

The Planning, Budgeting, And Technical Aspects Of Integrated Waste Management In Kabupaten Batang

Novan Arief Nugraha¹, Sobrotul Imtikhanah²

¹Fakultas Ekonomika dan Bisnis, Universitas Muhammadiyah Pekajangan Pekalongan, Indonesia

¹novanwax@gmail.com, 2emmaferdiz.umpp@gmail.com

ABSTRACT

Keywords:

Integrated Waste Management, Planning, Budgeting, Waste Processing Infrastructure.

Abstract: Waste management issues in Batang have become a major concern due to the growing waste management emergency. The challenges faced include a high waste generation rate of 477 tons per day, most of which has not yet been properly managed, the limited availability of waste management infrastructure and facilities, insufficient budget allocation for waste management activities, and the lack of public awareness in actively participating in waste reduction activities based on the principles of Reduce, Reuse, and Recycle. The waste management should not merely focus on the implementation of operational waste management methods but also requires consideration from the perspectives of regulatory policy, planning, and budgeting within waste management programs and sub-program activities. The integration of planning aspects and budget allocation related to waste management is one of the issues that must be addressed immediately by the Government of Batang in order to achieve integrated waste management. Therefore, this study aimed to analyze the integration of planning, budgeting, and technical aspects of integrated waste management in Batang. This study used a qualitative method through a literature review and an analysis of public policy documents. The findings indicate that the Government of Batang has established a waste management program planning that encompasses waste management from upstream to downstream through the availability of waste reduction and waste handling programs. Several planned programs have been supported by adequate budget allocations for waste management activities, which have continued to increase within the Environmental Agency of Batang. Nevertheless, further optimization in the provision of waste processing infrastructure is still required to help reduce the volume of waste disposed of at the Final Disposal Site (FDS) and the Integrated Waste Processing Facility (IWPF). To optimize waste management, it is recommended that the Environmental Agency strengthen its planning and program implementation by maximizing waste service fees to increase budgeting capacity, while also enhancing public outreach to improve community awareness and compliance in independently carrying out waste segregation activities. These efforts are expected to contribute to reducing waste generation at the source before it is transported to the Final Disposal Site (FDS) or the Integrated Waste Processing Facility (IWPF).

Kata Kunci:

Integrasi Pengelolaan, Sampah Terpadu, Perencanaan, Penganggaran, Infrastruktur Pengolahan Sampah.

Abstrak: Permasalahan sampah di Kabupaten Batang menjadi perhatian yang cukup serius dalam menghadapi tantangan darurat sampah. Berbagai tantangan yang dihadapi diantaranya tingginya timbulan sampah 477 ton per hari dan sebagian besar belum teratasi, terbatasnya jumlah infrastruktur dan fasilitas pengelolaan sampah, minimnya anggaran kegiatan pengelolaan sampah, dan ditambah belum adanya kesadaran masyarakat dalam melakukan kegiataan aktif pengurangan sampah dengan prinsip reuse, reduce, recycle. Pengelolaan sampah memiliki indikasi tidak sekedar pada penerapan metode pengelolaan sampah pada operasionalnya namun perlu adanya dalam sudut pandang kebijakan peraturan, perencanaan dan penganggaran dalam program sub kegiatan pengelolaan sampah. Integrasi antara aspek perencanaan kegiatan dan penentuan anggaran terkait persampahan merupakan salah satu masalah yang harus segera diselesaikan oleh Pemerintah Kabupaten Batang agar mendapatkan pengelolaan sampah yang terpadu. Tujuan dari penelitian ini untuk dapat menganalisis integrasi aspek perencanaan, penganggaran, dan metode pengelolaan sampah terpadu di Kabupaten Batang. Karya ilmiah ini memakai metode kualitatif dengan studi pustaka dan proses pengkajian dokumen kebijakan publik. Produk dari penelitian menyatakan bahwa Pemerintah Kabupaten Batang telah mempunyai perencanaan

program kegiatan pengelolaan persampahan dengan adanya pengelolaan sampah mulai dari hulu sampai hilir dalam ketersediaan program kegiatan pengurangan dan penanganan sampah. Beberapa program perencanaan didukung kecukupan anggaran program pengelolaan sampah yang terus bertambah di Dinas Lingkungan Hidup Kabupaten Batang. Namun demikian masih perlu adanya optimalisasi penyediaan infrastruktur pengolahan sampah sehingga dapat membantu dalam hal pengurangan sampah yang dibuang di Tempat Pemrosesan Akhir (TPA) atau Tempat Pengolahan Sampah Terpadu (TPST). Saran untuk optimalisasi pengelolaan sampah dapat dilakukan dengan program perencanaan dan program kegiatan di Dinas Lingkungan Hidup dengan memaksimalkan retribusi persampahan guna menambah kemampuan penganggaran serta meningkatkan sosialisasi terkait kesadaran dan kepatuhan masyarakat dalam melakukan kegiatan pemilahan sampah secara mandiri sehingga dapat membantu dalam pengurangan timbulan sampah dari hulu yang akan diangkut ke Tempat Pemrosesan Akhir atau Tempat Pengolahan Sampah Terpadu.

