limitation. Most previous studies conceptualize social capital primarily in terms of institutional capacity, governance quality, or community participation, while comparatively limited attention has been devoted to the normative values that shape and sustain social relationships. Consequently, the ethical and cultural foundations underlying trust, cooperation, and collective responsibility remain underexplored within the forest bioeconomy literature. This synthesis identifies a research gap

concerning the integration of ethical values into forest bioeconomy, particularly regarding their role in reinforcing social capital and strengthening collaborative governance in community-based forest management.

To summarize the principal findings of the integrative literature review, Table 1 presents the synthesis of previous studies together with the conceptual positioning adopted in this study.

Table 1. Literature Synthesis and Conceptual Positioning of the Proposed Framework

Literature Theme	Main Findings from Previous Studies	Research Gap	Conceptual Position in This Study
Forest Bioeconomy	Technological innovation, renewable resources, governance, green economy	Limited attention to ethical and cultural dimensions	Forest bioeconomy functions as the strategic instrument for sustainable development
Social Capital	Trust, social networks, institutional capacity, collective action	Normative foundations remain underexplored	Value-based social capital serves as the institutional mechanism linking ethical values and governance
Aswaja Values	Religious ethics, social moderation, environmental stewardship, local wisdom	Rarely integrated into forest bioeconomy studies	Aswaja values constitute the normative foundation of value-based social capital
Conceptual Integration	Studies examine these themes separately	No integrated conceptual framework	This study develops an integrated model linking Aswaja values, value-based social capital, and forest bioeconomy

Source: Developed by the authors based on the integrative literature review and thematic synthesis.

Development of the Conceptual Model

The integrative literature review and thematic synthesis resulted in the development of a conceptual model that integrates Aswaja values, value-based social capital, and forest bioeconomy into a unified analytical framework (**Figure 1**). The model was derived through an iterative synthesis of theoretical perspectives, empirical findings, and national policy documents. The synthesis identified three interrelated conceptual dimensions that collectively explain how ethical values, institutional mechanisms, and forest-based economic activities interact in supporting sustainable community-based forest management.

