

Implementation of Plastic Waste Management Policy in Malang Regency: A Quantitative Analysis of the Gap Against Regent Regulation No. 26/2019 Targets

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Abstract

This study analyzes the gap between realization and targets for waste reduction and handling in Malang Regency against Regent Regulation No. 26/2019, and examines the readiness of waste-bank infrastructure together with the absence of a plastic-specific regulation in the region. A descriptive quantitative approach with an ex post facto design was used, drawing on official secondary data from the Malang Regency Environmental Agency (DLH), Statistics Indonesia (BPS) for Malang Regency, credible mass media, and prior academic studies, analyzed through time-series trend analysis, gap analysis against the Regent Regulation's tiered targets, proportion analysis of waste-bank activity, and content analysis of regulatory completeness. Waste-handling realization lagged behind the Regent Regulation's targets at every observation point, reaching 41.36% in 2023 against a 57.36% target (a gap of -16.00 points) and only 40.00% in 2025 against a 70.00% target (a gap of -30.00 points), with the gap widening rather than narrowing over time. Of 250 registered waste banks, only 125 units (50.0%) were actively operating, and Malang Regency had yet to enact any Regional Regulation or Regent Regulation specifically restricting single-use plastics, unlike the approach beginning to be taken by neighboring Malang City. The study concludes that waste policy implementation in Malang Regency faces structural challenges in the form of a widening target gap, low infrastructure activity, and a regulatory void on plastics, despite the regency's status as Indonesia's first national pilot site for a plastic-waste-elimination partnership with international stakeholders.

Keywords: *Plastic Waste Policy, Waste Handling, Waste Bank, Malang Regency, Regent Regulation.*

A. INTRODUCTION

Malang Regency is one of the largest regencies by land area in East Java, comprising 33 sub-districts and 390 villages with a population of 2.65 million according to the 2020 population census (Statistics Indonesia [BPS] Malang Regency, 2021). That sheer geographic scale is itself a source of complexity for waste management: daily waste generation was reported at around 1,300 tonnes in 2022-2023 (Kompas.com, 2022; Ariyanti & Pradana, 2024), declining somewhat to roughly 1,200-1,226 tonnes per day by 2025-2026 (IDN Times, 2025; Malang Post, 2026). Plastic accounted for 15.19% of total waste generation in 2022 (Kompas.com, 2022), a proportion significant enough that Malang Regency was selected as Indonesia's first national pilot site for the Bersih Indonesia Program, a plastic-waste-elimination partnership between the Coordinating Ministry for Maritime Affairs and Investment

and the Alliance to End Plastic Waste, with a targeted investment of US\$29 million aimed at diverting more than 50,000 tonnes of plastic waste annually (Kompas.com, 2022; Memontum Kabupaten Malang, 2022).

The regency's waste-management policy rests on Malang Regency Regional Regulation No. 2/2018 on Waste Management as the general legal umbrella (Malang Regency Government, 2018), operationalized in more technical form through Regent Regulation No. 26/2019 on the Regional Policy and Strategy (Jakstrada) for Household and Household-Type Waste Management, which sets tiered reduction and handling targets culminating in 30% reduction and 70% handling by 2025 (Malang Regency Government, 2019). Even so, as of April 2025 the acting head of the regency's Environmental Agency acknowledged that of the 1,226 tonnes generated daily, only around 40% was being properly managed, leaving the remainder at risk of polluting the environment (IDN Times, 2025); by August 2026, roughly 600 tonnes per day, about half of total generation, was still reported ending up in rivers or being openly burned by residents because of limited collection capacity (Malang Post, 2026).

Community-based waste infrastructure in the regency consists of 250 registered waste banks, though only about half are actively operating, with 125 managers having received training from the Ministry of Environment and Forestry (Tugumalang.id, 2023). The most prominent 3R-based processing facility is the Mulyoagung Bersatu Integrated Waste Management Site (TPST) in Dau sub-district, which converts incoming waste into 39% compost and 45% recyclable materials, leaving only 16% residue (Martindari, 2018) -- a model widely regarded as successful but not yet replicated at scale, given that the regency's total inventory of Reduce-Reuse-Recycle Waste Transfer Stations (TPS3R) stood at just 16 units as of August 2022 (Memontum Kabupaten Malang, 2022b) for a territory spanning 33 sub-districts.