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A. INTRODUCTION

The Batang Regency government is one of the local governments in Central Java that has industrial zones. This is due to the establishment of the Industropolis Batang Special Economic Zone, the Segayung Batang Industrial Zone, and the Batang Industrial Park, which will increase the volume of waste generated in Batang Regency by 477.76 metric tons per day, with 100 metric tons per day transported to the Final Waste Treatment Facility. Based on data recorded in the Ministry of Environment's Sistem Informasi Pengelolaan Sampah Nasional (SIPSN), waste generation in Batang Regency is projected to reach 174,384.8 metric tons per year by 2025. The discrepancy between daily waste generation and the amount transported to the Final Disposal Site (FDS) is due to suboptimal waste management in Batang Regency, which is the primary factor contributing to the high volume of waste generated. Household waste is the largest source of daily waste generation. Currently, the vast majority of waste processing is still carried out conventionally, meaning that waste is transported directly to the Final Processing Site (FPS) without prior sorting, thereby straining its capacity.

Several factors contribute to suboptimal waste management, including technical and operational factors, financial efficiency and viability, technological infrastructure and capacity, as well as the need to raise public awareness and enhance the community's role in waste management—all of which present challenges that must be addressed (Pasang, H., Moore, G. A., & Sitorus, 2007). Solving waste management problems involves not only technical matters but also requires the integration of supportive policy and regulatory aspects (Bui & Tseng, 2021). Waste management is crucial for the implementation of cooperative or collaborative policies (Tsai, 2020). The disparity between financial capacity and operational costs is an issue that must be addressed seriously (Fischhendler, 2007).

Population growth, changing consumption patterns, and shifts in lifestyles have led to an increase in the volume and diversity of waste generated (Azwar, A., 1990). In Batang Regency, the main challenges in waste management include limited landfill space, low public awareness of waste sorting, a heavy reliance on the "collect-transport-dispose" system, and insufficient public involvement. These conditions have made waste management increasingly challenging and unsustainable in the long term, while also negatively impacting the surrounding environment. Additionally, local governments face challenges d

ue to limited resources and budgets (Girma et al., 2022). To improve urban ecological infrastructure through effective waste management, it is essential to implement policies and establish facilities for urban waste management, recycling, and integrated treatment (Li et al., 2017).

Public participation is a key factor in promoting the implementation of the 3Rs. Changing public participation patterns and fostering cultural change are essential for improving the implementation of the 3R (Abdoli et al., 2016). The 3R principles (reduce, reuse, recycle) will subsequently influence efforts to reduce

the amount of waste transported to landfills, thereby helping to decrease the volume of waste generated at landfills. Sustainable waste management can be implemented through the involvement of various stakeholders and the application of the principles of sustainability, equity, effectiveness, and efficiency, which must be promoted through waste reduction (reduce), reuse, and recycling (Bharadwaj et al., 2020). The implementation of the 3Rs can help create a circular economy model that promotes the financial sustainability of waste management (Bharadwaj et al., 2020). In the implementation of the 3R principles, public awareness serves to change people's mindsets, behaviors, and culture regarding waste management, as well as strategies for reusing residues and the availability of recycling infrastructure (Azevedo et al., 2021).

Improvements in integrated waste management through environmental management, policy enforcement, institutional capacity building, public engagement, financial sustainability, and technical innovation are necessary to achieve long-term sustainability (Abdoli et al., 2016). These factors are inseparable and must be taken into account in the mechanisms of sustainable waste management (Sondh et al., 2022). These mechanisms must regulate waste management from the upstream stage (source of waste) to the downstream stage (final processing site), ensuring that no part of the waste management process is disconnected from the others.