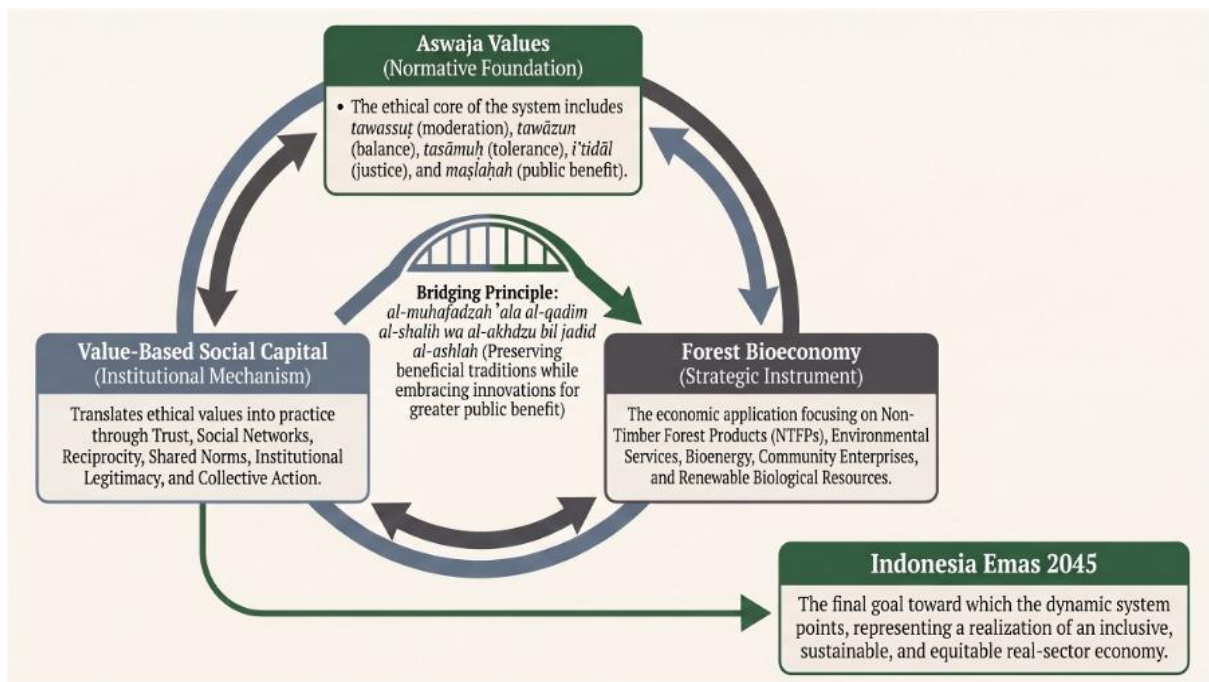


Figure 1. Conceptual Model of Integrating Aswaja Values into Forest Bioeconomy

(Source: Source: processed by researchers)

The first dimension consists of the core values of Ahlussunnah wal Jama'ah (Aswaja), namely *tawassuṭ* (moderation), *tawāzun* (balance), *tasāmuḥ* (tolerance), *i'tidāl* (justice), and *maṣlaḥah* (public benefit). The literature synthesis indicates that these values collectively function as ethical principles guiding community interaction, cooperation, and responsible stewardship of forest resources. Together, these principles encourage inclusive participation, mutual trust, social cohesion, and collective responsibility within community-based forest governance.

The second dimension comprises value-based social capital, which represents the institutional mechanism through which ethical values are translated into collaborative practices. Consistent with the literature reviewed, this dimension encompasses trust, social networks, reciprocity, shared norms, institutional legitimacy, and collective action. The synthesis demonstrates that these institutional characteristics facilitate long-term cooperation, conflict resolution, and collaborative governance in community-based forest management.

The third dimension consists of forest bioeconomy, which functions as the strategic application of value-based social capital within sustainable forest management. The literature identifies forest bioeconomy as encompassing the sustainable utilization of renewable biological resources, including non-timber forest products, environmental services, bioenergy, biomaterials, and community-based forest enterprises. These activities contribute simultaneously to economic development, biodiversity conservation, ecosystem services, and community resilience.

The synthesis further indicates that these three dimensions form an interconnected system. Aswaja values provide the ethical basis that supports value-based social capital, while value-based social capital facilitates collaborative governance and collective action in forest management. These institutional processes enable the effective implementation of forest bioeconomy, which subsequently contributes to sustainable forest utilization, community welfare, environmental conservation, and the resilience of the real-sector economy. The resulting interactions form a continuous relationship among ethical values, institutional mechanisms, and sustainable forest-based development.

Discussion

Theoretical Contribution of the Conceptual Model

The conceptual model developed in this study contributes to the evolving discourse on forest bioeconomy by integrating ethical, institutional, and socio-economic dimensions into a unified analytical framework. Previous studies have predominantly examined forest bioeconomy from technological, ecological, or governance perspectives, emphasizing renewable biological resources, innovation, market development, institutional arrangements, and the transition toward a sustainable and low-carbon economy (Artene et al., 2022; Chamberlain & Smith-Hall, 2024; Holmgren et al., 2020; Linser & Lier, 2020). Recent scholarship has further broadened this perspective by recognizing sustainable forest management as a strategic foundation for economic security (Butko, 2021), highlighting the transition toward Forestry 5.0 through the integration of human-centered artificial intelligence and digital innovation (Holzinger et al., 2024), and optimizing forest sector performance through innovation, long-term investment strategies, and life-cycle decision-making (de Melo et al., 2025). More recent studies have also highlighted that the long-term success of forest bioeconomy depends not only on technological innovation but also on governance quality, institutional resilience, and social sustainability, particularly within the Global South (Kleinschmit et al., 2025; Luhas & Mikkilä, 2025). Collectively, these developments indicate that contemporary forest bioeconomy has evolved beyond biomass utilization toward a multidimensional development paradigm integrating technological innovation, governance, socio-economic resilience, and sustainability. Nevertheless, the literature synthesis undertaken in this study indicates that, although social capital has become an essential component of forest bioeconomy, its ethical and normative foundations remain insufficiently explored.