Ariyanti and Pradana's (2024) study of Malang Regency's paradiplomacy through its 2014-2018 partnership with UNESCAP on the Integrated Resource Recovery Center (IRRC) project at Pasar Mantung found that, as of 2023, only 41.36% of waste generated was being channeled into managed final disposal (TPA), while Martindari's (2018) single-site study of the Mulyoagung TPST pointed to a relatively successful community-based management model. What remains largely unexamined is a systematic quantitative account of the gap between the Regent Regulation's tiered targets and actual year-on-year realization, linked to the state of infrastructure readiness and the completeness of plastic-specific regulation -- the gap this study addresses. Accordingly, the study aims to: (1) analyze the trend in the gap between realization and target for waste handling in Malang Regency against Regent Regulation No. 26/2019; (2) assess the activity rate of waste-bank infrastructure as a pillar of policy implementation; and (3) examine the completeness of plastic-waste-reduction regulation in Malang Regency relative to the approach taken by neighboring jurisdictions.

The study draws on Grindle's (1980) policy implementation framework, which holds that implementation outcomes are shaped jointly by the content of policy and the context of implementation -- including the power, interests, and strategies of the

actors involved, the character of implementing institutions, and the compliance and responsiveness of policy targets. This framework is well suited to interpreting why implementation gaps in Malang Regency, a jurisdiction with an unusually large geographic footprint and a correspondingly large number of implementing actors, follow a different pattern than the gaps observed in more compact urban areas such as Batu City and Malang City.

Because much of Malang Regency's waste-reduction capacity depends on 250 community-run waste banks spread across 390 villages, this study also draws on Ostrom's (1990) theory of collective action, which explains how self-governed common-pool resource institutions succeed or fail depending on design principles such as clearly bounded membership, congruence between rules and local conditions, graduated monitoring and sanctions, and -- critically for a jurisdiction of this scale -- nested enterprises, where small local institutions are organized into layered structures rather than left to operate in isolation. Ostrom's framework predicts that collective action becomes harder to sustain as group size and heterogeneity increase, which is directly relevant to interpreting why a regency spanning 33 sub-districts struggles with infrastructure activity rates in a way that more compact cities do not. Recent Indonesian studies frame this same dynamic as co-production between citizens and local government (Prastya, Putranti, Yuniningsih, Priyadi, & Mangai, 2024; Haziq, Prastya, & Safitri, 2026), a framing this study uses later to interpret the sustainability problem behind Malang Regency's low waste-bank activity rate.

B. METHODS

This study uses a quantitative approach with an ex post facto design, analyzing official records of Malang Regency's waste-management policy achievements without manipulating any study variable. The population comprises the full set of official waste-management and waste-bank-infrastructure records published for Malang Regency between 2018 and 2026 (a secondary-data census study), so no random sampling was performed.

Secondary data were drawn from four sources: (1) official releases by the Malang Regency Environmental Agency (DLH) as reported through credible mass media outlets (Kompas.com, IDN Times, Malang Post, Tugumalang.id, Memontum Kabupaten Malang); (2) regulatory documents, namely Malang Regency Regional Regulation No. 2/2018 and Regent Regulation No. 26/2019, as the reference for policy targets and standards; (3) prior academic journal articles and theses containing quantitative waste-management data for Malang Regency, specifically Ariyanti and Pradana (2024) and Martiandari (2018); and (4) population and administrative data from Statistics Indonesia (BPS) Malang Regency. Data were collected through documentary review of all four source types.

Analysis proceeded in four stages. First, time-series trend analysis traced the year-on-year development of waste generation and handling realization. Second, gap analysis, computed as $\text{Gap} = \text{Realization} - \text{Target}$, was applied against the tiered targets set out in Appendix I of Regent Regulation No. 26/2019, which specifies

handling targets of 37.26% (2020), 57.36% (2023), and 70.00% (2025). Third, proportion analysis was used to compute the waste-bank activity rate, calculated as $\text{Proportion} = (\text{Number of active units} / \text{Number of registered units}) \times 100\%$. Fourth, a content analysis of Malang Regency's regulatory documents identified whether any policy instrument explicitly restricted single-use plastics, benchmarked against the regulatory approaches of neighboring jurisdictions (Malang City and Batu City). All quantitative computations were carried out using the Python programming language.

