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Multi-Actor Collaboration in Waste Governance: A Study of Local Government, Private Sector, and Community Engagement in Medan, Binjai, Deli Serdang, and Karo, North Sumatra

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ABSTRACT

Waste governance in metropolitan and peri-urban regions of Indonesia continues to face significant institutional and operational challenges, particularly in areas where jurisdictional boundaries overlap and multi-level actors interact with varying degrees of coordination. This study examines multi-actor collaboration in waste governance across four interconnected regions in North Sumatra: Medan, Binjai, Deli Serdang, and Karo. Drawing on collaborative governance theory and a qualitative case study methodology, the research investigates how local governments, private waste management companies, and community-based organizations engage in, negotiate, and sustain collaborative arrangements. Data were collected through in-depth interviews, field observations, and document analysis, involving 34 informants from government agencies, private sector actors, and community representatives. Findings reveal that while formal collaboration mechanisms exist across the four regions, their effectiveness is constrained by asymmetric power relations, fragmented regulatory frameworks, weak institutional trust, and limited community voice in decision-making. The study identifies four critical dimensions of collaborative governance in this context: structural formalization, resource interdependency, communicative rationality, and accountability mechanisms. The Mebidangro metropolitan framework (Medan–Binjai–Deli Serdang) provides a partial governance scaffold, yet its application to solid waste management remains inconsistent. Karo, as a highland rural district, presents a distinct governance dynamic influenced by tourism-driven waste loads and traditional community structures. The findings contribute to the growing literature on collaborative environmental governance in the Global South, offering theoretical and practical implications for strengthening multi-actor waste governance in Indonesian urban–rural corridors.

Keywords: collaborative governance; waste management; multi-actor; local government; Mebidangro; North Sumatra; Indonesia



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INTRODUCTION

Waste governance in rapidly urbanizing regions of the Global South presents one of the most complex administrative and environmental challenges of the 21st century. In Indonesia, where decentralization has redistributed significant administrative responsibilities to district and city-level governments, the capacity to manage solid waste remains highly uneven. The

challenge is particularly acute in metropolitan corridors where multiple local government units share ecological and infrastructural systems, necessitating cross-jurisdictional collaboration (Agustina et al., 2021).

North Sumatra's Mebidangro corridor comprising the city of Medan, Binjai municipality, Deli Serdang regency, and Langkat regency represents one of Indonesia's most dynamic urban growth zones outside Java. While Karo regency is geographically adjacent and ecologically connected through shared river basins and road networks, it presents a distinct governance context shaped by its highland topography, agricultural economy, and growing tourism sector. Together, these four regions generate substantial volumes of solid waste that collectively strain existing management infrastructure (Badan Pusat Statistik Sumatera Utara, 2023).

The challenges of waste governance in this region are compounded by the involvement of multiple actors operating across different institutional logics: formal government agencies (Dinas Lingkungan Hidup), private waste collection companies, informal sector workers (pemulung), bank sampah (waste banks), and community-based environmental groups. The coordination of these actors within and across jurisdictions requires deliberate collaborative mechanisms, yet evidence of effective multi-actor governance frameworks in this specific regional context remains sparse in the academic literature.

This study addresses this gap by examining the structure, dynamics, and outcomes of multi-actor collaboration in waste governance across Medan, Binjai, Deli Serdang, and Karo. Drawing on collaborative governance theory (Ansell & Gash, 2008; Emerson et al., 2012), the study asks: How do local governments, private sector actors, and community-based organizations collaborate in waste governance in the four regions, and what factors enable or constrain such collaboration?

The significance of this inquiry extends beyond regional relevance. As Indonesia pursues its national waste reduction targets under Government Regulation No. 81/2012 on Household and Household-Like Waste Management, understanding the conditions under which multi-actor collaboration succeeds or fails carries important implications for policy design and institutional strengthening at the subnational level. Furthermore, the four-region configuration studied here represents a theoretically rich comparative context, as it encompasses both densely urbanized municipalities and a rural-highland district, allowing for analysis of how governance dynamics vary across urban–rural gradients.