Most existing studies conceptualize social capital primarily in terms of trust, social networks, collective action, institutional effectiveness, and collaborative governance (Halonen et al., 2022; Riyanto et al., 2025; Suwanto et al., 2026). These perspectives successfully explain how communities cooperate in forest management but provide only limited explanation of the ethical values that sustain trust, reciprocity, and collective responsibility over time. This study addresses that conceptual limitation by positioning Ahlussunnah wal Jama'ah (Aswaja) values as the normative foundation of value-based social capital. Rather than treating ethical values as external socio-cultural variables, the proposed model conceptualizes them as institutional resources that reinforce trust, institutional legitimacy, and collaborative action. In doing so, the model extends conventional social capital theory by demonstrating that social capital is sustained not only through institutional arrangements and stakeholder collaboration but also through shared ethical values that support long-term cooperation in community-based forest governance. This perspective complements previous studies emphasizing institutional effectiveness and community participation as key determinants of successful forest management (Harbi et al., 2023; Myers et al., 2022).

Beyond its theological meaning, Aswaja represents a comprehensive framework of social ethics that shapes interactions among individuals, communities, and institutions while promoting moderation, inclusiveness, social harmony, and collective responsibility within Indonesian Muslim society (Amri, 2012; Basri et al., 2024). This understanding is also consistent with the broader conception of Islam Nusantara, in which Islamic teachings interact dynamically with local culture and indigenous traditions to shape social ethics, religious practice, and community life (Zamroji et al., 2026). Accordingly, Aswaja should be understood not only as a theological orientation but also as a socio-cultural framework capable of strengthening institutional legitimacy and community resilience. This normative orientation is further reinforced by KH. Hasyim Asy'ari's principle of *al-muhafadzah 'ala al-qadim al-shalih wa al-akhdzu bil jadid al-ashlah*, which advocates preserving beneficial traditions while embracing innovations that generate greater public benefit (Aini et al., 2025). Rather than rejecting change, this principle

encourages adaptive transformation grounded in enduring moral values, making it particularly relevant as an ethical foundation for sustainable community-based forest governance. Collectively, the five core principles of Aswaja—*tawassuṭ* (moderation), *tawāzun* (balance), *tasāmuḥ* (tolerance), *i‘tidāl* (justice), and *maṣlaḥah* (public benefit)—provide complementary ethical guidance that promotes balanced decision-making, social inclusion, equitable participation, and collective welfare. Together, these principles reinforce trust, reciprocity, social cohesion, and institutional legitimacy, thereby strengthening value-based social capital that supports collaborative forest governance and sustainable forest bioeconomy.

The proposed framework also contributes to the literature on sustainable forest governance by integrating three analytical dimensions that have generally been examined separately, namely forest bioeconomy, social capital, and Aswaja values. Existing studies on forest bioeconomy have largely focused on technological transformation, industrial innovation, sustainable forest utilization, and biomass-based value creation (Chamberlain & Smith-Hall, 2024; Holmgren et al., 2020). More recently, increasing attention has also been devoted to the strategic contribution of non-wood forest products (NWFPs) and ecosystem services in expanding forest-based value creation, thereby reinforcing the multidimensional character of forest bioeconomy (Weiss et al., 2020). Meanwhile, studies concerning Aswaja have predominantly examined environmental ethics, ecological education, ecological stewardship, and socio-religious movements within the context of Nahdlatul Ulama (Barizi & Kosbhandono, 2021; Firnando & Setiawati, 2025; Huda, 2023; Maksum et al., 2025; Munandar & Susanti, 2025). By synthesizing these previously disconnected bodies of knowledge into a single conceptual framework, this study demonstrates how ethical values function as the normative foundation, value-based social capital operates as the institutional mechanism, and forest bioeconomy serves as the strategic instrument for achieving sustainable forest development. In this perspective, integrating Aswaja values transforms social capital from a predominantly institutional concept into a value-based social capital framework, in which trust is strengthened through ethical commitment, collective action is reinforced by shared moral responsibility, and collaborative governance derives legitimacy from commonly accepted normative values.