C. RESULTS AND DISCUSSION

1. Waste Generation and Composition in Malang Regency

Waste generation in Malang Regency held relatively steady in the range of 1,200-1,300 tonnes per day between 2022 and 2026, though the exact annual figure varies somewhat across sources (Table 1). Plastic accounted for 15.19% of total generation in 2022 (Kompas.com, 2022), a proportion that helped underpin the regency's selection as Indonesia's first national pilot site for the Bersih Indonesia Program, a plastic-waste-elimination partnership between the Coordinating Ministry for Maritime Affairs and Investment and the Alliance to End Plastic Waste, backed by a targeted US\$29 million investment aimed at diverting more than 50,000 tonnes of plastic waste per year and creating 3,000 jobs (Kompas.com, 2022; Memontum Kabupaten Malang, 2022).

Table 1. Waste Generation and Handling Rate in Malang Regency, 2022-2026

Year	Generation (tonnes/day)	Managed/Handled Share	Source
2022	1,300	-	Kompas.com (2022)
2023	1,300	41.36% reaching final disposal	Ariyanti & Pradana (2024)
2025	1,226	40.00% managed	IDN Times (2025)
2026	~1,200	50.00% collected to final disposal	Malang Post (2026)

Source: Compiled From the Sources Listed in the Source Column.

The modest difference between the share "reaching final disposal" (2023) and the share "managed"/"collected to final disposal" (2025-2026) in Table 1 likely reflects operational definitions that are not perfectly identical across reporting periods. Even so, all three figures point in the same direction: a majority of the regency's waste, somewhere between 50% and 59% of total generation, remains inadequately handled and at substantial risk of polluting the environment through river dumping or open burning, as documented in 2026 (Malang Post, 2026).

2. The Gap Between Realization and the Regent Regulation No. 26/2019 Target

Appendix I of Regent Regulation No. 26/2019 sets tiered waste-handling targets of 37.26% (2020), 57.36% (2023), and 70.00% (2025) (Malang Regency Government, 2019). Handling realization stood at 41.36% in 2023, 16.00 percentage points below the 57.36% target (Table 2 and Figure 1). The gap then widened considerably by 2025, when realization reached only 40.00%, 30.00 percentage points below the final 70.00% target. This widening pattern is a notable finding in its own right, since it runs counter

to the usual expectation that policy implementation moves closer to target over time as implementers gain experience.

Table 2. Gap Between Realization and the Malang Regent Regulation No. 26/2019 Target (%)

Year	Handling Target (Regent Reg. 26/2019)	Handling Realization	Gap (percentage points)
2020	37.26	n/a	n/a
2023	57.36	41.36	-16.00
2025	70.00	40.00	-30.00

Source: Compiled from Malang Regent Regulation No. 26/2019, Ariyanti & Pradana (2024), and IDN Times (2025). Realization data for 2020 were not found in the sources reviewed.

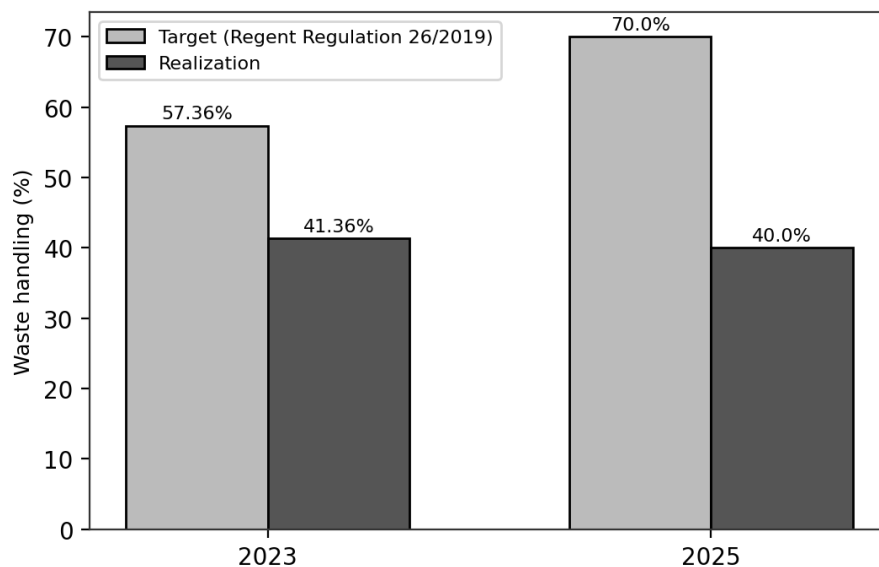


Figure 1. Gap Between Target and Realization of Waste Handling in Malang Regency, 2023 and 2025