Table 1. Solid Waste Generation and Management Data by Region (2023)

Region	Admin. Type	Population (2023)	Waste Generated (tons/day)	Formal Collection Rate (%)	Final Disposal Site
Medan	City	2,564,145	1,820	68.4	TPA Terjun
Binjai	City	298,012	195	61.2	TPA Tanah Merah
Deli Serdang	Regency	2,147,732	1,140	42.7	TPA

Region	Admin. Type	Population (2023)	Waste Generated (tons/day)	Formal Collection Rate (%)	Final Disposal Site
					Namobintang
Karo	Regency	398,215	210	33.5	TPA Sempa Jaya

Source: Badan Pusat Statistik Sumatera Utara (2023); Dinas Lingkungan Hidup Masing-Masing Daerah (2023)

The table above reveals considerable disparities in both waste generation volume and formal collection capacity across the four regions. Medan dominates as the primary waste-generating city with over 1,820 tons per day, while Karo despite a smaller population faces the lowest formal collection rate at 33.5%, a figure consistent with the governance fragility characteristic of rural districts with limited institutional capacity.

LITERATURE REVIEW

Collaborative governance has emerged as a dominant paradigm in public administration for addressing complex, multi-jurisdictional problems that cannot be resolved by any single actor (Ansell & Gash, 2008). Emerson, Nabatchi, and Balogh (2012) define collaborative governance as the processes and structures of public policy decision-making and management that engage people constructively across boundaries of public agencies, levels of government, and/or the public, private, and civic spheres to carry out a public purpose that could not otherwise be accomplished. In the context of waste governance, this framework is particularly relevant because solid waste management inherently involves intergovernmental coordination, public-private partnerships, and community participation.

In the Indonesian context, decentralization under Law No. 23/2014 on Regional Government has allocated primary waste management authority to city and regency governments. This has created both opportunities for locally adaptive governance and challenges related to uneven capacity, overlapping jurisdictions, and limited inter-regional coordination mechanisms (Sururi & Lestari, 2020). The Mebidangro metropolitan region, formally recognized under Presidential Regulation No. 62/2011, provides a partial governance scaffold for cross-border coordination, yet its application to solid waste management has received limited scholarly attention.

The role of the private sector in waste governance has expanded significantly as governments struggle to keep pace with urban waste growth. Public-private partnerships (PPP) in waste management span a spectrum from contracted collection services to integrated material recovery facilities. However, the effectiveness of such arrangements is conditioned by contractual clarity, regulatory oversight, and the degree to which private actors are integrated into broader governance networks rather than operating as standalone service providers (Wilson et al., 2021).

Community participation in waste governance has long been recognized as a critical but underutilized resource. In Indonesia, the bank sampah (waste bank) model represents the

most institutionalized form of community-level waste governance, engaging households in waste sorting and temporary storage in exchange for monetary credits or goods. Research by Aprilia et al. (2013) and Wahyudi et al. (2022) demonstrates that bank sampah significantly improve recycling rates in urban neighborhoods; however, their integration into formal municipal waste systems remains inconsistent.

Table 2. Collaborative Governance Framework Applied to Waste Management

Dimension	Key Elements	Indicator in Waste Governance
Structural Formalization	MOUs, joint task forces, formal mandates	Inter-regional agreements, joint TPA management
Resource Interdependency	Shared infrastructure, funding, expertise	Shared landfills, technical capacity transfer
Communicative Rationality	Deliberative forums, inclusive dialogue	Coordination meetings, community consultations
Accountability Mechanisms	Reporting, transparency, performance review	RPJMD targets, audit reports, public complaint systems

Source: Adapted from Emerson et al. (2012); Ansell & Gash (2008); Sururi & Lestari (2020)

The four-dimensional framework presented above guides the empirical analysis of this study. Each dimension is operationalized through observable indicators drawn from the waste governance context of the four study regions. The framework enables systematic comparison across regions while remaining sensitive to contextual variation in governance capacity and actor configurations.

RESEARCH METHODS

This study employed a qualitative case study methodology, selected for its ability to capture the complexity and contextual embeddedness of collaborative governance arrangements (Yin, 2018). A multiple-case design was adopted, treating each of the four regions Medan, Binjai, Deli Serdang, and Karo as a distinct case while allowing for cross-case comparison. The unit of analysis was the multi-actor collaboration arrangement in solid waste governance within each region and across inter-regional boundaries.

