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Decentralization, Institutional Capacity, and Waste Governance: A Comparative Study of Medan and Binjai, North Sumatra

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ABSTRACT

Decentralization under Indonesian Law No. 23/2014 transferred solid waste management authority to municipal governments, yet the translation of this mandate into effective governance outcomes has been uneven across urban settings of different scales and capacities. This study examines how institutional capacity, resource allocation, and governance arrangements shape waste management outcomes in two adjacent North Sumatran cities: Medan, the provincial capital and third-largest city in Indonesia, and Binjai, a secondary municipality of approximately 300,000 residents. Through a comparative case study design, the research draws on in-depth interviews with 28 informants, document analysis of regional waste management plans and budget allocations, and secondary data from the National Waste Management Information System (SIPSN). Findings reveal that while both cities have expanded formal collection coverage over the 2019–2023 period, substantial disparities persist in collection rates, infrastructure quality, and private sector integration. Medan demonstrates greater structural capacity but faces coordination fragmentation across its 21 sub-districts; Binjai exhibits stronger inter-agency coherence but is constrained by limited budgetary resources and landfill capacity. The study identifies three institutional mechanisms that mediate the decentralization–outcome relationship: budget adequacy, inter-agency coordination, and community-based waste governance integration. Theoretical contributions to the decentralization and urban governance literature are discussed, alongside practical recommendations for strengthening waste governance in secondary cities of the Global South.

Keywords: decentralization; waste governance; institutional capacity; Medan; Binjai; North Sumatra; secondary cities; Indonesia



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INTRODUCTION

The transfer of solid waste management authority to local governments through Indonesia's decentralization framework has generated significant variation in governance capacity and service delivery outcomes across municipalities. While large metropolitan cities generally benefit from greater administrative resources and political salience, secondary cities — those with populations between 100,000 and 500,000 — frequently face a compound disadvantage: they bear full legal responsibility for waste management under Law No. 23/2014 on Regional

Government, yet lack the fiscal and institutional resources to discharge this mandate effectively (Hadiz, 2020; Prasajo & Kurniawan, 2021).

This tension between devolved authority and uneven capacity is particularly visible in North Sumatra, where the provincial capital of Medan and the adjacent secondary city of Binjai occupy the same ecological corridor and share a border, yet demonstrate markedly different patterns of waste governance. Medan, as the third-largest city in Indonesia with a population exceeding 2.5 million, commands a far larger administrative apparatus, DLH (Dinas Lingkungan Hidup) budget, and service infrastructure. Binjai, with approximately 298,000 residents, manages its waste through a considerably smaller institutional structure while facing comparable per-capita waste generation challenges driven by shared urban growth dynamics.

The comparative study of these two cities offers a theoretically productive natural experiment: by holding regional context, regulatory framework, and historical development trajectory broadly constant while varying city scale and institutional capacity, the analysis can illuminate how decentralization interacts with municipal-level governance factors to produce divergent waste management outcomes. This approach responds to calls in the decentralization and urban governance literature for more fine-grained comparative analysis of governance dynamics in adjacent cities within the same provincial context (Smoke, 2019; Tonkëns, 2022).

The study is guided by three research questions: (1) How do institutional capacity and resource allocation differ between Medan and Binjai in relation to waste governance? (2) What governance mechanisms — inter-agency coordination, private sector engagement, and community integration — distinguish the two cities? (3) What factors explain convergent and divergent waste management outcomes despite shared regulatory and regional environments? Through these questions, the study contributes to broader debates on decentralization effectiveness, secondary city governance, and institutional capacity building in the Global South.

LITERATURE REVIEW

Decentralization in the context of public service delivery has been extensively theorized as a mechanism for improving governance efficiency, local responsiveness, and accountability (Rondinelli, 1981; Faguet, 2014). In the solid waste domain, decentralization is argued to facilitate context-sensitive service design and allow municipalities to mobilize local stakeholders — including communities and private actors — more effectively than centralized bureaucratic systems (Wilson et al., 2021). However, the empirical evidence for these claims in developing country settings is mixed, and a substantial body of research highlights how decentralization can amplify existing capacity inequalities across localities (Hadiz, 2020; Prasajo & Kurniawan, 2021).