Source: Compiled by the Author from the Data in Table 2

3. Waste-Bank Infrastructure Activity

Of the 250 waste banks registered in Malang Regency, only 125 units, or 50.0%, were actively operating, with the remainder falling short of optimal function despite many managers having received training from the Ministry of Environment and Forestry (Tugumalang.id, 2023). This 50% activity rate indicates that the physical provision of waste-bank infrastructure does not by itself guarantee operational continuity -- a pattern that diverges from Batu City, where the waste-bank units reported by the local Environmental Agency all appear to be counted as active in the basis for its reduction-achievement figures. As a benchmark for a successful model, the Mulyoagung Bersatu TPST in Dau sub-district achieves a product mix of 39% compost, 45% recyclable materials, and 16% residue (Martindari, 2018), yet this model has not been replicated at scale: the regency's total TPS3R inventory stood at just 16 units as of August 2022 (Memontum Kabupaten Malang, 2022b) to serve a territory of 390 villages.

4. The Regulatory Void on Plastic Waste Reduction

A content analysis of Malang Regency's regulatory documents shows that Regional Regulation No. 2/2018 and Regent Regulation No. 26/2019 govern household waste management in general terms but contain no article explicitly restricting single-use plastics (Malang Regency Government, 2018; Malang Regency Government, 2019). This stands in contrast to Malang City, which has at least issued Mayoral Circular Letter No. 8/2021 on Plastic Waste Reduction, even though that instrument itself remains a non-binding appeal. Malang Regency therefore has no plastic-specific policy instrument at any level, whether a binding regulation or a mere circular letter, leaving its plastic-reduction efforts resting substantially on partnership programs such as Bersih Indonesia (Kompas.com, 2022) rather than on legally binding regional regulation.

Read through Grindle's (1980) implementation framework, the widening gap between target and realization for waste handling in Malang Regency, from -16.00 points in 2023 to -30.00 points in 2025, is best explained through the dimension of implementation context, particularly the character of the institutions and the distribution of power involved in carrying out policy across an unusually large territory. With 33 sub-districts and 390 villages to serve, an infrastructure base of just 16 TPS3R units (Memontum Kabupaten Malang, 2022b) and 125 active waste banks (Tugumalang.id, 2023) is far out of proportion to the area it must cover, in contrast to Batu City and Malang City, whose more compact territories allow for a proportionally denser service infrastructure. This pattern is consistent with Grindle's broader argument that well-designed policy content -- in this case the fairly detailed tiered targets set out in Regent Regulation No. 26/2019 -- does not on its own produce successful implementation when the implementation context, namely institutional capacity and the resources available to implementers, is not adequate to the scale of territory being governed.

The 50% waste-bank activity rate points to a further, more micro-level sustainability problem. Training already delivered by the Ministry of Environment and Forestry to 125 waste-bank managers (Tugumalang.id, 2023) suggests the constraint is not primarily one of initial human-resource capacity, but rather of operational continuity after training ends, which is likely shaped by economic incentives, sustained institutional support, and market demand for recycled outputs. The Mulyoagung Bersatu TPST's success in reducing residue to just 16% (Martindari, 2018) demonstrates that strong outcomes are achievable at the single-site level given robust institutional management, but that success has not yet been replicated systemically across the regency's 390 villages.

Ostrom's (1990) theory of collective action supplies a more precise account of why that 50% activity rate looks the way it does. Her design principles for durable common-pool resource institutions include graduated monitoring and sanctioning of members, and, for larger systems, the nesting of small local institutions within an intermediate layer of coordination rather than leaving each unit to fend entirely for itself. Malang Regency's waste-bank network appears to satisfy neither condition well:

training was delivered directly by a national ministry to individual managers with no described intermediate body to monitor whether units remained active afterward, and there is no evidence of a sub-district or district-level coordinating structure sitting between the regency's DLH and its 250 dispersed units. Where Ostrom's theory would predict fragility, absent nesting and monitoring, is exactly where this study finds it: half of the network inactive despite substantial prior investment in training. This reading is reinforced by recent Indonesian co-production research: Prastya, Putranti, Yuniningsih, Priyadi, and Mangai (2024) found that community-based waste co-production in Semarang was sustained by continuous government encouragement rather than a one-off intervention, while Haziq, Prastya, and Safitri (2026) found in Tanjungpinang that co-production requires an ongoing relationship between citizens and local government beyond simple participation in a single program cycle; Malang Regency's pattern of upfront training followed by unmonitored operation is consistent with what both studies identify as an insufficient basis for durable co-production.