Waste management in accordance with the provisions of No. 18 of 2008 on Waste Management, which is implemented through Government Regulation No. 81 of 2012. This regulation establishes a comprehensive waste management system based on reduction and treatment, and shifts the paradigm of conventional waste management from mere disposal (collect-transport-dispose) to one that is economically viable and environmentally sound. Management must include the 3R principles (reduce, reuse, recycle) and technical solutions for sorting, collection, transportation, treatment, and final disposal. It also outlines waste sorting by category, namely household waste, household-like waste, and specific waste (including hazardous waste). Optimizing waste reduction will result in reduced capacity at final disposal sites (FDS), and environmental pollution can be mitigated through sustainable practices.

The integration of various aspects of waste management serves as a framework for improving sustainable waste management, including operational methods, institutional frameworks, financing, regulations, and community participation. The main challenges faced include poor waste management infrastructure, the need for implementable waste management policies, a lack of awareness and capacity in waste management, and poor law enforcement (Topić & Biedermann, 2015). The development of waste management must be promoted to integrate stakeholders, legislation, and technical components to support sustainable waste management. This study confirms that the Batang Regency Government's efforts to achieve sustainable waste management are supported by the policies it has issued.

B. METHOD

This study employs a descriptive qualitative method, which involves describing existing conditions. This method focuses on gaining an in-depth understanding of a phenomenon through the collection of qualitative data such as interviews, observations, and document analysis (Creswell, 2014). In this study, the sources used consist of government policy documents supporting waste management in Batang Regency that were published from 2022 to 2026. The documents used focus on waste management activity planning programs and their budgets, as well as documents detailing the availability of waste management infrastructure and the amount of waste generated in Batang Regency. The documents used in this study are the Batang Regency Local Regulation on Anggaran Pendapatan dan Belanja Daerah (APBD) for 2022–2026, which includes plans for programs and activities as well as the budget for waste management. In addition, documents sourced from Sistem Informasi Pengelolaan Sampah Nasional (SIPSN) of the Ministry of Environment were used to obtain data on waste generation, the availability of waste management infrastructure, and data on managed and unmanaged waste.

The regional regulation containing the Regional Budget (APBD) includes data on the amount of funding available for waste management programs and planning programs to be implemented based on the existing budget. The results of an analysis by the Ministry of Environment's SIPSN system show the distribution of waste management infrastructure availability in Batang Regency. In this context, four local regulations were utilized: the 2022–2026 Regional Budget (APBD) regulations, as well as three datasets from the Ministry of Environment's SIPSN—specifically, data on the volume of waste generated in Batang Regency, the distribution of waste management facilities in 2025, and data on managed and unmanaged waste in Batang Regency.

Table 1. Data and Data Sources

Data Types	Data Sources
Program dan Anggaran Persampahan 2022	Peraturan Daerah Nomor 9 Tahun 2021
Program dan Anggaran Persampahan 2023	Peraturan Daerah Nomor 4 Tahun 2022
Program dan Anggaran Persampahan 2024	Peraturan Daerah Nomor 9 Tahun 2023
Program dan Anggaran Persampahan 2025	Peraturan Daerah Nomor 12 Tahun 2024
Program dan Anggaran Persampahan 2026	Peraturan Daerah Nomor 8 Tahun 2025
Ketersediaan Fasilitas Pengelolaan Sampah 2025	Sistem Informasi Pengelolaan Sampah Nasional
Jumlah Timbunan Sampah Tahun 2022, 2024, 2025	Sistem Informasi Pengelolaan Sampah Nasional
Sampah Terkelola dan Sampah Belum Terkelola	Sistem Informasi Pengelolaan Sampah Nasional

Data collection methods refer to the approaches used in the process of gathering data. These methods can be employed through interviews, observations, tests, documentation, and so on. Some commonly used data collection techniques include documentation, observation, and interviews. The documents used include the Batang Regency Regional Budget (APBD) for 2022–2026 and data from the Ministry of Environment's SIPSN system. In addition to documentation, data was also obtained through direct observation at waste treatment facilities in Batang Regency to assess the effectiveness of waste management efforts in reducing waste generation. Furthermore, public awareness campaigns regarding waste management were conducted in each village and subdistrict, resulting in the establishment of village and subdistrict regulations governing waste management practices from the household level up to the village and subdistrict levels. Interviews were then conducted to gather data from informants, including the Head of the Batang Regency Environmental Agency, the Head of the Waste, Hazardous and Toxic Materials Management Division, the TPST/TPS3R Manager, the Landfill Supervisor, and the Waste Bank Manager. Data analysis applied the Miles and Huberman interactive model, consisting of data reduction, data presentation, and drawing conclusions. The analysis integrated the root causes of the problem, which comprised three aspects: planning, budgeting, and the technical aspects of waste management. The validity of the resulting data was ensured through source triangulation, method triangulation, and member checking.

