



ENVIRONMENTAL GOVERNANCE AND REGULATORY CHALLENGES IN ORGANIC WASTE MANAGEMENT THROUGH COMMUNITY PARTICIPATION IN URBAN INDONESIA

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ABSTRACT

Community participation is increasingly recognized as a critical component of sustainable organic waste management; however, its effectiveness remains constrained by regulatory, institutional, and socio-economic challenges. This study examines the regulatory framework, socio-legal determinants, and governance strategies for strengthening community-based organic waste management in Indonesia. Employing a socio-legal research approach supported by empirical analysis, this study investigates how legal frameworks, institutional support, infrastructure availability, and community practices influence participation in organic waste management. The findings reveal that Indonesia has established a comprehensive regulatory foundation through waste management legislation and national policies promoting reduction, recycling, and public involvement. Nevertheless, significant implementation gaps remain due to fragmented governance structures, limited coordination among stakeholders, insufficient infrastructure, and weak financial support mechanisms. Empirical results demonstrate that social and policy support is the strongest determinant of community participation, followed by community action, while environmental knowledge and attitudes alone are insufficient to generate sustainable practices. The study argues that effective organic waste governance requires a transition from a regulatory compliance model toward collaborative environmental governance based on circular economy principles. These findings contribute to the development of sustainable urban environmental governance strategies in Indonesia.

1. Introduction

Sustainable urban development requires an effective environmental governance framework capable of balancing economic development, social welfare, and ecological protection. Within this framework, solid waste management has become a fundamental component of sustainable cities, particularly in achieving Sustainable Development Goals (SDGs) 11 on sustainable cities and communities and SDG 12 on responsible consumption and production.¹ Effective waste governance is no longer understood merely as a technical process of collection, transportation, and disposal, but as a multidimensional governance challenge involving regulatory design, institutional coordination, public participation, and behavioral transformation. The transition toward sustainable waste management increasingly requires integration between legal frameworks, administrative capacity, and community-based approaches to ensure waste reduction and resource recovery.²

Globally, urban solid waste management remains one of the most persistent environmental governance challenges, particularly in developing countries experiencing rapid urbanization, population growth, and increasing consumption patterns. Global waste generation has increased dramatically from approximately 2 million tons in 1950 to more than 400 million tons annually in recent decades, creating significant pressure on urban infrastructure and environmental systems.³ This condition demonstrates that waste management problems are closely related to institutional readiness, governance effectiveness, and socio-economic capacity rather than merely technological limitations. Comparative studies indicate that successful urban waste management depends significantly on the quality of governance institutions, local government capacity, and socio-economic development conditions.⁴ Therefore, waste management should be positioned as an environmental governance issue requiring coordinated intervention among governments, communities, private actors, and civil society.

In Indonesia, waste management challenges reflect similar structural problems.

¹ United Nations Environment Programme., *From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution*, Nairobi, United Nations Environment Programme, 2021, page.31.

² Florence Barbara Awino and Sabine E. Apitz., Solid Waste Management in the Context of the Waste Hierarchy and Circular Economy Frameworks: An International Critical Review, *Integrated Environmental Assessment and Management*, Vol.20, no.1, 2024, page.18. See too, Julian Kirchherr, Denise Reike, and Marko Hekkert., Conceptualizing the Circular Economy: An Analysis of 114 Definitions, *Resources, Conservation and Recycling*, Vol.127, no.4, 2017, page.224.

³ United Nations Environment Programme., *From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution*, Nairobi, United Nations Environment Programme, 2021, page.34.

⁴ Costas A. Velis, David C. Wilson, Yoni Gavish, Sue M. Grimes, and Andrew Whiteman., Socio-Economic Development Drives Solid Waste Management Performance in Cities: A Global Analysis Using Machine Learning, *Science of the Total Environment*, Vol.872, no.4, 2023, page.161913.

National waste generation continues to increase, with household organic waste representing one of the dominant components of municipal solid waste.⁵ Organic waste, particularly food and vegetable residues, creates significant environmental burdens when disposed of through conventional landfill-based systems due to its high moisture content, decomposition process, odor generation, and potential contribution to greenhouse gas emissions. However, organic waste also provides substantial opportunities for resource recovery through composting, circular economy initiatives, and community-based waste utilization.⁶ Thus, the effectiveness of organic waste management depends not only on technical facilities but also on regulatory support and community involvement in waste reduction at the source.

The Indonesian government has established a comprehensive legal framework through Law Number 18 of 2008 concerning Waste Management, Government Regulation Number 81 of 2012 concerning Management of Household Waste and Waste Similar to Household Waste, Presidential Regulation Number 97 of 2017 concerning National Policy and Strategy for Household Waste Management, and Ministry of Environment and Forestry Regulation Number 14 of 2021 concerning Waste Banks. These regulations represent a paradigm shift from the traditional "collect–transport–dispose" approach toward integrated waste governance based on reduction, separation, recycling, and community participation. Law Number 18 of 2008 explicitly recognizes that waste management is a shared responsibility involving central government, local governments, businesses, and communities. Nevertheless, several socio-legal studies demonstrate that regulatory completeness does not automatically guarantee effective implementation. Persistent gaps remain between normative legal obligations and practical waste management outcomes due to institutional fragmentation, inadequate infrastructure, weak enforcement mechanisms, and limited public engagement.⁷

From an environmental governance perspective, community participation represents a crucial element in ensuring the effectiveness of waste regulation. Public involvement should not be understood merely as voluntary behavioral compliance but as part of environmental democracy and procedural environmental rights. Environmental law increasingly recognizes that meaningful public participation strengthens legitimacy, accountability, and effectiveness of

⁵ Rico Purnawandi Pane, Vicky Satya Wijaksana, Aldy Adrian, Zaki Alfayed, Tiara Shifa Arizky, Dian Isla Fauziah, Puspita Sari, Anggi Aprilia Putri, Wafika Zahra, Raihan Ananda Nasfi, Muhammad Rasyid, Hizkia Hasudungan Sibagariang, and Alfu Hidayatullah., Meningkatkan Efektivitas Pengangkutan Sampah melalui Penyediaan Titik Gantung Sampah di Kelurahan Sukamaju Kota Pekanbaru, *Abdimas Indonesian Journal*, Vol.6, no.1, 2026, page.339.

⁶ Patrizia Ghisellini, Catia Cialani, and Sergio Ulgiati., A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems, *Journal of Cleaner Production*, Vol.114, no.6, 2016, page.15.

⁷ Prisca Listiningrum, Moh Dahlan, Muhammad Anis Zhafran Al Anwary, Herlin Sri Wahyuni, and Rizqi Bachtiar., Waste Management Without Direction in Indonesia: A Proposed Legal Reform Towards Smart Cities, *Legality: Jurnal Ilmiah Hukum*, Vol.31, no.2, 2023, page.229. See too, Edy Lisdiyono and Moh Sidik., Regulatory Reconstruction of Waste Management to Achieve Efficient and Sustainable Environmental Management, *International Journal of Criminology and Sociology*, Vol.10, no.2, 2021, page.1051.

environmental policies.⁸ However, empirical evidence indicates that many waste management programs continue to experience participation constraints because of insufficient institutional support, limited facilities, weak social networks, and inconsistencies between policy design and local implementation.⁹

Pekanbaru City, as the capital of Riau Province, represents an important case for examining these governance challenges. Rapid urban expansion, increasing population density, and growing consumption patterns have significantly increased pressure on municipal waste management systems. In 2024, Pekanbaru generated approximately 369,019.82 tons of waste annually, while waste reduction remained limited and waste handling capacity remained insufficient.¹⁰ The imbalance between waste generation and treatment capacity has increased dependence on the Muara Fajar Final Disposal Site (TPA), while conventional disposal practices continue to create environmental risks. Although Pekanbaru has introduced several waste reduction initiatives, including waste banks, TPS 3R facilities, composting programs, and community-based environmental programs, their effectiveness remains constrained by weak source segregation, limited infrastructure, and inconsistent community participation.

The challenge becomes more significant in relation to vegetable organic waste generated from households, traditional markets, and food-related activities. Unlike inorganic waste, organic waste requires active participation at the household and community levels because separation, processing, and utilization must occur close to the source. Previous studies demonstrate that knowledge, socio-economic conditions, infrastructure availability, social support, and institutional arrangements influence waste management behavior and participation.¹¹ Research on community-based waste management in Indonesia further shows that successful waste programs depend on collaboration between local governments

⁸ Achmad Muchsin., Public Participation as a Constitutional Right in the Process of Preparing Environmental Documents: Partisipasi Publik sebagai Hak Konstitusional dalam Proses Penyusunan Dokumen Lingkungan, *Jurnal Konstitusi*, Vol.21, no.2, 2024, page.174.