Finally, this study expands the conceptual discourse on sustainable development by demonstrating that religious values should not merely be regarded as socio-cultural attributes but also as strategic institutional resources capable of strengthening governance systems and enhancing community resilience. This perspective is particularly relevant in socially embedded contexts such as Indonesia, where religious institutions, local wisdom, and community organizations continue to influence patterns of cooperation and natural resource management (Firnando & Setiawati, 2025; Huda, 2023; Munandar & Susanti, 2025). Accordingly, the principal theoretical contribution of this study lies in reconceptualizing forest bioeconomy as a multilevel framework in which Aswaja values constitute the normative layer, value-based social capital functions as the institutional layer, and forest bioeconomy represents the developmental layer through which sustainable ecological, social, and economic outcomes are achieved. Beyond enriching the literature on forest bioeconomy and social capital, the proposed framework provides a conceptual basis for integrating ethical values into community-based forest development strategies that support ecological sustainability, social inclusion, institutional resilience, and an inclusive real-sector economy toward Indonesia Emas 2045.

Practical Implications for Forest Bioeconomy Development

The conceptual model developed in this study has important practical implications for forest bioeconomy development, particularly in countries where forest governance involves complex interactions among ecological, institutional, and socio-cultural systems. The findings suggest that successful forest bioeconomy transformation depends not only on technological innovation, policy support, and institutional capacity but also on ethical values capable of strengthening trust, collective action, and long-term collaboration among stakeholders.

Accordingly, forest bioeconomy should be understood as a socially embedded development process in which institutional effectiveness is reinforced by value-based social capital rather than by formal governance mechanisms alone. This perspective is consistent with the growing international recognition that sustainable forest management should simultaneously enhance economic resilience, environmental sustainability, and societal well-being, thereby contributing to broader economic security and sustainable development (Butko, 2021; de Melo et al., 2025).

Beyond the forestry sector itself, the proposed framework also aligns with the growing international discourse on Nature-based Solutions (NbS), which emphasizes the integration of ecological integrity, social inclusion, and economic resilience in addressing complex sustainability challenges (Cook et al., 2025; Kabisch et al., 2022). Although NbS has primarily been discussed in urban and landscape contexts, its underlying principles of collaborative governance, ecosystem stewardship, and community participation are equally relevant to community-based forest bioeconomy. By strengthening value-based social capital through shared ethical values, the proposed framework provides an additional socio-cultural dimension that complements existing NbS approaches, particularly in socially embedded rural landscapes.

Within the Indonesian context, these findings are particularly relevant because forest governance is characterized by high levels of social, cultural, and institutional diversity. The implementation of Social Forestry, forest and land rehabilitation, non-timber forest product development, ecosystem service management, and community-based bioeconomy initiatives requires sustained collaboration among government institutions, local communities, customary organizations, religious institutions, academic institutions, and the private sector. Likewise, strengthening rural livelihoods through sustainable forest management requires increasing local value creation, equitable market access, and community participation, particularly among small-scale forest managers (Sadanandan Nambiar, 2021). Consequently, strengthening collaborative governance cannot rely solely on regulatory frameworks or financial incentives but should also incorporate shared ethical values that cultivate trust, mutual responsibility, and social cohesion. In this regard, Aswaja values complement existing institutional arrangements by reinforcing participatory and inclusive approaches to community-based forest governance (Aini et al., 2025; Amri, 2012; Basri et al., 2024; Firnando & Setiawati, 2025).

The proposed framework also provides practical guidance for policymakers in designing forest bioeconomy strategies that integrate socio-cultural dimensions into sustainable forest development. Rather than approaching bioeconomy solely through technological innovation or industrial development, policies should strengthen community empowerment, value-based capacity building, collaborative leadership, and institutional partnerships involving local communities, customary institutions, religious organizations, academia, and the private sector. Such an approach is fully consistent with Indonesia's current forestry development agenda, which prioritizes sustainable forest management, Social Forestry, forest rehabilitation, forest bioeconomy, and community empowerment as strategic components of the Ministry of Forestry Strategic Plan 2025–2029 (Ministry of Environment and Forestry Republic of Indonesia, 2024; Nugroho et al., 2023; Peraturan Menteri Kehutanan Nomor 18 Tahun 2025 Tentang Rencana Strategis Kementerian Kehutanan Tahun 2025-2029, 2025).