The concept of institutional capacity — broadly defined as an organization's ability to mobilize resources, coordinate action, and deliver services toward specified goals — is central to understanding why decentralized waste governance produces divergent outcomes (Andrews et al., 2017). In Indonesian municipal waste governance, institutional capacity is

shaped by at least three interacting factors: fiscal capacity (budget allocation and revenue generation), human capital (technical expertise within DLH), and organizational coordination (integration across agencies and actor types) (Agustina et al., 2021).

The governance of solid waste in Indonesian cities has increasingly moved beyond the binary of government provision versus market delivery toward hybrid multi-actor arrangements. Bank sampah (community waste banks) represent perhaps the most distinctly Indonesian innovation in community-based waste governance, engaging households in waste sorting and monetizing recyclable materials through organized exchange systems (Aprilia et al., 2013). Research in Medan specifically has documented the growth of bank sampah networks as a form of urban environmental citizenship (Thamrin et al., 2022), though their systemic integration into municipal waste governance remains uneven.

For secondary cities — a governance category increasingly recognized as analytically distinct from both large metropolises and small towns — the decentralization–capacity relationship takes on particular significance. Secondary cities tend to experience rapid urbanization, growing waste volumes, and rising service expectations while commanding smaller fiscal transfers and weaker technical capacity than provincial capitals (Roberts, 2014). Studies from comparable contexts in Southeast Asia, including Philippine provincial cities and Vietnamese secondary municipalities, document similar patterns of governance under-capacity relative to mandated responsibilities (Tonkëns, 2022).

RESEARCH METHODS

This study adopted a comparative case study design, treating Medan and Binjai as paired cases selected on the basis of geographic adjacency, shared regulatory environment, and contrasting institutional scale (Yin, 2018). The comparative logic allowed for systematic analysis of how variation in institutional capacity, across otherwise similar contextual conditions, shapes waste governance outcomes. The unit of analysis was the institutional governance arrangement for solid waste management within each city.

Data were collected between February and May 2024 through three methods. First, semi-structured in-depth interviews were conducted with 28 informants distributed across the two cities: DLH officials and field supervisors (n=10), municipal planning and budget officers from Bappeda and BPKAD (n=6), private waste collection contractors (n=6), and community representatives including bank sampah coordinators and neighborhood environment officers (n=6). Interviews were audio-recorded, transcribed, and translated where necessary from Bahasa Indonesia to English for analysis. Second, document analysis was conducted on regional medium-term development plans (RPJMD), masterplans for waste management, annual DLH performance reports, and budget realization documents for both cities covering 2019–2023. Third, secondary quantitative data were obtained from SIPSN-KLHK and the Statistics Indonesia (BPS) database for North Sumatra.

Qualitative data were analyzed using thematic analysis (Braun & Clarke, 2006), supplemented by process tracing to identify causal mechanisms linking institutional capacity to governance outcomes. NVivo software was used for systematic coding. Trustworthiness was ensured through data triangulation across sources and methods, member checking with

key informants, and peer review of emerging interpretations. Quantitative secondary data were analyzed descriptively and used to contextualize and corroborate qualitative findings.

RESULTS AND DISCUSSION

Institutional Capacity and Resource Allocation

The most fundamental difference between Medan and Binjai in waste governance is one of institutional scale. Medan's DLH operates with a workforce of approximately 2,340 personnel (including contract and outsourced workers), a fleet of 184 collection vehicles, and an annual waste management budget that grew from IDR 42.1 billion in 2019 to IDR 54.3 billion in 2023. Binjai's DLH, by contrast, operates with approximately 380 personnel, 47 collection vehicles, and a budget that increased from IDR 8.4 billion to IDR 13.2 billion over the same period.

Per-capita budget analysis reveals a more nuanced picture. Medan's per-capita DLH expenditure in 2023 stood at approximately IDR 21,180 per resident, while Binjai's reached IDR 44,295 — a figure suggesting that, on a per-capita basis, Binjai's resource allocation is actually more generous relative to its population. This apparent paradox is explained by the higher fixed costs of urban waste management infrastructure in denser, more complex cities, and by Medan's need to service informal settlements and peripheral areas that generate disproportionate waste volumes relative to formal collection capacity.