⁹ Yeny Dhokhikah, Yulinah Trihadiningrum, and Sony Sunaryo., Community Participation in Household Solid Waste Reduction in Surabaya, Indonesia, *Resources, Conservation and Recycling*, Vol.102, no.4, 2015, page.158. See too, Lubna Salsabila, Eko Priyo Purnomo, and Hazel D. Jovita., The Importance of Public Participation in Sustainable Solid Waste Management, *Journal of Governance and Public Policy*, Vol.8, no.2, 2021, page.114.

¹⁰ Rico Purnawandi Pane, Vicky Satya Wijaksana, Aldy Adrian, Zaki Alfayed, Tiara Shifa Arizky, Dian Isla Fauziah, Puspita Sari, Anggi Aprilia Putri, Wafika Zahra, Raihan Ananda Nasfi, Muhammad Rasyid, Hizkia Hasudungan Sibagariang, and Alfu Hidayatullah., Meningkatkan Efektivitas Pengangkutan Sampah melalui Penyediaan Titik Gantung Sampah di Kelurahan Sukamaju Kota Pekanbaru, *Abdimas Indonesian Journal*, Vol.6, no.1, 2026, page.340.

¹¹ Rahmat Perdana Putra, Zulfan Saam, and Swis Tantoro., Pengaruh Sosial Ekonomi Masyarakat Terhadap Perilaku Pengolahan Sampah di Kecamatan Tampan Kota Pekanbaru, *Jurnal Ilmu Lingkungan*, Vol.13, no.2, 2019, page.198. See too, Rahmi Febrianti, Ratna Dewi, and Ainun Mardiah., Analisis Partisipasi Masyarakat dalam Pengelolaan Sampah di Kecamatan Tuah Madani Kota Pekanbaru, *PUBLICNESS: Journal of Public Administration Studies*, Vol.1, no.2, 2022, page.109; Prama Widayat, Ryan Pahlawan, and Safrul Rajab., Tantangan Pengelolaan Sampah Kota Pekanbaru, *Jurnal Indragiri Penelitian Multidisiplin*, Vol.5, no.1, 2025, page.111.

and communities, rather than relying solely on regulatory commands.¹²

Nevertheless, existing literature reveals several important gaps. First, previous studies on waste management in Indonesia have predominantly examined general household waste, waste banks, recycling practices, or community behavior, while empirical studies specifically addressing vegetable organic waste management remain limited. Second, although numerous studies discuss community participation, relatively limited attention has been given to the interaction between regulatory frameworks, institutional support, and community participation from an environmental governance perspective. Existing research often treats participation as an individual behavioral outcome rather than examining how legal and policy structures enable or constrain such participation.¹³ Third, limited empirical evidence exists regarding the relative influence of cognitive, social, infrastructural, and policy-related factors determining community participation in organic waste management. Understanding these determinants is essential because regulatory effectiveness depends not only on the existence of legal norms but also on their social acceptance and implementation capacity.

Furthermore, previous legal studies have identified that Indonesian waste governance continues to face regulatory challenges, including unclear institutional responsibilities, fragmented authority, weak enforcement, and limited integration of circular economy principles into municipal waste management systems.¹⁴ However, these studies have largely adopted normative or doctrinal approaches and have not sufficiently examined how regulatory conditions influence actual community participation at the local level. Therefore, a socio-legal empirical approach is required to bridge the gap between environmental law as written (*das sollen*) and waste governance practices as implemented (*das sein*).

Based on these gaps, this study seeks to analyze community participation in

¹² Rieko Kubota, Masahide Horita, and Tomohiro Tasaki., Integration of Community-Based Waste Bank Programs with the Municipal Solid-Waste-Management Policy in Makassar, Indonesia, *Journal of Material Cycles and Waste Management*, Vol.22, no.3, 2020, page.931. See too, Fatmawati, Nuryanti Mustari, Haerana, Risma Niswaty, and Abdillah., Waste Bank Policy Implementation Through Collaborative Approach: Comparative Study—Makassar and Bantaeng, Indonesia, *Sustainability*, Vol.14, no.13, 2022, page.7974; Michael Denny Latanna, Budhi Gunawan, María Laura Franco-García, and Hans Bressers., Governance Assessment of Community-Based Waste Reduction Program in Makassar, *Sustainability*, Vol.15, no.19, 2023, page.14371.

¹³ S. H. Nabila, H. A. Negoro, and D. Utari., The Level of Individual Participation of Community in Implementing Effective Solid Waste Management Policies, *Global Journal of Environmental Science and Management (GJESM)*, Vol.6, no.3, 2020, page.344. See too, Indriyani Rachman, Nia Komalasari, and Ira Rumiris Hutagalung., Community Participation on Waste Bank to Facilitate Sustainable Solid Waste Management in a Village, *Journal of Environmental Science and Sustainable Development*, Vol.4, no.2, 2021, page.332.

¹⁴ Prisca Listiningrum, Moh Dahlan, Muhammad Anis Zhafran Al Anwary, Herlin Sri Wahyuni, and Rizqi Bachtiar., Waste Management Without Direction in Indonesia: A Proposed Legal Reform Towards Smart Cities, *Legality: Jurnal Ilmiah Hukum*, Vol.31, no.2, 2023, page.230. See too, Maskun, Hanim Kamaruddin, Farida Pattitingi, Hasbi Assidiq, Siti Nurhaliza Bachril, and Nurul Habaib Al Mukarramah., Plastic Waste Management in Indonesia: Current Legal Approaches and Future Perspectives, *Hasanuddin Law Review*, Vol.9, no.1, 2025, page.111; Tasfieza Rifa and Mohammad Belayet Hossain., Micro Plastic Pollution in South Asia: The Impact of Plastic Pollution Over the Unsustainable Development Goals, *Lex Publica*, Vol.9, no.2, 2022, page.18.

vegetable organic waste management in urban Indonesia through an environmental governance and regulatory perspective. Specifically, this study addresses three research questions:

1. How does the existing environmental regulatory framework govern community participation in organic waste management in Indonesia?
2. What socio-economic, infrastructural, institutional, and policy factors influence community participation in organic waste management?
3. What regulatory and governance strategies can strengthen community-based organic waste management toward sustainable urban environmental governance?

This study contributes to environmental law and socio-legal scholarship in three ways. First, it provides empirical evidence regarding the determinants of community participation in organic waste management within the context of Indonesian environmental governance. Second, it bridges the gap between regulatory analysis and community-level implementation by examining how legal and institutional arrangements influence participation outcomes. Third, it offers policy implications for strengthening waste governance through improved regulatory coordination, participatory mechanisms, infrastructure provision, and community-based circular economy strategies.

2. Research Methods

This study employs an empirical socio-legal research approach with a quantitative analytical design to examine the implementation of environmental governance and regulatory frameworks in organic waste management through community participation in Pekanbaru City, Riau Province. The socio-legal approach was selected because waste management is not solely a technical environmental issue but also a legal and institutional problem involving the effectiveness of regulatory implementation, governmental responsibility, community obligations, and public participation as mandated under Indonesian environmental and waste management regulations. The normative framework of this study refers primarily to Law Number 18 of 2008 concerning Waste Management, Government Regulation Number 81 of 2012 concerning Management of Household Waste and Waste Similar to Household Waste, and Presidential Regulation Number 97 of 2017 concerning National Policy and Strategy for Household Waste Management, which establish waste reduction, source segregation, community participation, and sustainable waste governance as fundamental principles.

The empirical component was conducted through an analytical survey aimed at identifying factors influencing community participation in vegetable organic waste management. The study was conducted in Pekanbaru City, Riau Province, focusing on three districts with high population density and significant organic waste generation: Tuah Madani, Marpoyan Damai, and Payung Sekaki. These locations were purposively selected based on two considerations: (1) population density as an indicator of household organic waste production, and (2) the presence of active

traditional markets that generate substantial vegetable waste.

The study population comprised two groups of organic waste generators, namely household residents and traditional market vendors, representing the primary sources of vegetable organic waste in Pekanbaru City's urban waste management system. The household population consisted of 48,713 households in Tuah Madani District, 46,384 households in Marpoyan Damai District, and 30,937 households in Payung Sekaki District, resulting in a total household population of approximately 125,000 households. The minimum household sample size was estimated using the Slovin formula with a 5% margin of error, resulting in 399 respondents. The household sample was proportionally allocated based on population distribution: 154 respondents from Tuah Madani, 147 respondents from Marpoyan Damai, and 98 respondents from Payung Sekaki. In addition, 30 traditional market vendors were included as supplementary respondents, consisting of 10 vendors from each selected market (Selasa Panam Market, Arengka Market, and Labuh Baru Market), based on their role as generators of vegetable organic waste.