From an institutional perspective, the model highlights the strategic contribution of religious organizations, particularly Nahdlatul Ulama (NU), in supporting sustainable forest governance. Through its extensive network of pesantren, educational institutions, community organizations, and grassroots initiatives, NU possesses considerable capacity to disseminate environmental ethics, strengthen community participation, and encourage collective responsibility in forest-based economic activities. Furthermore, the principle of *al-muhafadzah 'ala al-qadim al-shalih wa al-akhdzu bil jadid al-ashlah* provides an ethical foundation for integrating local wisdom with contemporary forest bioeconomy practices by encouraging adaptive innovation while preserving beneficial cultural values (Aini et al., 2025). This

perspective demonstrates that religious institutions can function not only as agents of social development but also as strategic partners in strengthening collaborative forest governance and supporting the long-term sustainability of forest-based rural development.

More broadly, the proposed framework suggests that future forest bioeconomy policies should move beyond predominantly economic and technological approaches by incorporating ethical values as strategic institutional assets. Such an approach enables ecological sustainability, social inclusion, and economic development to be pursued simultaneously while strengthening institutional resilience, community participation, and adaptive governance. Consequently, integrating Aswaja values into forest bioeconomy provides an alternative pathway for promoting sustainable forest governance that is not only economically productive and environmentally responsible but also socially legitimate and culturally grounded. This integrated perspective contributes to Indonesia's broader aspiration of achieving an inclusive, resilient, and sustainable real-sector economy toward Indonesia Emas 2045.

CONCLUSION

This study demonstrates that the sustainability of forest bioeconomy extends beyond technological innovation, institutional reform, and policy intervention. Through an integrative literature review and thematic synthesis, it develops a conceptual model that positions Ahlussunnah wal Jama'ah (Aswaja) values as the normative foundation of value-based social capital, thereby strengthening collaborative governance and supporting the sustainable implementation of forest bioeconomy. The model shows that the principles of tawassut (moderation), tawāzun (balance), tasāmuḥ (tolerance), i'tidāl (justice), and maṣlaḥah (public benefit) provide an ethical basis for fostering trust, reciprocity, institutional legitimacy, and collective responsibility in community-based forest management.

The principal contribution of this study lies in extending the forest bioeconomy literature by integrating ethical values into the analysis of social capital. While previous studies have primarily emphasized technological advancement, governance mechanisms, and institutional capacity, the proposed framework introduces value-based social capital as a conceptual bridge linking normative values with sustainable forest governance. This perspective demonstrates that cultural and religious values are not merely socio-cultural attributes but strategic institutional resources capable of reinforcing collective action, strengthening community resilience, and promoting inclusive bioeconomy development.

The proposed model also offers practical implications for forest governance in Indonesia. It provides an alternative framework for policymakers, Social Forestry practitioners, community organizations, and religious institutions to design development strategies that integrate ecological sustainability, economic empowerment, and local cultural values. Such an approach is particularly relevant in Indonesia, where social cohesion, local wisdom, and religious institutions continue to shape community participation in natural resource management. By incorporating these dimensions into forest bioeconomy, the model supports more inclusive, adaptive, and sustainable development while contributing to the realization of Indonesia Emas 2045.

This study is limited by its conceptual nature, as the proposed framework has not yet been empirically tested. Future research should therefore validate the model through quantitative, qualitative, or mixed-method studies across different Social Forestry contexts and socio-cultural settings. Comparative studies involving diverse local communities and institutional arrangements would further enhance understanding of how ethical values interact with social capital to influence the implementation of forest bioeconomy, thereby refining the theoretical and practical applicability of the proposed framework.

Acknowledgements

The authors gratefully acknowledge Muhammad Zahrul Muttaqin for his valuable comments and constructive feedback on earlier drafts of this manuscript. His insights contributed to improving the quality of the paper; however, he did not contribute as an author or co-author, and all interpretations and conclusions remain the responsibility of the authors.