Data collection was conducted between January and April 2024 through three primary methods. First, in-depth semi-structured interviews were conducted with 34 informants selected through purposive sampling. Informants included: heads and staff of Dinas Lingkungan Hidup (DLH) from all four regions (n=12), managers and operational staff of contracted private waste companies (n=8), leaders and members of community-based organizations including bank sampah coordinators (n=10), and representatives of regional planning bodies including the Bappeda and Mebidangro secretariat (n=4). Second, field observations were conducted at waste collection points, transfer stations, final disposal sites (TPA), and bank sampah facilities in each region. Third, document analysis was performed on regional waste management plans (Masterplan Persampahan), RPJMD documents, inter-regional memoranda of understanding (MoU), and environmental audit reports.

Data were analyzed using thematic analysis following Braun and Clarke's (2006) six-phase framework: familiarization with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Atlas.ti software was used to facilitate systematic coding and theme management. Trustworthiness was ensured through member checking, data triangulation across methods and sources, and peer debriefing with two colleagues specializing in Indonesian public administration.

RESULTS AND DISCUSSION

The findings are organized around the four analytical dimensions of the collaborative governance framework: structural formalization, resource interdependency, communicative rationality, and accountability mechanisms. Cross-cutting themes related to power asymmetry, institutional trust, and community voice are discussed where relevant.

Structural Formalization

All four regions possess formal legal mandates for waste governance derived from national law, regional regulations (Perda), and the national target of 30% waste reduction and 70% waste handling by 2025 under Government Regulation No. 81/2012. However, the translation of these mandates into operational inter-regional collaboration mechanisms remains partial and inconsistent.

Medan and Deli Serdang maintain a de facto resource-sharing arrangement regarding the TPA Terjun facility, which serves portions of both jurisdictions. This arrangement, however, is governed by informal understandings rather than formalized inter-regional agreements, creating uncertainty regarding cost-sharing, maintenance responsibilities, and expansion planning. As the Head of DLH Deli Serdang noted: 'We use Medan's TPA for several sub-districts near the border, but there is no formal MoU. It depends on the goodwill of the city government each year.'

Binjai, as a smaller municipality surrounded by Deli Serdang territory, faces particular challenges of jurisdictional isolation. The city manages its waste through an independent TPA at Tanah Merah, but informal waste flows across the Binjai–Deli Serdang boundary remain ungoverned. The Mebidangro coordination secretariat acknowledges waste management as a priority concern but has not yet produced binding inter-regional protocols.

In Karo, structural formalization is most constrained. The regency operates a single TPA at Sempa Jaya (near Kabanjahe) that serves urban centers but lacks coverage for rural sub-districts and tourist corridors. No formal private sector partnership agreements were identified in Karo; waste collection in rural areas relies predominantly on community self-management and informal collection by waste pickers.

Table 3. Status of Formal Collaboration Mechanisms by Region (2024)

Region	Inter-Regional MoU	PPP Contracts	Bank Sampah Units	Mebidangro Integration
Medan	Informal (TPA)	4 active contracts	312 registered	Partial

Region	Inter-Regional MoU	PPP Contracts	Bank Sampah Units	Mebidangro Integration
Binjai	None active	2 active contracts	48 registered	Partial
Deli Serdang	Informal (TPA)	3 active contracts	186 registered	Partial
Karo	None	None	27 registered	None

Source: Dinas Lingkungan Hidup Medan, Binjai, Deli Serdang, Karo (2024); Mebidangro Sekretariat (2024)

Resource Interdependency

Resource interdependency the extent to which actors depend on one another's resources to achieve waste governance goals varies substantially across the four regions and actor types. In Medan, the DLH maintains the largest operational capacity with a fleet of over 180 collection vehicles, yet relies on private contractors for approximately 40% of total waste collection in peripheral sub-districts. Private sector actors, in turn, depend on government-controlled disposal infrastructure, creating a mutual dependency that in principle supports collaboration.