Household respondents were selected using simple random sampling based on household records at the neighborhood level, while market vendors were selected randomly from available vendor lists. Data were collected through structured questionnaires measuring variables related to knowledge, attitudes, availability of waste management facilities, social and policy support, community actions, and participation in organic waste management. These variables represent both behavioral dimensions and governance-related factors affecting the implementation of waste management regulations at the community level.

The research instrument was tested through validity analysis using Pearson Product Moment correlation and reliability testing using Cronbach's Alpha. Data analysis consisted of three stages: descriptive analysis to identify respondent characteristics and variable distributions; bivariate analysis using the Chi-square test to examine relationships between independent variables and participation levels; and multivariate analysis using multiple logistic regression to determine dominant factors affecting community participation. The regression results were presented using Odds Ratios (OR), 95% Confidence Intervals, and significance values.

Ethical principles were applied throughout the research process. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality of respondent identities was maintained. Through this methodology, the study integrates empirical evidence with legal and governance analysis to evaluate the effectiveness of Indonesia's regulatory framework in promoting community-based organic waste management.

3. Results and Discussion

3.1. Regulatory Framework Governing Community Participation in Organic Waste Management in Indonesia

Indonesia has established a relatively comprehensive legal foundation for integrating community participation into organic waste management. The regulatory architecture has gradually shifted from a conventional waste disposal paradigm toward a governance-oriented approach emphasizing waste reduction,

source separation, recycling, and shared responsibility among government institutions, private actors, and communities. The primary legal basis is Law Number 18 of 2008 concerning Waste Management, which recognizes waste management as a public responsibility and introduces the principles of reduction and handling based on the 3R approach (Reduce, Reuse, Recycle). This regulatory transformation indicates that communities are no longer positioned merely as waste producers but as active actors within the waste governance system.¹⁵

The legal framework is further strengthened by Law Number 32 of 2009 concerning Environmental Protection and Management, which places waste management within the broader objective of environmental sustainability and ecological protection. At the policy level, Presidential Regulation Number 97 of 2017 concerning the National Policy and Strategy for Household Waste Management and Similar Waste establishes national targets for waste reduction and handling, requiring cooperation between central government, local governments, and communities. These policies reflect the adoption of environmental governance principles where effective waste management depends not only on regulatory compliance but also on institutional coordination and public participation.¹⁶

However, empirical evidence indicates that the existence of regulatory mandates does not automatically translate into effective community participation. The decentralization system in Indonesia creates a multi-level governance structure in which waste management responsibilities are distributed between national and local governments. Although regional autonomy provides opportunities for municipalities to formulate policies that are responsive to local environmental conditions, it also produces variations in regulatory implementation, institutional capacity, budgetary support, and enforcement mechanisms across regions. In practice, the implementation of national waste management policies is highly dependent on the ability of local governments to translate legal obligations into operational programs, provide adequate infrastructure, and establish effective coordination mechanisms with community organizations and other stakeholders.¹⁷

¹⁵ Kadar Pamuji, Slamet Rosyadi, and Abdul Aziz Nasihuddin., The Legal Institutional Model of Community-Based Waste Management to Reinforce Multi-Stakeholder Collaboration in Indonesia, *Kasetsart Journal of Social Sciences*, Vol.44, no.1, 2023, page.76. See too, Hari Harjanto Setiawan, Rizal Akbar Aldyan, Siti Khoiriyah, Chanel Tri Handoko, Widodo Aribowo, and Agung Hidayat., Community-Based Approaches to Sustainable Municipal Waste Management in Indonesia, In *Municipal Waste Management: Policies and Strategies*, Britania Raya, CABI, 2025, page.101.

¹⁶ Aulia Ulfah Farahdiba, I. D. A. A. Warmadewanthi, Yunus Fransiscus, Elsa Rosyidah, Joni Hermana, and Adhi Yuniarto., The Present and Proposed Sustainable Food Waste Treatment Technology in Indonesia: A Review, *Environmental Technology & Innovation*, Vol.32, no.2, 2023, page.103256. See too, Christia Meidiana, Sekito Tomoo, and Aris Subagiyo., Municipal Waste and Its Management: Case Study in Indonesia, In *the Palgrave Handbook of Global Sustainability*, Cham, Springer International Publishing, 2022, page.10.

¹⁷ Misbah Zulfa Elizabeth, Sholihan, Masrohatun, Ririh Megah Safitri, and Naili Ni'matul Illiyyun., Why Policies and Community Don't Greet Each Other: A Study of Semarang City Policies and

This governance fragmentation has become particularly evident in community-based organic waste management, where successful implementation requires continuous interaction between regulatory frameworks, institutional arrangements, and public engagement. Several studies demonstrate that local governments often face difficulties in coordinating waste-related agencies, sustaining community programs, and providing incentives that encourage long-term participation.¹⁸ Furthermore, differences in political commitment, administrative capacity, and availability of supporting facilities contribute to unequal outcomes among cities. As a result, while national regulations establish community participation as a fundamental principle of sustainable waste governance, the practical realization of such participation remains contingent upon local governance quality, collaborative institutional arrangements, and the capacity to bridge the gap between regulatory expectations and community-level practices.¹⁹

One important finding is that the current regulatory framework still contains a significant implementation gap between normative legal obligations and practical governance arrangements. Law Number 18 of 2008 concerning Waste Management represents a fundamental shift in Indonesia's waste governance paradigm by moving beyond the conventional *collect-transport-dispose* approach toward an integrated system based on waste reduction, segregation, reuse, recycling, and community participation. The law recognizes that sustainable waste management cannot be achieved solely through governmental intervention but requires active involvement from households, communities, businesses, and other non-state actors. Similarly, subsequent policies, including Government Regulation Number 81 of 2012 and Presidential Regulation Number 97 of 2017, further reinforce the importance of community-based waste management and national waste reduction targets.

However, the existence of these regulatory provisions has not yet been fully translated into effective institutional practices at the local level. Empirical studies reveal that community participation remains constrained by several structural challenges, including unclear division of authority among institutions, limited

Community Initiatives in Waste Management, *Asian Politics & Policy*, Vol.17, no.2, 2025, page.70009. See too, Teguh Yuwono and Retna Hanani., Waste Management in Decentralized Indonesia: Policy Coherence and Multi-Level Governance in Yogyakarta, *Acta Innovations*, Vol.56, no.1, 2025, page.6.

¹⁸ Michael Denny Latanna, Budhi Gunawan, María Laura Franco-García, and Hans Bressers., Governance Assessment of Community-Based Waste Reduction Program in Makassar, *Sustainability*, Vol.15, no.19, 2023, page.14372. See too, Riska Sarofah, Taufik Nurohman, Hilal Ramdhani, and Sidik Firmadi., Bridging Environmental Justice and Policy: A Collaborative Waste Management Approach in Local Level, In *IOP Conference Series: Earth and Environmental Science*, vol.1566, Bristol, IOP Publishing, 2025, page.012028.

¹⁹ Misbah Zulfa Elizabeth, Sholihan, Masrohatun, Ririh Megah Safitri, and Naili Ni'matul Illiyyun., Why Policies and Community Don't Greet Each Other: A Study of Semarang City Policies and Community Initiatives in Waste Management, *Asian Politics & Policy*, Vol.17, no.2, 2025, page.70011. See too, Hendra Try Ardianto, Rina Martini, Wijayanto, and Yoga Putra Prameswari., Community-Based Waste Bank: Collaborative Governance in Waste Management in Two Regions, In *IOP Conference Series: Earth and Environmental Science*, vol.1537, Bristol, IOP Publishing, 2025, page.012016.

financial and technical support for community initiatives, insufficient waste management infrastructure, and weak coordination between local governments and community organizations.²⁰ Furthermore, waste management programs such as waste banks, composting initiatives, and community-based recycling schemes often depend heavily on temporary government projects rather than being integrated into sustainable institutional mechanisms.²¹ This indicates that although Indonesia's legal framework has successfully established participatory principles, it remains insufficient in creating concrete governance arrangements that ensure continuity, accountability, and incentives for community engagement. Therefore, strengthening regulatory implementation requires not only clearer legal mandates but also institutional coordination, resource allocation, and collaborative governance mechanisms capable of transforming community participation from a formal obligation into an effective environmental governance practice.²²

The regulatory challenges are particularly evident in organic waste management, where community involvement is indispensable because organic waste requires segregation, processing, and treatment at the source. Unlike conventional waste streams that may rely more heavily on centralized collection and disposal systems, organic waste management is highly dependent on daily household practices, community-level composting, local waste banks, and collective environmental initiatives. The effectiveness of organic waste governance therefore requires not only regulatory compliance but also behavioral transformation among waste producers and the availability of institutional mechanisms that support community action. National policies, including Law Number 18 of 2008 and related regulations, have recognized the importance of source-based waste reduction and community participation; however, their implementation remains strongly influenced by local governance capacity, infrastructure availability, and the ability of institutions to facilitate sustained participation.