REFERENCES

- Aini, I. N., Sopingi, I., & Hidayati, A. (2025). Al-Muhafadzah bil Qadim al-Shalih wa Al-Akhdzu bil Jadid Al-Ashlah in Education Perspective of Hadrotus Syaikh KH Hasyim Asy'ari. *Al-Munawwarah: Journal of Islamic Education*, 1(1). <https://doi.org/10.38073/almunawwarah.v1i1.2685>
- Amri, U. (2012). Konservasi Berbasis Komunitas Religi: Membedah Peran Ormas Keagamaan Dalam Upaya Melestarikan Sumber Daya Alam Di Indonesia. *Masyarakat Indonesia*, 38(1). <https://doi.org/10.14203/jmi.v38i1.294>
- Artene, A. E., Cioca, L.-I., Domil, A. E., Ivascu, L., Burca, V., & Bogdan, O. (2022). The Macroeconomic Implications of the Transition of the Forestry Industry towards Bioeconomy. In *Forests* (Vol. 13, Issue 11, p. 1961). <https://doi.org/10.3390/f13111961>
- Barizi, A., & Kosbhandono, E. (2021). *Ijtihad ekologis pesantren dalam upaya konservasi hutan dan sumber daya air (studi pada Pesantren Nurussalam Singgahan, Tuban)* [UIN Maulana Malik Ibrahim Malang]. <https://repository.uin-malang.ac.id/13505/>
- Basri, S., Adnan, Y., Widiastuty, L., Syamsul, M. A., & Indar, I. (2024). Islamic Environmental Ethics: A Cultural Framework for Sustainable Resource Management and Global Ecological Stewardship. *Diversity: Disease Preventive of Research Integrity*. <https://api.semanticscholar.org/CorpusID:277028414>
- Butko, G. (2021). Sustainable forest management as a basis for economic security. *EDP Sciences*, 291(02031). <https://doi.org/10.1051/e3sconf/202129102031>
- Chamberlain, J., & Smith-Hall, C. (2024). Harnessing the full potential of a global forest-based bioeconomy through non-timber products: Beyond logs, biotechnology, and high-income countries. *Forest Policy and Economics*, 158, 103105. <https://doi.org/https://doi.org/10.1016/j.forpol.2023.103105>
- Cook, E. M., Kim, Y., Grimm, N. B., McPhearson, T., Anderson, P., Bulkeley, H., Collier, M. J., Diep, L., Morató, J., & Zhou, W. (2025). Nature-based solutions for urban sustainability. *Proceedings of the National Academy of Sciences*, 122(29), e2315909122. <https://doi.org/10.1073/pnas.2315909122>
- Creswell, J. W. (2018). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches + a crash course in statistics. In *Research Defign: Qualitative, Quantitative, and Mixed M ethods Approaches* (p. 304). Sage Publications, Inc.
- de Melo, G. A., Paes, T. F. A., da Costa, J. S., Jarochinski e Silva, C. S., de Castro Júnior, L. G., Gomide, L. R., Peixoto, M. G. M., Guarnieri, P., Barbosa, S. B., Serrano, A. L. M., & Ferreira, L. O. G. (2025). Optimizing forest sector performance based on life cycle cost analysis and real options. *Science of The Total Environment*, 988, 179675. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2025.179675>
- Erbaugh, J. T. (2019). Responsibilization and social forestry in Indonesia. *Forest Policy and Economics*, 109, 102019. <https://doi.org/https://doi.org/10.1016/j.forpol.2019.102019>
- Firnando, H. G., & Setiawati, C. (2025). Ekoteologi Aswaja: Integrasi Nilai-Nilai Nahdlatul Ulama dalam Etika Lingkungan. *NAHNU: Journal of Nahdlatul Ulama and Contemporary Islamic Studies*, 3(2). <https://doi.org/10.63875/nahnu.v3i2.109>
- Gunawan, H., Yeny, I., Karlina, E., Suharti, S., Murniati, Subarudi, Mulyanto, B., Ekawati, S.,