In Deli Serdang, the regency's large territorial extent (2,497 km²) creates severe logistical challenges that no single actor can address alone. The DLH partners with three private companies operating in different service zones, but coordination between companies within the same regency is limited. Community-based organizations, including 186 registered bank sampah units, generate 12–18 tons of recyclable materials per month that are sold to aggregator companies a material flow that creates economic interdependency but lacks formal governance integration.

The most compelling example of potential resource interdependency that remains unrealized was identified in Karo. The regency's tourism sector particularly in Berastagi and Tongging generates seasonal waste surges that overwhelm existing infrastructure during peak periods (July–August and December). Tourism operators and hotel associations in Berastagi possess financial resources and logistical capacity that could be mobilized for waste management, yet no formal engagement mechanism exists between the tourism private sector and the DLH Karo.

Communicative Rationality

Communicative rationality refers to the quality of deliberative dialogue and information exchange among collaborating actors. Across all four regions, coordination meetings between the DLH and private contractors were reported to occur regularly, typically on a monthly or quarterly basis. However, the structure of these meetings was predominantly procedural focusing on service delivery reporting rather than collaborative problem-solving or joint planning.

Community participation in governance dialogues was consistently identified as limited. In Medan, the annual Musrenbang (participatory planning) process nominally includes environmental concerns, but waste management proposals from kelurahan and kecamatan levels are rarely incorporated into city-level budget decisions. Bank sampah coordinators across all four regions reported feeling excluded from formal governance processes despite their operational significance to the waste management system.

An exception was identified in one sub-district of Deli Serdang (Percut Sei Tuan), where the DLH had established a forum (Forum Pengelolaan Sampah Terpadu) involving government officers, private contractor representatives, bank sampah coordinators, and neighborhood association heads. Informants from this forum reported higher levels of trust, better information flow, and more responsive service delivery compared to areas without such forums. This case suggests that communicative infrastructure, when deliberately constructed, can substantially improve collaborative outcomes.

Table 4. Stakeholder Perceptions of Collaborative Governance Quality (n=34 Informants)

Governance Dimension	Government Officers (n=12)	Private Sector (n=8)	Community Reps (n=10)	Planning Bodies (n=4)
Structural Formalization	Moderate	Moderate	Low	Low
Resource Interdependency	High	High	Moderate	Moderate
Communicative Rationality	Moderate	Low	Very Low	Moderate
Accountability Mechanisms	Moderate	Low	Very Low	Moderate

Source: Primary data, in-depth interviews (2024). Scale: Very Low / Low / Moderate / High based on thematic coding of informant responses.

Accountability Mechanisms

Accountability in waste governance encompasses both upward accountability (to higher levels of government) and downward accountability (to the public and communities served). Across the four regions, upward accountability mechanisms are relatively more developed, driven by national reporting requirements to the Ministry of Environment and Forestry and the Sistem Informasi Pengelolaan Sampah Nasional (SIPSN) platform. All four DLH offices reported waste generation, handling, and reduction data to SIPSN annually, providing a baseline of systemic accountability.

Downward accountability mechanisms through which communities can hold both government and private actors accountable for service quality are considerably weaker. Public complaint mechanisms exist in all four cities/regencies through the formal LAPOR! system, but awareness of this mechanism among community informants was low (reported by

3 of 10 community informants). Private contractor performance evaluations are conducted by the DLH but are rarely disclosed publicly.

In Karo, the absence of formal private sector engagement in waste governance also implies an absence of contractual accountability mechanisms. Community-managed waste collection in rural sub-districts operates outside any formal accountability framework, making performance monitoring and improvement extremely difficult.

Discussion

The findings collectively demonstrate that multi-actor collaboration in waste governance across the four study regions is characterized by what this study terms 'fragmented interdependency': a condition in which resource dependencies among government, private, and community actors are recognized and partially operational, yet collaboration remains structurally weak, communicatively limited, and accountability-poor. This condition echoes findings from comparable studies in Indonesian urban governance (Sururi & Lestari, 2020; Wahyudi et al., 2022) and from broader scholarship on collaborative governance in decentralized developing country contexts (Marchi & Quill, 2023).