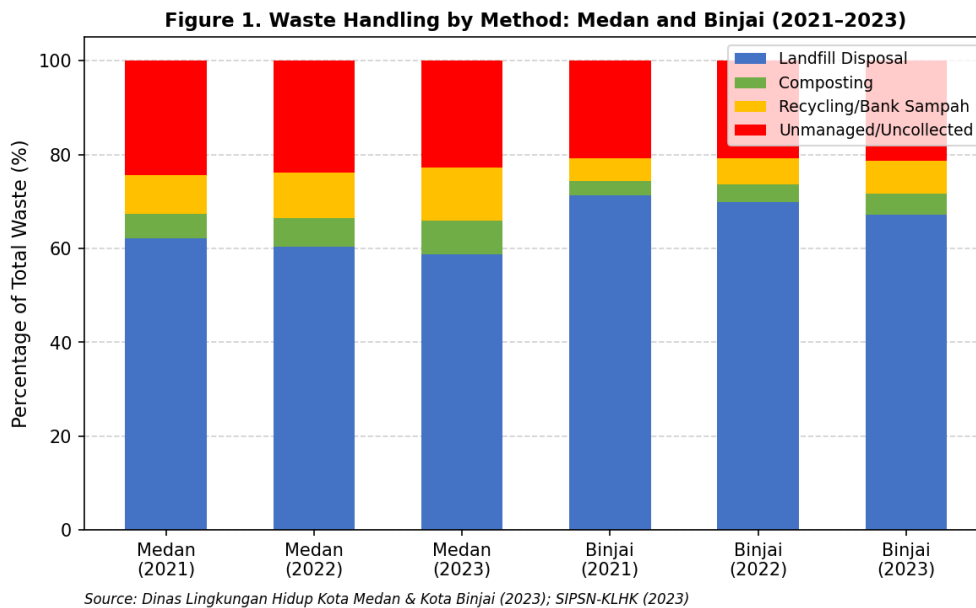
Table 1. Comparative Institutional Capacity Indicators: Medan and Binjai (2023)

Indicator	Medan	Binjai
Population (2023)	2,564,145	298,012
Daily Waste Generation (tons/day)	1,820	195
DLH Personnel (including contract)	2,340	380
Collection Vehicles (operational)	184	47
DLH Annual Budget (IDR Billion)	54.3	13.2
Per-Capita DLH Budget (IDR)	21,180	44,295
Formal Collection Coverage (%)	68.4	61.2
Registered Bank Sampah Units	312	48
Active PPP Contracts	4	2
Landfill Operational Status	Active (TPA Terjun)	Active (TPA Tanah Merah)

Source: Dinas Lingkungan Hidup Kota Medan & Kota Binjai (2023); BPS Sumatera Utara (2023); SIPSN-KLHK (2023)

The disparity in registered bank sampah units — 312 in Medan versus 48 in Binjai — reflects not only the scale difference but also the deeper penetration of community-based waste governance in Medan's urban neighborhoods. Thamrin et al. (2022) document the role of Medan's bank sampah network in creating social capital and environmental awareness,

particularly among women-led household groups. In Binjai, bank sampah activity is concentrated in specific sub-districts (particularly Binjai Utara and Binjai Selatan) and has received limited institutional support from the DLH, which lacks a dedicated community engagement unit.



Source: Dinas Lingkungan Hidup Kota Medan & Kota Binjai (2023); SIPSN-KLHK (2023)