- Garsetiasih, R., Pratiwi, Sumirat, B. K., Sawitri, R., Heriyanto, N. M., Takandjandji, M., Widarti, A., Surati, Desmiwati, Kalima, T., Effendi, R., ... Nurlia, A. (2022). Integrating Social Forestry and Biodiversity Conservation in Indonesia. In *Forests* (Vol. 13, Issue 12). <https://doi.org/10.3390/f13122152>
- Halonen, M., Näyhä, A., & Kuhmonen, I. (2022). Regional sustainability transition through forest-based bioeconomy? Development actors' perspectives on related policies, power, and justice. *Forest Policy and Economics*, 142, 102775. <https://doi.org/https://doi.org/10.1016/j.forpol.2022.102775>
- Harbi, J., Cao, Y., Milantara, N., & Mustafa, A. B. (2023). Assessing the Sustainability of NTFP-Based Community Enterprises: A Viable Business Model for Indonesian Rural Forested Areas. In *Forests* (Vol. 14, Issue 6, p. 1251). <https://doi.org/10.3390/f14061251>
- Holmgren, S., D'Amato, D., & Giurca, A. (2020). Bioeconomy imaginaries: A review of forest-related social science literature. *Ambio*, 49(12), 1860–1877. <https://doi.org/10.1007/s13280-020-01398-6>
- Holzinger, A., Schweier, J., Gollob, C., Nothdurft, A., Hasenauer, H., Kirisits, T., Häggström, C., Visser, R., Cavalli, R., Spinelli, R., & Stampfer, K. (2024). From Industry 5.0 to Forestry 5.0: Bridging the gap with Human-Centered Artificial Intelligence. *Current Forestry Reports*, 10(6), 442–455. <https://doi.org/10.1007/s40725-024-00231-7>
- Huda, M. K. (2023). Kontribusi komunitas NU dalam isu kelestarian lingkungan hidup di Indonesia. *Jurnal Dialektika Politik*, 7(2), 170–186. <https://doi.org/10.37949/jdp.v7i2.70>
- Kabisch, N., Frantzeskaki, N., & Hansen, R. (2022). Principles for urban nature-based solutions. *Ambio*, 51(6), 1388–1401. <https://doi.org/10.1007/s13280-021-01685-w>
- Kleinschmit, D., Giurca, A., Lehmann, R., Rodríguez, F., & Sinaga, H. (2025). Bioeconomy governance in the global South: State of the art and the way forward. *Forest Policy and Economics*, 171, 103403. <https://doi.org/https://doi.org/10.1016/j.forpol.2024.103403>
- Krippendorff, K. (2013). *Content Analysis. An Introduction to Its Methodology* (3rd Editio). SAGE Publications. <https://doi.org/10.4135/9781071878781.n10>
- Linser, S., & Lier, M. (2020). The Contribution of Sustainable Development Goals and Forest-Related Indicators to National Bioeconomy Progress Monitoring. In *Sustainability* (Vol. 12, Issue 7, p. 2898). <https://doi.org/10.3390/su12072898>
- Luhass, J., & Mikkilä, M. (2025). Social sustainability in the forest-based bioeconomy: A narrative review. *Forest Policy and Economics*, 177, 103523. <https://doi.org/https://doi.org/10.1016/j.forpol.2025.103523>
- Maksum, A., Kholish, M. A., Halim, W., Sukron, A., & Harwanto, A. P. (2025). Penguatan Fatwa Hijau Nahdlatul Ulama dan pentingnya konservasi mangrove berkelanjutan di pesisir Paciran. *Wisesa: Jurnal Pengabdian Masyarakat*, 4(1), 31–36. <https://doi.org/10.21776/ub.wisesa.2025.04.1.6>
- Ministry of Environment and Forestry Republic of Indonesia. (2024). *State of Indonesia's Forest (SOIFO) - 2024: Towards Sustainability of Forest Ecosystems in Indonesia* (Vol. 4). <https://statistik.kehutan.go.id/publication/show/state-of-indonesias-forest-soifo-2024>
- Munandar, A., & Susanti, E. (2025). Green Dakwah Nahdlatul Ulama: Strategi komunikasi digital NU Online dalam membangun kesadaran ekologis. *NAHNU: Journal of Nahdlatul Ulama and Contemporary Islamic Studies*, 3(2), 579–602. <https://doi.org/10.63875/nahnu.v3i2.124>
- Myers, R., Fisher, M., Monterroso, I., Liswanti, N., Maryudi, A., Larson, A. M., Mwangi, E., & Herawati, T. (2022). Coordinating forest tenure reform: Objectives, resources and relations in Indonesia, Kenya, Nepal, Peru, and Uganda. *Forest Policy and Economics*, 139, 102718. <https://doi.org/https://doi.org/10.1016/j.forpol.2022.102718>
- Ní Dhubháin, Á., Fléchar, M.-C., Moloney, R., & O'Connor, D. (2009). Assessing the value of forestry to the Irish economy — An input–output approach. *Forest Policy and Economics*,