The absence of any plastic-specific regulation in Malang Regency -- compared with Malang City, which has at least a Mayoral Circular Letter (No. 8/2021), and Batu City, which is piloting village-level regulation in Oro-Oro Ombo -- places the regency at the earliest stage in the hierarchy of plastic-policy instrument strength among the three study areas. The regency's evident preference for large-scale investment and infrastructure partnership through the Bersih Indonesia Program (Kompas.com, 2022) over binding plastic-restriction regulation is consistent with the interests-and-actor-strategy dimension of Grindle's framework, suggesting a local-government preference for infrastructure investment over regulatory intervention in household plastic-consumption behavior. It is the combination of a vast territory, low infrastructure activity, and a regulatory void on plastics that together account for the widening gap between target and realization in Malang Regency's waste-handling performance. In practical terms, this void could be narrowed without waiting for a dedicated regional bylaw by tying Malang Regency into the national Extended Producer Responsibility roadmap under Ministry of Environment and Forestry Regulation No. P.75/2019, which already obligates large producers and retailers operating anywhere in Indonesia, including the modern retail chains and food-service outlets present in the regency, to report and reduce the plastic packaging they place on the market (Ministry of Environment and Forestry, 2019); this would give the regency a source of regulatory leverage over plastic waste that does not depend on drafting new local legislation from scratch.

Taken together with the findings from Batu City and Malang City, this pattern suggests that territorial scale functions as a distinct moderating variable in plastic-waste-policy implementation across Greater Malang, one that compounds whatever gains a well-designed target framework might otherwise deliver. A regency-scale jurisdiction appears to need not merely more of the same infrastructure that works in a compact city, but a fundamentally different implementation architecture -- one that nests waste-bank support within intermediate, sub-district-level coordinating bodies along the lines Ostrom's (1990) theory would recommend, decentralizes monitoring

accordingly, and pairs partnership-driven investment with at least a baseline regulatory instrument, whether local or, in the interim, drawn from the national EPR framework, rather than treating infrastructure and regulation as substitutes for one another.

D. CONCLUSION

This study concludes that the implementation of waste-handling policy in Malang Regency faces a target gap that has widened over time, from -16.00 percentage points in 2023 (41.36% realization against a 57.36% target) to -30.00 percentage points in 2025 (40.00% realization against the 70.00% target set by Malang Regent Regulation No. 26/2019) -- a pattern running counter to the expectation that realization should move closer to target over time. This gap is compounded by a low waste-bank activity rate of just 50.0% among the 250 registered units, and by a TPS3R capacity of only 16 units that is far out of proportion to a territory spanning 33 sub-districts and 390 villages.

The study also concludes that Malang Regency has yet to enact any regulation specifically restricting single-use plastics, whether in the form of a Regional Regulation, a Regent Regulation, or even a circular letter, leaving the regency's plastic-reduction strategy reliant chiefly on investment-partnership programs such as Bersih Indonesia rather than on a legally binding regulatory instrument, in contrast to the approach Malang City has begun to take.

Based on these findings, the Malang Regency Government should move to draft a dedicated regulation, at minimum in the form of a Regent Regulation, that explicitly restricts single-use plastics, given that the regency has been designated a national pilot site for plastic-waste elimination yet still lacks a local legal framework commensurate with that status; in the interim, tying local enforcement to the national Extended Producer Responsibility roadmap (Ministry of Environment and Forestry Regulation No. P.75/2019) would give the regency a regulatory lever over plastic waste without waiting for that local bylaw to be drafted and passed. The Regency Environmental Agency should likewise conduct a comprehensive evaluation of the 125 inactive waste banks to identify the barriers to their operational continuity and design incentive schemes to support reactivation, while progressively replicating the Mulyoagung Bersatu TPST model in other sub-districts according to waste-generation density priorities.

Consistent with Ostrom's (1990) design principles for durable collective-action institutions, the regency should also establish an intermediate, sub-district-level coordinating structure between DLH and its 250 waste banks, rather than continuing to manage the network as 250 individually monitored units, so that reactivation support, performance monitoring, and market linkages for recycled outputs can be organized at a scale the regency's own institutional capacity can realistically sustain.