Moreover, community-based waste management initiatives frequently encounter challenges related to limited technical assistance, inconsistent institutional support, and weak integration between government programs and grassroots

²⁰ Hari Harjanto Setiawan, Rizal Akbar Aldyan, Siti Khoiriyah, Chanel Tri Handoko, Widodo Aribowo, and Agung Hidayat., Community-Based Approaches to Sustainable Municipal Waste Management in Indonesia, In *Municipal Waste Management: Policies and Strategies*, Britania Raya, CABI, 2025, page.102.

²¹ Rieko Kubota, Masahide Horita, and Tomohiro Tasaki., Integration of Community-Based Waste Bank Programs with the Municipal Solid-Waste-Management Policy in Makassar, Indonesia, *Journal of Material Cycles and Waste Management*, Vol.22, no.3, 2020, page.930. See too, Fatmawati, Nuryanti Mustari, Haerana, Risma Niswaty, and Abdillah., Waste Bank Policy Implementation Through Collaborative Approach: Comparative Study—Makassar and Bantaeng, Indonesia, *Sustainability*, Vol.14, no.13, 2022, page.7975.

²² Michael Denny Latanna, Budhi Gunawan, María Laura Franco-García, and Hans Bressers., Governance Assessment of Community-Based Waste Reduction Program in Makassar, *Sustainability*, Vol.15, no.19, 2023, page.14373. See too, Hasan Mustapa., Politics and Civil Society in Regional Waste Management, In *E3S Web of Conferences*, vol.506, Les Ulis, EDP Sciences, 2024, page.01004.

initiatives. Studies on waste banks and community participation in Indonesian cities indicate that successful waste management models are not merely the result of community willingness but depend on continuous collaboration among local governments, community organizations, private actors, and supporting institutions.²³ Effective waste bank implementation requires a collaborative governance approach involving policy coordination, institutional commitment, and community empowerment. Therefore, the regulatory challenge in organic waste management is not primarily the absence of legal recognition of participation, but rather the limited capacity of existing governance arrangements to transform participatory principles into sustainable practices. Strengthening organic waste governance consequently requires mechanisms that connect regulatory frameworks with community empowerment, institutional facilitation, and long-term support systems.²⁴

Furthermore, regulatory effectiveness is significantly affected by limited enforcement, supervision, and monitoring mechanisms at the local level. Although Indonesia has established comprehensive legal instruments that regulate waste reduction, segregation, recycling, and environmentally sound waste handling, the practical enforcement of these obligations remains uneven across municipalities. The persistence of improper disposal practices, limited household-level waste separation, inadequate utilization of recycling facilities, and continued dependence on landfill-oriented systems demonstrates that regulatory compliance has not been fully realized.²⁵ This situation indicates that the main challenge is not merely the absence of legal norms, but rather the institutional capacity to translate regulatory requirements into consistent implementation, monitoring, and behavioral compliance. Weak enforcement mechanisms, limited evaluation systems, and insufficient integration between policy objectives and operational programs have reduced the effectiveness of existing waste governance frameworks.²⁶

²³ Yeny Dhokhikah, Yulinah Trihadiningrum, and Sony Sunaryo., Community Participation in Household Solid Waste Reduction in Surabaya, Indonesia, *Resources, Conservation and Recycling*, Vol.102, no.1, 2015, page.156. See too, Rieko Kubota, Masahide Horita, and Tomohiro Tasaki., Integration of Community-Based Waste Bank Programs with the Municipal Solid-Waste-Management Policy in Makassar, Indonesia, *Journal of Material Cycles and Waste Management*, Vol.22, no.3, 2020, page.932.

²⁴ Fatmawati, Nuryanti Mustari, Haerana, Risma Niswaty, and Abdillah., Waste Bank Policy Implementation Through Collaborative Approach: Comparative Study—Makassar and Bantaeng, Indonesia, *Sustainability*, Vol.14, no.13, 2022, page.7976. See too, Olena Melnyk, Viktoriia Scliar, Sergei Sabadash, and Vira Butova., EU Municipal Organic Wastes Management and Its Implementation Prospects in Ukraine, *Environmental and Climate Technologies*, Vol.25, no.1, 2021, page.212.

²⁵ Azhar, Kgs Muhammad Sobri, and Abdul Halim., Law Enforcement of Waste Management in an Effort to Reduce Flood Risk in Indonesia, *Jambe Law Journal*, Vol.3, no.1, 2020, page.41. See too, Umami A'Zizah Zahroh and Fatma Ulfatun Najicha., Problems and Challenges on Environmental Law Enforcement in Indonesia: AMDAL in the Context of Administrative Law, *Indonesian State Law Review*, Vol.5, no.2, 2022, page.58.

²⁶ Kadar Pamuji, Slamet Rosyadi, and Abdul Aziz Nasihuddin., The Legal Institutional Model of Community-Based Waste Management to Reinforce Multi-Stakeholder Collaboration in Indonesia, *Kasetsart Journal of Social Sciences*, Vol.44, no.1, 2023, page.77. See too, Insan Amuda, A. Adi Sulianto, and Anang Sujoko., Visiting the Institutional Landscape: Building Better Waste Management Through Multilevel Regulatory Harmonization, a Case from Malang Regency, In *IOP*

These findings further demonstrate that community participation should be conceptualized as a fundamental element of environmental governance rather than merely an individual behavioral outcome. Participation in organic waste management cannot be sustained solely through public awareness campaigns or voluntary actions; it requires enabling governance conditions that include institutional support, regulatory clarity, transparency, incentives, and continuous collaboration between government authorities and communities. The environmental governance perspective emphasizes that sustainable waste management emerges from interactions among multiple actors, including government institutions, households, community organizations, private sectors, and civil society groups.²⁷ In this context, effective governance requires mechanisms that distribute responsibilities while ensuring accountability and coordination among stakeholders.

Evidence from community-based waste reduction initiatives further confirms that participation tends to increase when communities are integrated into formal governance structures and supported through adequate organizational arrangements, infrastructure provision, and institutional recognition.²⁸ Waste banks, community composting programs, and local recycling initiatives demonstrate that community engagement becomes more sustainable when government intervention moves beyond regulatory mandates toward facilitation, empowerment, and partnership-building.²⁹ Therefore, strengthening organic waste management governance requires a shift from a compliance-oriented regulatory approach toward a collaborative environmental governance model that enables communities to become active partners in achieving sustainable urban waste management.³⁰

Therefore, the analysis indicates that Indonesia's environmental regulatory

Conference Series: Earth and Environmental Science, vol.1489, Bristol, IOP Publishing, 2025, page.012015.

²⁷ Reza Darma Al Fariz, Ramdiana Muis, Nani Anggraini, Indriyani Rachman, and Toru Matsumoto., Good Environmental Governance Roles in Sustainable Solid Waste Management in Indonesia: A Review, *Journal of Community Based Environmental Engineering and Management*, Vol.8, no.1, 2024, page.47. See too, Ari Naldi, Herdis Herdiansyah, and L. G. Saraswati Putri., Good Governance Role for a Sustainable Solid Waste Management in Rural Community, In *IOP Conference Series: Earth and Environmental Science*, vol.819, Bristol, IOP Publishing, 2021, page.012033.

²⁸ Lubna Salsabila, Eko Priyo Purnomo, and Hazel D. Jovita., The Importance of Public Participation in Sustainable Solid Waste Management, *Journal of Governance and Public Policy*, Vol.8, no.2, 2021, page.116.

²⁹ Michael Denny Latanna, Budhi Gunawan, María Laura Franco-García, and Hans Bressers., Governance Assessment of Community-Based Waste Reduction Program in Makassar, *Sustainability*, Vol.15, no.19, 2023, page.14374.

³⁰ Ruth Lane, Annica Kronsell, David Reynolds, Rob Raven, and Jo Lindsay., Role of Local Governments and Households in Low-Waste City Transitions, *Environmental Innovation and Societal Transitions*, Vol.52, no.2, 2024, page.100879. See too, Hasan Mustapa., Politics and Civil Society in Regional Waste Management, In *E3S Web of Conferences*, vol.506, Les Ulis, EDP Sciences, 2024, page.01006.

framework has provided a strong normative foundation for community participation in organic waste management. Nevertheless, significant regulatory challenges remain, particularly regarding fragmented implementation, weak institutional coordination, insufficient incentives, and limited enforcement capacity. The existing framework requires further development toward collaborative environmental governance, where community participation is not only legally mandated but also institutionally facilitated and supported through effective local governance mechanisms.³¹

3.2. Socio-Legal Determinants of Community Participation in Organic Waste Management

The empirical findings demonstrate that community participation in vegetable organic waste management in Riau Province is shaped by a combination of cognitive, socio-economic, infrastructural, institutional, and policy-related factors. The characteristics of respondents indicate that the study captured diverse community conditions across the three selected districts. The majority of respondents were from Tuah Madani District (164 respondents; 38.2%), followed by Marpoyan Damai (157 respondents; 36.6%) and Payung Sekaki (108 respondents; 25.2%). Female respondents represented the majority of participants (266 respondents; 62.0%), while male respondents accounted for 163 respondents (38.0%). In terms of education, most respondents had completed junior high school (249 respondents), followed by bachelor's degree holders (115 respondents), diploma holders (36 respondents), senior high school graduates (19 respondents), postgraduate graduates (9 respondents), and elementary school graduates (1 respondent). These characteristics illustrate that organic waste management participation involves various social groups with different educational and demographic backgrounds.