- 11(1), 50–55. <https://doi.org/https://doi.org/10.1016/j.forpol.2008.08.005>
- Nugroho, H. Y., Indrajaya, Y., Astana, S., Murniati, Suharti, S., Basuki, T. M., Yuwati, T. W., Putra, P. B., Narendra, B. H., Abdulah, L., Setyawati, T., Subarudi, Krisnawati, H., Purwanto, Saputra, M. H., Lisnawati, Y., Garsetiasih, R., Sawitri, R., Putri, I. A., ... Rahmila, Y. I. (2023). A Chronicle of Indonesia's Forest Management: A Long Step towards Environmental Sustainability and Community Welfare. In *Land* (Vol. 12, Issue 6). <https://doi.org/10.3390/land12061238>
- Peraturan Menteri Kehutanan Nomor 18 Tahun 2025 Tentang Rencana Strategis Kementerian Kehutanan Tahun 2025-2029 (2025). https://jdih.kehutanan.go.id/new2/home/portfolioDetails3/PERMENHUT_18_2025.pdf/18/2025/5/1302
- Riyanto, S., Ismail, M. H., & Bidin, S. (2025). Social capital as power resource in forest governance networks: A systematic review. *Multidisciplinary Reviews*, 9(5), 2026254. <https://doi.org/10.31893/multirev.2026254>
- Sadanandan Nambiar, E. K. (2021). Strengthening Vietnam's forestry sectors and rural development: Higher productivity, value, and access to fairer markets are needed to support small forest growers. *Trees, Forests and People*, 3, 100052. <https://doi.org/https://doi.org/10.1016/j.tfp.2020.100052>
- Sahide, M. A. K., Fisher, M. R., Erbaugh, J. T., Intarini, D., Dharmiasih, W., Makmur, M., Faturachmat, F., Verheijen, B., & Maryudi, A. (2020). The boom of social forestry policy and the bust of social forests in Indonesia: Developing and applying an access-exclusion framework to assess policy outcomes. *Forest Policy and Economics*, 120, 102290. <https://doi.org/https://doi.org/10.1016/j.forpol.2020.102290>
- Santika, T., Wilson, K. A., Budiharta, S., Kusworo, A., Meijaard, E., Law, E. A., Friedman, R., Hutabarat, J. A., Indrawan, T. P., St. John, F. A. V., & Struebig, M. J. (2019). Heterogeneous impacts of community forestry on forest conservation and poverty alleviation: Evidence from Indonesia. *People and Nature*, 1(2), 204–219. <https://doi.org/https://doi.org/10.1002/pan3.25>
- Suwanto, S., Awang, S. A., Atmojo, T., & Harun, M. K. (2026). Social Capital and Empowerment in Forest Governance: A Systematic Review of Southeast Asian Social Forestry Models. *Jurnal Manajemen Hutan Tropika*, 32(2). <https://doi.org/10.7226/jtfm.32.2.128>
- Torraco, Richard J. (2005). Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review*, 4(3), 356–367. <https://doi.org/10.1177/1534484305278283>
- Weiss, G., Emery, M. R., Corradini, G., & Živojinović, I. (2020). New Values of Non-Wood Forest Products. In *Forests* (Vol. 11, Issue 2, p. 165). <https://doi.org/10.3390/f11020165>
- Zamroji, N., Nahdiah, U., & Azizah, M. N. (2026). Tipologi Islam di Indonesia: Dialektika Agama, Budaya dan Tradisi Lokal. *Jurnal Pendidikan: Riset & Konseptual*, 10(2). https://doi.org/10.28926/riset_konseptual.v10i2.1474
- Zargar, S., Roy, B. B., Li, Q., Gan, J., Ke, J., Liu, X., & Tu, Q. (2022). The Application of Industrial Ecology Methods to Understand the Environmental and Economic Implications of the Forest Product Industries. *Current Forestry Reports*, 8(4), 346–361. <https://doi.org/10.1007/s40725-022-00174-x>