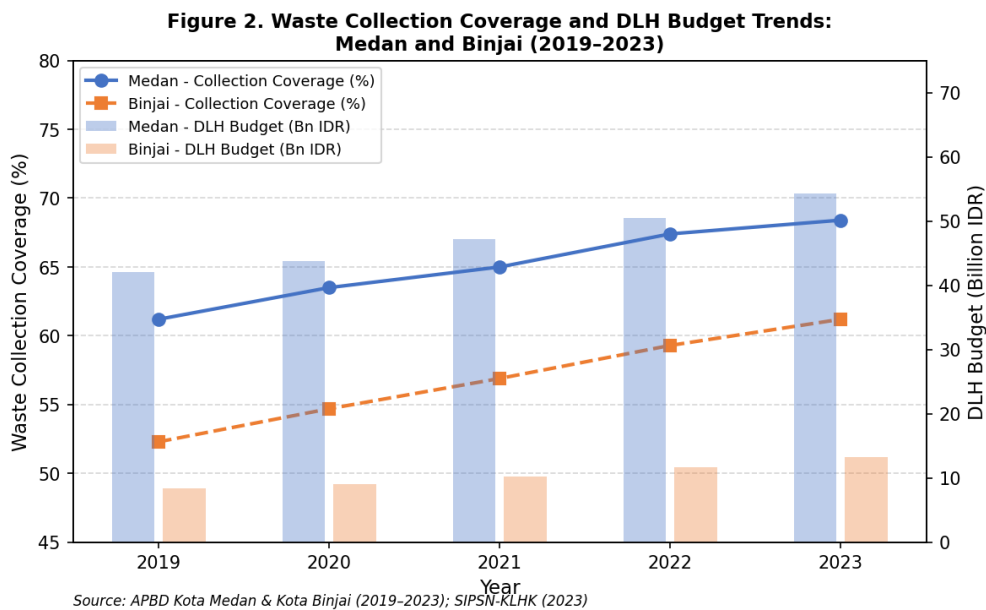
Figure 1 illustrates the composition of waste handling methods in both cities from 2021 to 2023. Several patterns are notable. First, both cities show a gradual decline in the proportion of waste directed to landfill disposal, consistent with national policy targets under Government Regulation No. 81/2012 to reduce landfill dependency. Second, recycling through bank sampah and formal recycling facilities has grown in both cities, though Medan demonstrates a more substantial increase — from 8.4% to 11.2% — compared to Binjai's more modest growth from 4.8% to 6.9%. Third, the proportion of unmanaged or uncollected waste remains significant in both cities, with Binjai showing a slight deterioration in 2023 (21.4%) compared to 2022 (20.8%), likely reflecting the strain of population growth on existing collection infrastructure.

Governance Mechanisms: Coordination, Private Sector, and Community Integration

Beyond resource endowments, the quality of governance mechanisms — particularly inter-agency coordination, private sector integration, and community engagement — significantly differentiates waste governance in the two cities. In Medan, the DLH operates within a complex multi-agency environment, formally coordinating with Bappeda (regional planning), BPKAD (regional financial management), the Infrastructure and Spatial Planning Office, and the Health Office on matters spanning waste collection routes, landfill expansion, and health impact monitoring. A dedicated waste management coordination unit within the DLH facilitates these inter-agency linkages, though informants reported that coordination becomes fragmented at the kecamatan level, where sub-district administrations operate with limited integration into DLH planning processes.

Binjai's smaller administrative scale paradoxically enables more coherent inter-agency coordination at the city level. The head of Binjai's DLH reported that regular coordination meetings with Bappeda and the mayor's office occur fortnightly, allowing waste management concerns to be escalated and resolved within shorter feedback loops. This coherence advantage at the city level, however, diminishes at the neighborhood scale, where the absence of a dedicated community engagement program limits the integration of grassroots waste reduction efforts into the formal governance system.

Private sector involvement differs notably between the two cities. Medan has four active public-private partnership contracts covering waste collection in peripheral sub-districts where municipal collection capacity is insufficient. These contracts are managed through an annual competitive tendering process overseen by the DLH procurement unit. In Binjai, two PPP contracts are in place, but informants within the DLH indicated that contract monitoring is constrained by limited technical staff, resulting in periodic service quality gaps that are not promptly addressed.



Source: APBD Kota Medan & Kota Binjai (2019–2023); SIPSN-KLHK (2023)

Figure 2 presents the trend in formal waste collection coverage alongside DLH budget allocations for both cities from 2019 to 2023. A consistent upward trend is visible for both coverage and budget across both cities, suggesting a positive relationship between increased fiscal commitment and improved service delivery. However, the rate of coverage improvement relative to budget growth is more favorable in Medan, where each incremental IDR billion in DLH budget corresponds to approximately a 0.23 percentage point gain in coverage. Binjai's coverage-to-budget ratio is lower at approximately 0.18 percentage points per billion IDR, suggesting that scale economies in waste infrastructure may disproportionately benefit larger cities.

Mechanisms Mediating Decentralization and Outcomes

Synthesizing the qualitative and quantitative findings, this study identifies three institutional mechanisms that mediate the relationship between decentralized authority and waste

governance outcomes in the Medan–Binjai comparison. These mechanisms are not deterministic but interact dynamically, and their relative strength differs between the two cities.