The descriptive analysis indicates that respondents generally possess adequate environmental knowledge regarding organic waste management. Most respondents understood the concept of waste (96.3%), were able to identify organic waste types (97.7%), understood biodegradable and non-biodegradable waste (96.0%), recognized the importance of source separation (92.1%), and acknowledged the benefits of composting (83.2%). This finding confirms that environmental literacy among urban communities is relatively established. Previous studies emphasize that knowledge represents an important foundation for environmentally responsible behavior; however, knowledge alone is insufficient to generate consistent environmental action without supportive social and institutional conditions.³²

³¹ Hendra Try Ardianto, Rina Martini, Wijayanto, and Yoga Putra Prameswari., Community-Based Waste Bank: Collaborative Governance in Waste Management in Two Regions, In *IOP Conference Series: Earth and Environmental Science*, vol.1537, Bristol, IOP Publishing, 2025, page.012018.

³² D. Asteria and J. T. Haryanto., Empowerment Key Factors in Shaping Women's Awareness of Household Waste Management, *Global Journal of Environmental Science and Management (GJESM)*, Vol.7, no.3, 2021, page.11. See too, Soekidjo Notoatmodjo., *Metodologi penelitian kesehatan*, Jakarta, Rineka Cipta, 2018, page.81; Jannatul Bakia Sweetty, A. R. I. F. Mahmud, I. M. R. A. N. Mahmud, A. F. T. A. B. Hossain, and Polin Kumar Saha., Solid Waste Separation Among Women in Dhaka Households: An Extended TPB Perspective, *J Sustain Sci Manag*, Vol.19, no.1, 2024, page.35.

Respondents also demonstrated generally positive attitudes toward organic waste management. Most agreed that waste segregation, composting, and household responsibility are important components of environmental protection. Nevertheless, the statistical findings reveal that attitude was not significantly associated with community participation ($p = 1.000$). This result indicates the existence of an attitude–behavior gap, where positive environmental perceptions do not automatically result in actual participation when communities face external constraints such as limited facilities, insufficient institutional support, and weak policy incentives.³³ Therefore, participation appears to be influenced more strongly by enabling conditions than by individual attitudes alone.

The availability of infrastructure emerged as an important contextual factor. Although some respondents reported access to waste segregation facilities, many households still lacked composting facilities, separate organic waste collection systems, technical training, and community waste management groups. The bivariate analysis confirmed a significant relationship between infrastructure availability and participation ($p = 0.000$). This finding indicates that community willingness must be supported by practical mechanisms that enable households to implement organic waste management practices. Similar evidence shows that waste segregation facilities, composting infrastructure, and community waste management facilities are essential enabling factors for sustainable waste behavior.³⁴

Social and policy support represented the strongest determinant of community participation. The results showed that respondents who received support from government programs, community leaders, and local organizations were more likely to participate actively in organic waste management activities. Bivariate analysis confirmed a significant association between social-policy support and participation ($p = 0.000$). This finding demonstrates that community participation is not merely an individual responsibility but is strongly dependent on institutional arrangements, policy consistency, and collaborative governance mechanisms. Previous research has similarly shown that waste banks and community-based waste management programs achieve better outcomes when supported by government commitment, organizational structures, and continuous engagement with local communities.³⁵

³³ Yuhuan Zhao, Hemantha Premakumara Diunugala, and Claudel Mombeuil., Factors Affecting Household Solid Waste Generation and Management in Sri Lanka: An Empirical Study, *Environmental Monitoring and Assessment*, Vol.193, no.12, 2021, page.838.

³⁴ Yeny Dhokhikah, Yulinah Trihadiningrum, and Sony Sunaryo., Community Participation in Household Solid Waste Reduction in Surabaya, Indonesia, *Resources, Conservation and Recycling*, Vol.102, no.1, 2015, page.157. See too, Kayla Shafira Prasanti and Ririh Yudhastuti., Analisis Penerapan Pengelolaan Sampah Berbasis Masyarakat Melalui Bank Sampah (Studi Kasus Bank Sampah Rukmi, Gunung Anyar Tambak, Surabaya), *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, Vol.6, no.8, 2023, page.1586.

³⁵ Rieko Kubota, Masahide Horita, and Tomohiro Tasaki., Integration of Community-Based Waste Bank Programs with the Municipal Solid-Waste-Management Policy in Makassar, Indonesia, *Journal of Material Cycles and Waste Management*, Vol.22, no.3, 2020, page.933. See too, Lishan

The role of actual community practices was also significant. Respondents who routinely practiced waste separation, composting, or household waste processing were more likely to participate in broader community waste management activities. The relationship between community action and participation was statistically significant ($p = 0.000$), indicating that repeated environmental practices contribute to stronger participation patterns. This finding supports previous studies suggesting that behavioral habits and daily waste management practices become important mechanisms for strengthening collective environmental action.³⁶

The multivariate logistic regression further identifies the dominant factors influencing participation (Table 1). The model was statistically significant (Omnibus test, $p < 0.001$), with a Nagelkerke R^2 value of 0.323, indicating that the selected variables explain 32.3% of the variation in community participation. The remaining variation is influenced by other external factors beyond the current model.

Table 1. Logistic Regression Model of Factors Influencing Community Participation in Organic Waste Management

Variable	B	Sig.	Exp(B)	95% CI Lower	95% CI Upper
Knowledge Category 1	-0.679	0.235	0.507	0.166	1.553
Knowledge Category 2	-1.647	0.001	0.193	0.070	0.529
Availability of Facilities and Infrastructure	0.179	0.640	1.196	0.565	2.529
Social and Policy Support	1.581	0.000	4.862	2.335	10.123
Community Action	1.098	0.000	2.997	1.905	4.716
Constant	-4.214	0.000	0.015	—	—

The regression model demonstrates that social and policy support is the most influential factor, with an odds ratio of 4.862. This means that respondents receiving stronger institutional and social support have substantially higher possibilities of participating in organic waste management. Community action is the second strongest determinant, with an odds ratio of 2.997, indicating that existing household practices significantly strengthen participation. Meanwhile, infrastructure availability shows a positive relationship, although its effect becomes

Xiao, Guoqin Zhang, Yan Zhu, and Tao Lin., Promoting Public Participation in Household Waste Management: A Survey Based Method and Case Study in Xiamen City, China, *Journal of Cleaner Production*, Vol.144, no.4, 2017, page.317; Costas A. Velis, David C. Wilson, Yoni Gavish, Sue M. Grimes, and Andrew Whiteman., Socio-Economic Development Drives Solid Waste Management Performance in Cities: A Global Analysis Using Machine Learning, *Science of the Total Environment*, Vol.872, no.5, 2023, page.161913.

³⁶ S. Maryati, N. F. Arifiani, A. N. S. Humaira, and H. T. Putri., Factors Influencing Household Participation in Solid Waste Management (Case Study: Waste Bank Malang), In *IOP Conference Series: Earth and Environmental Science*, vol.124, Bristol, IOP Publishing, 2018, page.012015. See too, Unruan Leknoi, Pisut Painmanakul, Nattawin Chawaloeshonsiya, Wuthiwong Wimolsakcharoen, Chadalak Samritthinanta, and Annop Yienthaisong., Building Sustainable Community: Insight from Successful Waste Management Initiative, *Resources, Conservation & Recycling Advances*, Vol.24, no.3, 2024, page.200238.

statistically weaker in the multivariate model after controlling for other factors.

The empirical findings demonstrate that community participation in organic waste management is not merely a matter of individual environmental awareness but is constructed through the interaction between legal frameworks, institutional capacity, social conditions, and material availability. The findings indicate that although communities generally possess sufficient knowledge and positive attitudes toward organic waste management, these internal capacities have not automatically generated consistent participation. This condition illustrates the socio-legal character of waste governance, where the effectiveness of legal norms depends heavily on social acceptance, institutional implementation, and the availability of supporting structures.