Future research should empirically test the factors behind waste-bank inactivity in Malang Regency through surveys of waste-bank managers, ideally applying Ostrom's design-principle framework directly to identify which specific

principles, bounded membership, monitoring, graduated sanctions, or nested governance, are most clearly absent, and should periodically evaluate the Bersih Indonesia Program's implementation progress to assess how far its targets for investment and plastic-waste diversion, 50,000 tonnes annually, are being met, given the scale of resources already committed to that partnership.

REFERENCES

1. Ariyanti, S. D., & Pradana, H. A. (2024). Kolaborasi global dalam pengelolaan sampah: Paradiplomasi Pemerintah Kabupaten Malang melalui kerja sama dengan UNESCAP. *Sospol: Jurnal Sosial Politik*, 10(1).
2. Badan Pusat Sattistik Kabupaten Malang. (2021). *Jumlah Penduduk Kabupaten Malang Hasil Sensus Penduduk 2020 Sebanyak 2,65 Juta Jiwa*. Retrieved from: <https://malangkab.bps.go.id/en/pressrelease/2021/01/22/183/the-total-population-of-malang-regency-from-the-2020-population-census-sp2020--is-2-65-million-person.html>
3. Grindle, M. S. (1980). *Politics and policy implementation in the Third World*. Princeton University Press.
4. Haziq, M. H., Prastya, I. Y., & Safitri, D. P. (2026). Beyond participation in community-based waste management: A study of co-production in Tanjungpinang, Indonesia. *Priviet Social Sciences Journal*, 6(8), 46-63.
5. IDN Times. (2025). *Kabupaten Malang Produksi 1.226 Ton Sampah, Baru Bisa Kelola 40 Persen*. Retrieved from: <https://jatim.idntimes.com/news/jawa-timur/kabupaten-malang-produksi-1-226-ton-sampah-baru-bisa-kelola-40-persen-00-gytrj-f6t1y6>
6. Kompas.com. (2022). *Pabrik Pengolahan Sampah Plastik Akan Dibangun di Malang*. Retrieved from: <https://surabaya.kompas.com/read/2022/05/19/061325178/pabrik-pengolahan-sampah-plastik-akan-dibangun-di-malang?page=all>
7. Malang Post. (2026). *Kabupaten Malang Darurat Sampah, 600 Ton Mampir di Sungai dan Dibakar*. Retrieved from: <https://malang-post.com/2026/08/07/kabupaten-malang-darurat-sampah-600-ton-mampir-di-sungai-dan-dibakar/>
8. Martiandari, P. (2018). *Pengelolaan sampah domestik berbasis masyarakat di Kabupaten Malang (Studi implementasi PP No. 81 Tahun 2012 dengan prinsip 3R di TPST Desa Mulyoagung)*. Universitas Brawijaya, Malang.
9. Memontum Kabupaten Malang. (2022). *Program Bersih Indonesia: Eliminasi Sampah Plastik Diluncurkan, Kabupaten Malang Dipilih Sebagai Piloting Pertama*. Retrieved from: <https://kabupatenmalang.memontum.com/program-bersih-indonesia-eliminasi-sampah-plastik-diluncurkan-kabupaten-malang-dipilih-sebagai-piloting-pertama>
10. Memontum Kabupaten Malang. (2022b). *Resmikan TPS 3R Gadingkulon, Bupati Malang Sampaikan Optimalisasi Lapangan Kerja Baru*. Retrieved from: <https://kabupatenmalang.memontum.com/resmikan-tps-3r-gadingkulon-bupati-malang-sampaikan-optimalisasi-lapangan-kerja-baru>
11. Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

12. Peraturan Bupati Malang Nomor 26 Tahun 2019 tentang Kebijakan dan Strategi Daerah dalam Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga.
13. Peraturan Daerah Kabupaten Malang Nomor 2 Tahun 2018 tentang Pengelolaan Sampah.
14. Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor 75 Tahun 2019 tentang Peta Jalan Pengurangan Sampah oleh Produsen.
15. Prastya, I. Y., Putranti, I. R., Yuniningsih, T., Priyadi, B. P., & Mangai, M. (2024). Co-production analysis in waste management: A local perspective. *Journal of Local Government Issues*, 7(2), 176-193.
16. Tugumalang.id. (2023). 250 Bank Sampah di Kabupaten Malang Belum Berjalan Optimal. Retrieved from: <https://tugumalang.id/250-bank-sampah-di-kabupaten-malang-belum-berjalan-optimal/>