The Mebidangro framework represents an underutilized institutional resource. While the metropolitan coordination structure exists and is legally grounded in Presidential Regulation No. 62/2011, its application to waste governance has been limited to informal coordination at the TPA level. Strengthening the Mebidangro secretariat's mandate to include binding inter-regional waste management agreements modeled on comparable metropolitan environmental governance arrangements in cities such as Bandung Raya and Greater Makassar would represent a significant structural improvement.

The case of Karo adds an important analytical dimension that is often absent from urban-centric waste governance studies. The highland regency's combination of rural institutional fragility, tourism-driven seasonal waste surges, and the absence of formal private sector engagement creates a governance challenge distinct from those faced by the three metropolitan regions. The theoretical implication is that collaborative governance frameworks developed primarily in urban contexts may require significant adaptation when applied to peri-urban and rural-mountainous settings, where informal community structures and non-government actors may carry greater governance weight than formal institutional arrangements.

The identification of the Forum Pengelolaan Sampah Terpadu in Percut Sei Tuan as a positive deviant case carries important implications for policy design. This sub-district-level forum demonstrates that communicative infrastructure when deliberately and inclusively constructed can generate the trust, information flow, and joint problem-solving capacity that collaborative governance theory predicts as necessary conditions for effective outcomes. Scaling this model to other sub-districts and replicating its design principles at the inter-regional level warrants serious consideration by policymakers.

Table 5. Collaborative Waste Governance Reform Framework for North Sumatra Regional Corridor

Reform Area	Proposed Action	Lead Actor	Timeline
Inter-Regional Formalization	Draft binding MoU on TPA sharing and waste flow regulation across Medan-Binjai-Deli Serdang	Mebidangro Secretariat + DLH	Short-term (1–2 years)
Private Sector Integration (Karo)	Establish PPP framework for tourism corridor waste management in Berastagi–Tongging	DLH Karo + KADIN	Short-term (1–2 years)
Community Voice	Establish multi-stakeholder forums at kecamatan level in all four regions	DLH + Bappedalitbang	Medium-term (2–3 years)
Accountability Transparency	Public disclosure of contractor performance evaluations and waste data via open platform	DLH + BPKAD	Medium-term (2–3 years)
Capacity Parity (Karo–Deli Serdang)	Inter-regional technical assistance and vehicle sharing program	All DLH + Kemendagri support	Long-term (3–5 years)

Source: Authors' synthesis based on fieldwork findings and collaborative governance literature (2024)

CONCLUSION

This study examined multi-actor collaboration in waste governance across four North Sumatran regions Medan, Binjai, Deli Serdang, and Karo through the lens of collaborative governance theory. The findings revealed a pervasive condition of fragmented interdependency: actors recognize their mutual resource dependencies and formal governance mandates exist, yet collaborative arrangements remain structurally informal, communicatively limited, and insufficiently accountable to the communities they serve.

Four key conclusions are drawn from this research. First, structural formalization of inter-regional collaboration particularly through the Mebidangro framework is urgently needed to transform informal TPA-sharing arrangements into binding governance agreements. Second, resource interdependencies, particularly those involving community-based bank sampah networks and private sector logistics capacity, are significantly underutilized due to weak integration mechanisms. Third, communicative rationality the foundation of effective collaborative governance is severely limited by the exclusion of community actors from governance dialogues, with the exception of deliberate forum-building initiatives such as the Percut Sei Tuan model. Fourth, accountability mechanisms remain primarily upward-oriented, failing to create the downward accountability to communities that sustainable waste governance requires.

The distinct governance context of Karo regency characterized by tourism-driven waste challenges, absent private sector engagement, and rural institutional fragility highlights the

need for governance frameworks that are sensitive to urban–rural heterogeneity within regional corridors. A uniform metropolitan governance approach cannot adequately address the governance needs of geographically and institutionally diverse regions.

This study contributes to the growing literature on collaborative environmental governance in decentralized Indonesian contexts and to broader comparative scholarship on multi-actor governance in the Global South. The five-dimensional reform framework proposed in Table 5 offers practical guidance for policymakers at the regional and national levels. Future research should employ longitudinal designs to assess how collaborative arrangements evolve over time, and comparative studies including other metropolitan corridors in Indonesia would strengthen the generalizability of these findings.

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