The study shows that knowledge regarding organic waste management among respondents is relatively high. Most respondents understand waste classification, source separation, composting benefits, and the environmental consequences of unmanaged waste. However, the existence of environmental knowledge does not necessarily translate into sustained participation. This finding reflects the gap between *law in the books* and *law in action*, where normative expectations regarding community responsibility require social and institutional conditions to become operational practices. Environmental behavior is therefore not produced only through legal obligations or awareness campaigns but through continuous interaction between knowledge, social norms, and enabling environments.³⁷

The findings further reveal that infrastructural availability represents an important institutional condition shaping participation. Many respondents indicated limited access to composting facilities, waste separation infrastructure, temporary storage systems, and community waste management organizations. This demonstrates that community participation is partly dependent on the capacity of the state and local institutions to provide the necessary facilities for exercising environmentally responsible behavior. In socio-legal terms, participation cannot be understood as an isolated civic obligation because citizens require institutional support to perform the responsibilities imposed by environmental regulations. Previous studies similarly demonstrate that community-based waste management initiatives are more sustainable when governments provide infrastructure, technical assistance, and organizational support.³⁸

A central finding of this study is the dominant role of social and policy support in

³⁷ D. Asteria and J. T. Haryanto., Empowerment Key Factors in Shaping Women's Awareness of Household Waste Management, *Global Journal of Environmental Science and Management (GJESM)*, Vol.7, no.3, 2021, page.12. See too, Soekidjo Notoatmodjo., *Metodologi penelitian kesehatan*, Jakarta, Rineka Cipta, 2018, page.82.

³⁸ Yeny Dhokhikah, Yulinah Trihadiningrum, and Sony Sunaryo., Community Participation in Household Solid Waste Reduction in Surabaya, Indonesia, *Resources, Conservation and Recycling*, Vol.102, no.1, 2015, page.159. See too, Kayla Shafira Prasanti and Ririh Yudhastuti., Analisis Penerapan Pengelolaan Sampah Berbasis Masyarakat Melalui Bank Sampah (Studi Kasus Bank Sampah Rukmi, Gunung Anyar Tambak, Surabaya), *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, Vol.6, no.8, 2023, page.1585.

shaping participation. Community involvement is strongly influenced by the presence of local leadership, government programs, social networks, and institutional encouragement. This finding indicates that regulations encouraging public participation require effective governance mechanisms at the local level. Indonesia's waste management framework, particularly Law No. 18/2008 on Waste Management and related environmental policies, has established community participation as an important principle. However, the implementation of these legal mandates depends on how local governments translate regulatory objectives into practical programs, incentives, and collaborative arrangements. Similar challenges have been identified in Indonesian waste governance, where decentralized authority often creates differences in institutional capacity, policy commitment, and enforcement practices among regions.³⁹

The results also highlight the importance of community practices as a pathway toward sustainable participation. Individuals who have incorporated waste separation, composting, or other waste reduction activities into their daily routines are more likely to engage in broader collective initiatives. This suggests that participation develops through social learning and repeated practices rather than through regulatory compliance alone. Community-based waste management programs, such as waste banks and local recycling groups, demonstrate that collective action becomes stronger when communities receive recognition and institutional support from local governance structures.⁴⁰

From a regulatory governance perspective, the findings reveal an implementation gap between formal legal commitments and practical community empowerment. Existing regulations provide a foundation for reducing waste generation and promoting public involvement, but several governance barriers remain, including fragmented institutional responsibilities, weak coordination, insufficient incentives, and limited monitoring mechanisms. As a result, community participation often remains symbolic rather than transformative. This condition corresponds with broader findings that regulatory frameworks alone cannot guarantee successful community-led waste management without effective implementation arrangements and collaborative governance.⁴¹

Therefore, strengthening organic waste management requires a socio-legal

³⁹ Kadar Pamuji, Slamet Rosyadi, and Abdul Aziz Nasihuddin., The Legal Institutional Model of Community-Based Waste Management to Reinforce Multi-Stakeholder Collaboration in Indonesia, *Kasetsart Journal of Social Sciences*, Vol.44, no.1, 2023, page.79. See too, Misbah Zulfa Elizabeth, Sholihan, Masrohatun, Ririh Megah Safitri, and Naili Ni'matul Illiyyun., Why Policies and Community Don't Greet Each Other: A Study of Semarang City Policies and Community Initiatives in Waste Management, *Asian Politics & Policy*, Vol.17, no.2, 2025, page.e70010.

⁴⁰ Rieko Kubota, Masahide Horita, and Tomohiro Tasaki., Integration of Community-Based Waste Bank Programs with the Municipal Solid-Waste-Management Policy in Makassar, Indonesia, *Journal of Material Cycles and Waste Management*, Vol.22, no.3, 2020, page.929.

⁴¹ Hari Harjanto Setiawan, Rizal Akbar Aldyan, Siti Khoiriyah, Chanel Tri Handoko, Widodo Aribowo, and Agung Hidayat., Community-Based Approaches to Sustainable Municipal Waste Management in Indonesia, In *Municipal Waste Management: Policies and Strategies*, Britania Raya, CABI, 2025, page.104. See too, Riska Sarofah, Taufik Nurohman, Hilal Ramdhani, and Sidik Firmadi., Bridging Environmental Justice and Policy: A Collaborative Waste Management Approach in Local Level, In *IOP Conference Series: Earth and Environmental Science*, vol.1566, Bristol, IOP Publishing, 2025, page.012029.

approach that views communities not merely as waste producers who must comply with regulations, but as governance actors whose participation must be facilitated. Policy interventions should integrate legal certainty, institutional coordination, infrastructure development, and community empowerment. The effectiveness of waste governance depends not only on the existence of regulatory obligations but also on the ability of institutions to create social conditions that enable citizens to participate meaningfully and sustainably.⁴²

3.3. Regulatory and Governance Strategies for Sustainable Organic Waste Management

The findings of this study demonstrate that strengthening community-based organic waste management requires a comprehensive transformation from a conventional regulatory approach toward an integrated environmental governance model. The existing waste management framework in Indonesia has provided a legal foundation for community involvement through Law No. 18 of 2008 concerning Waste Management, Government Regulation No. 81 of 2012 concerning Management of Household Waste and Waste Similar to Household Waste, and Presidential Regulation No. 97 of 2017 concerning National Policy and Strategy for Household Waste Management. These regulations have introduced important principles, including waste reduction, recycling, community participation, and shared responsibility between government and society. However, the empirical reality indicates that the existence of legal norms does not automatically produce effective community-based organic waste management. The main challenge lies in the gap between regulatory design and governance implementation, particularly regarding institutional coordination, local capacity, community empowerment, and the availability of supporting mechanisms.⁴³

From a socio-legal perspective, regulations function not only as formal legal rules but also as institutional frameworks that organize relationships between governments, communities, and environmental stakeholders. The first strategic direction is strengthening regulatory coherence across national, provincial, and municipal levels. Although decentralization provides local governments with authority to develop waste management policies, it may also create regulatory

⁴² Costas A. Velis, David C. Wilson, Yoni Gavish, Sue M. Grimes, and Andrew Whiteman., Socio-Economic Development Drives Solid Waste Management Performance in Cities: A Global Analysis Using Machine Learning, *Science of the Total Environment*, Vol.872, no.5, 2023, page.161915. See too, Hendra Try Ardianto, Rina Martini, Wijayanto, and Yoga Putra Prameswari., Community-Based Waste Bank: Collaborative Governance in Waste Management in Two Regions, In *IOP Conference Series: Earth and Environmental Science*, vol.1537, Bristol, IOP Publishing, 2025, page.012019.

⁴³ Prisca Listiningrum, Moh Dahlan, Muhammad Anis Zhafran Al Anwary, Herlin Sri Wahyuni, and Rizqi Bachtiar., Waste Management Without Direction in Indonesia: A Proposed Legal Reform Towards Smart Cities, *Legality: Jurnal Ilmiah Hukum*, Vol.31, no.2, 2023, page.231. See too, Edy Lisdiyono and Moh Sidik., Regulatory Reconstruction of Waste Management to Achieve Efficient and Sustainable Environmental Management, *International Journal of Criminology and Sociology*, Vol.10, no.2, 2021, page.1051.

fragmentation due to differences in institutional capacity and policy interpretation, resulting in inconsistent implementation of waste separation, composting, and community-based recycling programs.⁴⁴

Strengthening community-based organic waste management requires clearer institutional responsibilities and coordination among environmental agencies, village governments, waste banks, community organizations, and private actors. Evidence from Makassar shows that waste bank initiatives become more sustainable when integrated into municipal waste management systems rather than functioning as isolated community programs.⁴⁵ Effective governance therefore requires a multi-level governance approach, where national regulations establish sustainability principles while local governments develop adaptive implementation mechanisms according to social and ecological conditions.⁴⁶ Regulatory reform should emphasize harmonization, clear institutional mandates, collaborative arrangements, and integration of community-based waste programs into local environmental planning. Through this approach, governments can shift from direct service providers toward facilitators of participatory and sustainable waste governance.