The first mechanism is budget adequacy — not merely the absolute level of DLH expenditure but its sufficiency relative to the waste management challenge faced. In both cities, DLH budgets have grown in nominal terms; however, the waste volumes generated by urban population growth and economic activity have grown comparably, creating a persistent gap between resource supply and demand. Binjai's higher per-capita DLH expenditure does not fully compensate for its relative lack of economies of scale in infrastructure investment.

The second mechanism is inter-agency coordination quality. The study finds that Binjai's advantage in city-level coordination coherence is a meaningful governance asset, enabling faster problem escalation and more responsive budgetary adjustments to waste management needs. Medan's coordination fragmentation at the sub-district level, by contrast, creates service delivery gaps in peripheral areas that are poorly addressed by centralized DLH planning.

The third mechanism is community-based governance integration — the degree to which bank sampah networks, environmental community groups, and neighborhood institutions are formally incorporated into the municipal waste governance system. Medan's denser bank sampah network represents a significant governance asset that remains underutilized due to limited formal integration. Binjai's bank sampah sector, while smaller, benefits from closer proximity to city-level decision-making, suggesting that integration quality may matter more than network scale in secondary city contexts.

Discussion

The comparative findings carry several implications for decentralization theory and urban waste governance practice. First, they challenge the conventional view that larger city scale automatically translates into superior governance outcomes. While Medan's absolute institutional capacity substantially exceeds Binjai's, the secondary city demonstrates competitive advantages in coordination coherence and per-capita resource commitment that partially offset the scale gap. This finding resonates with Roberts' (2014) argument that secondary cities can develop distinctive governance competencies that are obscured by aggregate comparisons focused on large metropolitan centers.

Second, the findings highlight what this study terms the integration deficit: in both cities, the most dynamic and locally embedded waste governance actors — community bank sampah networks — remain structurally peripheral to formal municipal governance systems. The bank sampah model in Medan, extensively documented by Thamrin et al. (2022) as generating environmental awareness and social cohesion, has not been formally incorporated into DLH service delivery planning. Closing this integration deficit — through formal data-sharing agreements, incentive structures for bank sampah participation in collection chain logistics, and community representation in governance planning forums — represents a high-return governance improvement opportunity in both cities.

Third, the study contributes to the literature on decentralization effectiveness by demonstrating that the decentralization–outcome relationship is mediated by multiple institutional mechanisms rather than fiscal resource transfers alone. Policy interventions aimed purely at increasing DLH budget allocations without simultaneously strengthening coordination mechanisms and community integration are likely to produce suboptimal returns in both large and secondary city contexts.

CONCLUSION

This comparative study of waste governance in Medan and Binjai has illuminated both the structural differences and functional parallels that characterize decentralized solid waste management in Indonesian cities of contrasting scales. While Medan's substantially greater institutional capacity in terms of personnel, infrastructure, and budget produces higher absolute levels of formal waste collection, Binjai's stronger inter-agency coherence and higher per-capita DLH expenditure demonstrate that secondary cities are not simply diminished versions of provincial capitals — they represent distinct governance configurations with their own strengths and vulnerabilities.

The study identifies three institutional mechanisms — budget adequacy, inter-agency coordination quality, and community-based governance integration — as the primary mediators of the decentralization–outcome relationship in this context. Critically, the integration deficit in both cities — the gap between the operational significance of community-based waste governance (bank sampah networks, neighborhood environmental groups) and their marginalization from formal governance systems — represents the most actionable improvement priority for both municipalities.

For Medan, the governance priority is structural: reducing coordination fragmentation at the sub-district level and formally integrating the extensive bank sampah network into DLH service delivery planning. For Binjai, the priority is developmental: leveraging existing coordination coherence to systematically expand coverage in underserved areas, build technical capacity in contract monitoring, and create institutional pathways for community-based waste actors to influence city-level planning.

Theoretically, this study contributes to the comparative decentralization literature by demonstrating that governance quality — particularly in the dimensions of coordination and community integration — mediates the relationship between fiscal decentralization and service delivery outcomes in ways that aggregate budget measures do not capture. Future research should examine longitudinal governance trajectories across a broader sample of North Sumatran municipalities and employ experimental or quasi-experimental designs to assess the causal impact of specific governance interventions on waste management outcomes.

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