Table 2. Regulatory and Governance Strategies for Strengthening Community-Based Organic Waste Management

Governance Challenge	Regulatory and Institutional Strategy	Expected Governance Outcome
Fragmented regulations and unclear institutional authority	Harmonization of national and local regulations; clarification of governmental responsibilities	More coherent implementation and reduced regulatory overlap
Weak coordination among government agencies and stakeholders	Development of collaborative governance platforms involving government, communities, private sector, and academia	Stronger institutional synergy and coordinated waste management programs

⁴⁴ Misbah Zulfa Elizabeth, Sholihan, Masrohatun, Ririh Megah Safitri, and Naili Ni'matul Illiyyun., Why Policies and Community Don't Greet Each Other: A Study of Semarang City Policies and Community Initiatives in Waste Management, *Asian Politics & Policy*, Vol.17, no.2, 2025, page.e70012. See too, Michael Denny Latanna, Budhi Gunawan, María Laura Franco-García, and Hans Bressers., Governance Assessment of Community-Based Waste Reduction Program in Makassar, *Sustainability*, Vol.15, no.19, 2023, page.14375.

⁴⁵ Rieko Kubota, Masahide Horita, and Tomohiro Tasaki., Integration of Community-Based Waste Bank Programs with the Municipal Solid-Waste-Management Policy in Makassar, Indonesia, *Journal of Material Cycles and Waste Management*, Vol.22, no.3, 2020, page.934.

⁴⁶ Steven H. A. Koop and Cornelis Johannes van Leeuwen., The Challenges of Water, Waste and Climate Change in Cities, *Environment, Development and Sustainability*, Vol.19, no.2, 2017, page.389. See too, Ruth Lane, Annica Kronsell, David Reynolds, Rob Raven, and Jo Lindsay., Role of Local Governments and Households in Low-Waste City Transitions, *Environmental Innovation and Societal Transitions*, Vol.52, no.2, 2024, page.100880.

Low community participation and limited environmental awareness	Institutionalization of community participation mechanisms, environmental education, and empowerment programs	Increased public involvement and sustainable behavioral transformation
Limited infrastructure and financial support	Provision of technical assistance, incentives, and funding schemes for community waste organizations	Improved operational capacity of community-based initiatives
Dominant disposal-oriented waste paradigm	Integration of circular economy principles into waste regulation	Transition from waste disposal toward resource recovery and sustainability

A second strategy involves transforming community participation from a voluntary social activity into an institutional component of environmental governance. In many urban areas, community waste management initiatives, including waste banks, neighborhood composting groups, and community recycling organizations, demonstrate that citizens can perform important environmental functions when supported by appropriate institutional arrangements.

Research on household waste reduction in Surabaya shows that community participation significantly influences waste reduction practices, including household sorting, recycling, and composting behavior. However, participation cannot be sustained solely through environmental awareness campaigns. It requires continuous institutional support, capacity building, and incentives. Waste bank policies in Makassar and Bantaeng illustrate that collaborative approaches involving government agencies, communities, and non-state actors can improve the sustainability of waste management initiatives.⁴⁷

From a legal perspective, community participation should also be understood as part of environmental democratic rights. Public involvement in environmental decision-making represents not merely administrative consultation but a constitutional dimension of environmental protection. Therefore, regulatory frameworks should guarantee meaningful participation, access to information, and recognition of community knowledge in environmental governance processes.⁴⁸

⁴⁷ Fatmawati, Nuryanti Mustari, Haerana, Risma Niswaty, and Abdillah., Waste Bank Policy Implementation Through Collaborative Approach: Comparative Study—Makassar and Bantaeng, Indonesia, *Sustainability*, Vol.14, no.13, 2022, page.7977.

⁴⁸ Achmad Muchsin., Public Participation as a Constitutional Right in the Process of Preparing Environmental Documents: Partisipasi Publik sebagai Hak Konstitusional dalam Proses Penyusunan Dokumen Lingkungan, *Jurnal Konstitusi*, Vol.21, no.2, 2024, page.175. See too, Lubna Salsabila, Eko Priyo Purnomo, and Hazel D. Jovita., The Importance of Public Participation

However, strengthening participation also requires protection of environmental actors. Community groups and environmental activists may face legal and social pressures when criticizing environmental policies or development practices. Consequently, mechanisms protecting public participation, including anti-SLAPP principles, are important components of environmental governance reform.⁴⁹

The third strategy is the integration of circular economy principles into organic waste governance. Organic waste management requires a fundamental paradigm shift from the traditional linear model of “collect–transport–dispose” toward a circular approach that views waste as a recoverable resource. Organic waste has significant potential for compost production, urban agriculture, biogas development, and other resource recovery activities. However, achieving this transformation requires regulatory support that encourages source separation, community composting, and local resource recovery systems.

The circular economy perspective provides an important conceptual foundation for strengthening community-based organic waste management because it connects environmental protection with economic and social benefits. Circular economy requires systemic transformation in production and consumption patterns by reducing waste generation and maintaining continuous resource circulation.⁵⁰ In urban organic waste governance, this approach implies that regulations should move beyond controlling disposal practices and instead promote resource recovery through incentives, institutional support, and community empowerment. Sustainable waste governance requires the integration of waste hierarchy principles, circular economy strategies, and effective institutional arrangements.⁵¹

However, achieving sustainable organic waste management requires collaborative governance involving multiple actors. Governments provide regulatory frameworks and infrastructure, communities contribute social capital and local knowledge, while private actors support technological innovation, financing, and market development. Evidence from Indonesian cities shows that civil society organizations play a significant role in bridging regulatory gaps between government policies and community implementation.⁵² Furthermore, collaborative

in Sustainable Solid Waste Management, *Journal of Governance and Public Policy*, Vol.8, no.2, 2021, page.117.

⁴⁹ Hartiwiningsih, Seno Wibowo Gumbira, and Jaco Barkhuizen., Dysfunctional Factors of Environmental Law on Strategic Lawsuit Against Public Participation and Developing Remedial Strategies Through Reconstruction Criminal Law System Model in Indonesia, *PADJADJARAN Jurnal Ilmu Hukum (Journal of Law)*, Vol.10, no.3, 2023, page.2. See too, Putri Mayessa Vegetasia Soetiyono, Yulia Estisari, Shambawa Dharma Raditya, Samaya Dharma Mandala, and Anto Kustanto., Strategic Lawsuit Against Public Participation (SLAPP) From Indonesian Law Perspective, *Lex Publica*, Vol.12, no.1, 2025, page.241.

⁵⁰ Julian Kirchherr, Denise Reike, and Marko Hekkert., Conceptualizing the Circular Economy: An Analysis of 114 Definitions, *Resources, Conservation and Recycling*, Vol.127, no.4, 2017, page.227.

⁵¹ Florence Barbara Awino and Sabine E. Apitz., Solid Waste Management in the Context of the Waste Hierarchy and Circular Economy Frameworks: An International Critical Review, *Integrated Environmental Assessment and Management*, Vol.20, no.1, 2024, page.21.

⁵² Abeer Abdulnabi Ali, Yuliya Golbert, Abdul Fikri Angga Reksa, Michael M. Kretzer, and Stefan Schweiger., Transformative Solutions in the Global South: Addressing Solid Waste Management

waste bank models demonstrate that partnerships between local governments and community organizations enhance policy effectiveness and strengthen public participation. Therefore, future regulatory strategies should emphasize formal recognition of community waste organizations, incentive mechanisms for household waste separation, public–private–community partnerships, and integration of waste management into sustainable urban planning. This approach is consistent with the concept of circular governance, where waste is not treated as an unwanted output but as a resource that can generate environmental and social value.⁵³

The fourth strategy focuses on strengthening community capacity through financial mechanisms, infrastructure development, and regulatory incentives. A major challenge in community-based organic waste management is that public participation is often promoted as a normative responsibility without adequate institutional support. Communities are expected to manage waste effectively, yet many initiatives continue to face limitations in processing facilities, technical capacity, financial resources, and long-term organizational support. Household waste reduction practices are influenced not only by environmental awareness but also by supporting infrastructure, social organization, and institutional facilitation, indicating that community participation requires enabling governance conditions rather than individual commitment alone.⁵⁴

Strengthening community capacity should also be accompanied by a regulatory transition toward circular economy principles. Organic waste should no longer be treated merely as an environmental burden requiring disposal but as a resource with economic and ecological value through composting, urban agriculture, bioenergy production, and soil regeneration. Sustainable waste governance requires the integration of waste hierarchy principles, circular economy strategies, and institutional transformation to ensure that resource recovery becomes part of urban environmental governance.⁵⁵ Therefore, regulatory reform should encourage mandatory source separation of organic waste, incentives for household composting, integration between waste banks and circular economy enterprises, and development of decentralized organic waste processing facilities. Such transformation requires not only legal reform but also institutional

Challenges in Jakarta Through Participation by Civil Society Organizations?, In *Environmental Governance in Indonesia*, Cham, Springer International Publishing, 2023, page.236.

⁵³ Julian Kirchherr, Denise Reike, and Marko Hekkert., Conceptualizing the Circular Economy: An Analysis of 114 Definitions, *Resources, Conservation and Recycling*, Vol.127, no.4, 2017, page.223. See too, Patrizia Ghisellini, Catia Cialani, and Sergio Ulgiati., A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems, *Journal of Cleaner Production*, Vol.114, no.6, 2016, page.17.

⁵⁴ Yeny Dhokhikah, Yulinah Trihadiningrum, and Sony Sunaryo., Community Participation in Household Solid Waste Reduction in Surabaya, Indonesia, *Resources, Conservation and Recycling*, Vol.102, no.1, 2015, page.162.

⁵⁵ Florence Barbara Awino and Sabine E. Apitz., Solid Waste Management in the Context of the Waste Hierarchy and Circular Economy Frameworks: An International Critical Review, *Integrated Environmental Assessment and Management*, Vol.20, no.1, 2024, page.22.

strengthening, sustainable financing mechanisms, and continuous community empowerment to ensure long-term implementation.⁵⁶

The fifth strategy involves strengthening environmental democracy and ensuring meaningful public participation in organic waste governance. Community participation should be understood not merely as an administrative obligation but as an environmental governance right that enables communities to influence decisions affecting ecological sustainability. Meaningful participation requires access to environmental information, opportunities to contribute to policy formulation, and institutional protection for community involvement throughout planning, implementation, monitoring, and evaluation processes. Public participation represents an essential element of environmental constitutionalism because communities possess legitimate rights to engage in environmental decision-making and contribute to environmental protection efforts.⁵⁷

However, regulatory effectiveness depends not only on participatory mechanisms but also on adequate implementation capacity. Waste governance challenges frequently emerge not from the absence of legal frameworks but from weak enforcement, insufficient infrastructure, limited institutional coordination, and inadequate financial resources.⁵⁸ Many community-based waste initiatives remain difficult to sustain because they depend heavily on voluntary participation without stable financial and institutional support. Sustainable governance therefore requires financing mechanisms, operational assistance, and incentive structures that strengthen community capacity. Urban waste management performance is strongly influenced by municipal capacity, socio-economic conditions, and governance quality.⁵⁹ Accordingly, governments should develop community waste management grants, performance-based incentives, integration of waste programs into village development funding, and CSR partnerships to ensure that participation becomes transformative rather than symbolic.

⁵⁶ Jamal Aslan., Legal Framework Model for Sustainable Solid Waste Management in Indonesia: A Contemporary Environmental Fiqh Perspective, *MILRev: Metro Islamic Law Review*, Vol.4, no.2, 2025, page.1101. See too, Amirul Mustofa, Ika Devy Pramudiana, Priyanto, and Ilyas Masudin., Governing Circular Waste for Public Value: Integrating Regulation, CSR Practices, and Collaborative Governance in an Emerging Economy, *Circular Economy and Sustainability*, Vol.6, no.2, 2026, page.169.

⁵⁷ Achmad Muchsin., Public Participation as a Constitutional Right in the Process of Preparing Environmental Documents: Partisipasi Publik sebagai Hak Konstitusional dalam Proses Penyusunan Dokumen Lingkungan, *Jurnal Konstitusi*, Vol.21, no.2, 2024, page.176.

⁵⁸ Azhar, Kgs Muhammad Sobri, and Abdul Halim., Law Enforcement of Waste Management in an Effort to Reduce Flood Risk in Indonesia, *Jambe Law Journal*, Vol.3, no.1, 2020, page.41. See too, Maskun, Hanim Kamaruddin, Farida Pattitingi, Hasbi Assidiq, Siti Nurhaliza Bachril, and Nurul Habaib Al Mukarramah., Plastic Waste Management in Indonesia: Current Legal Approaches and Future Perspectives, *Hasanuddin Law Review*, Vol.9, no.1, 2025, page.113.

⁵⁹ Costas A. Velis, David C. Wilson, Yoni Gavish, Sue M. Grimes, and Andrew Whiteman., Socio-Economic Development Drives Solid Waste Management Performance in Cities: A Global Analysis Using Machine Learning, *Science of the Total Environment*, Vol.872, no.5, 2023, page.161917.

Table 3. Proposed Governance Model for Sustainable Community-Based Organic Waste Management

Governance Dimension	Current Limitation	Proposed Strategy
Legal framework	Regulatory fragmentation between national and local levels	Harmonized regulations and clearer institutional mandates
Institutional arrangement	Weak coordination among actors	Collaborative governance framework
Community participation	Participation often limited to behavioral compliance	Recognition of communities as environmental governance partners
Economic mechanism	Limited financial sustainability	Incentive-based and circular economy financing mechanisms
Environmental management approach	Disposal-oriented paradigm	Resource recovery and circular waste governance
Public accountability	Limited community involvement in decision-making	Strengthening environmental democracy and transparency

Overall, the findings suggest that strengthening community-based organic waste management requires a transition from a regulatory compliance model toward a collaborative environmental governance model. Legal frameworks remain essential, but their effectiveness depends on institutional capacity, social legitimacy, and the ability to create meaningful partnerships among government, communities, and non-state actors. Sustainable urban environmental governance can therefore be achieved when regulations function not only as instruments of control but also as mechanisms for empowerment, coordination, and ecological transformation. This approach aligns with broader global movements toward circular economy, sustainable cities, and participatory environmental governance.⁶⁰

4. Conclusion

The phenomenon of catcalling, or verbal sexual harassment in public spaces, has become a serious problem in Indonesia, particularly for women and children. Studies show that victims of catcalling not only feel embarrassed, offended, or

⁶⁰ Ruth Lane, Annica Kronsell, David Reynolds, Rob Raven, and Jo Lindsay., Role of Local Governments and Households in Low-Waste City Transitions, *Environmental Innovation and Societal Transitions*, Vol.52, no.2, 2024, page.100883. See too, Mustofa, Ika Devy Pramudiana, Priyanto, and Ilyas Masudin., Governing Circular Waste for Public Value: Integrating Regulation, CSR Practices, and Collaborative Governance in an Emerging Economy, *Circular Economy and Sustainability*, Vol.6, no.2, 2026, page.171.

humiliated, but also experience long-term psychological disorders such as trauma, anxiety, and loss of self-confidence. This verbal harassment is often trivialized by society, due to social norms that still justify such behavior as mere "compliments" or "jokes." This is exacerbated by a lack of public education about the definition and impact of verbal harassment, leaving perpetrators unaware of their wrongdoing, while victims are afraid to report it due to stigma and potential retaliation.

This study demonstrates that Indonesia has established a relatively comprehensive regulatory foundation for community participation in organic waste management through Law No. 18 of 2008 concerning Waste Management, Government Regulation No. 81 of 2012, and Presidential Regulation No. 97 of 2017. These regulations represent an important paradigm shift from a disposal-oriented approach toward waste reduction, recycling, community involvement, and shared environmental responsibility. However, the findings reveal a persistent implementation gap between normative legal commitments and practical governance arrangements. Regulatory fragmentation, uneven local government capacity, weak institutional coordination, limited infrastructure, and insufficient financial incentives remain major barriers to transforming community participation into sustainable environmental governance.

The empirical findings further indicate that community participation is shaped not only by environmental knowledge and attitudes but also by socio-institutional conditions. Although communities demonstrate adequate awareness of organic waste management, participation is strongly influenced by social and policy support, community practices, and enabling infrastructure. The logistic regression results confirm that social-policy support represents the strongest determinant of participation, followed by community action, indicating that sustainable waste governance requires institutional facilitation rather than reliance solely on individual environmental responsibility.

From a governance perspective, this study highlights the need to reposition communities as active environmental governance partners rather than merely waste producers. Strengthening organic waste management requires a transition from regulatory compliance toward collaborative environmental governance involving government institutions, communities, private actors, and civil society organizations. Key recommendations include: (1) harmonizing national and local waste regulations to reduce institutional fragmentation; (2) strengthening collaborative governance mechanisms among governments, waste banks, and community organizations; (3) integrating circular economy principles through source separation, composting, and resource recovery systems; (4) providing financial incentives, infrastructure support, and technical assistance for community initiatives; and (5) ensuring meaningful environmental participation through transparency, access to information, and institutional protection for community involvement.

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