C. RESULTS AND DISCUSSION

According to Sistem Informasi Pengelolaan Sampah Nasional (SIPSN), the amount of waste generated in Batang Regency from 2022 to 2025 has continued to increase at a fairly rapid rate. Total waste generation consists of managed waste and unmanaged waste by the Batang Regency Environmental Agency. As shown in Table 2, daily waste generation is projected to decrease in 2024 compared to 2022, with a daily waste generation of 94.82 metric tons per day or 34,606.3 metric tons per year.

Table 2. Waste Generation in Kabupaten Batang

Kabupaten	2022		2024		2025	
	Daily Waste Generation (ton)	Generation of Waste Annually (ton)	Daily Waste Generation (ton)	Generation of Waste Annually (ton)	Daily Waste Generation (ton)	Generation of Waste Annually (ton)
Batang	567.28	207,055.41	472.46	172,449.11	477.76	174.384,8

Sumber: Sistem Informasi Pengelolaan Sampah Nasional, 2026

The Batang Regency Environmental Agency has developed an action plan for the waste management program included in Rencana Kerja Perangkat Daerah (RKPD) and Anggaran Pendapatan dan Belanja Daerah (APBD). This planning was carried out in accordance with Keputusan Menteri Dalam Negeri No. 900.1.15.5-3406 of 2024. The Environmental Agency is planning waste management activities. These activities are directly related to the creation of an integrated waste management system that takes into account waste management from source to disposal.

The Batang Regency Government is responsible for implementing final waste treatment. Final waste treatment is essential, given the still-low levels of waste reduction and management prior to transport to landfills or solid waste treatment facilities. Most of the waste management methods currently in use still follow the "collect–transport–dispose" model; therefore, waste treatment activities at landfills and solid waste treatment facilities remain a critical component of waste management implementation. Waste management

activities focus on upstream and midstream waste treatment, which can minimize the volume of waste transported to landfills or solid waste treatment facilities. The challenges in implementing these activities are not only related to treatment techniques but also to raising public awareness about reducing household waste. Therefore, in planning the waste management program, the budget allocated for waste management has been set in accordance with the planned activities, which are prioritized in environmental affairs budgeting. Looking at the 2026 Regional Budget (APBD), only 1.2% of the total budget for environmental affairs is allocated to waste management programs implemented by the Department of Environmental Affairs and the Regional Technical Implementation Unit for Waste Management.

Table 3. Waste Management Program Planning

2022	2023	2024	2025	2026
Activities: Waste Management	Activities: Waste Management	Activities: Waste Management	Activities: Waste Management	Activities: Waste Management
Sub-Activity: Increasing Community Participation in Waste Management	Sub-Activity: Increasing Community Participation in Waste Management	Sub-Activity: Increasing Community Participation in Waste Management	Sub-Activity: Increasing Community Participation in Waste Management	Sub-Activity: Increasing Community Participation in Waste Management
Coordination and Synchronization Provision of Facilities and Infrastructure Management of Solid Waste	Coordination and Synchronization Provision of Facilities and Infrastructure Management of Solid Waste	Coordination and Synchronization Provision of Facilities and Infrastructure Management of Solid Waste	Coordination and Synchronization Provision of Facilities and Infrastructure Management of Solid Waste	Coordination and Synchronization Provision of Facilities and Infrastructure Management of Solid Waste
Activities: Guidance and Oversight of Waste Management Conducted by the Private Sector	Activities: Guidance and Oversight of Waste Management Conducted by the Private Sector	Activities: Guidance and Oversight of Waste Management Conducted by the Private Sector	Activities: Guidance and Oversight of Waste Management Conducted by the Private Sector	Activities: Guidance and Oversight of Waste Management Conducted by the Private Sector
Sub-Activity: Monitoring and Evaluation of Compliance with Targets and Standards for Waste Management Services	Sub-Activity: Monitoring and Evaluation of Compliance with Targets and Standards for Waste Management Services	Sub-Activity: Monitoring and Evaluation of Compliance with Targets and Standards for Waste Management Services	Sub-Activity: Monitoring and Evaluation of Compliance with Targets and Standards for Waste Management Services	Sub-Activity: Monitoring and Evaluation of Compliance with Targets and Standards for Waste Management Services

Sumber: Anggaran Pendapatan dan Belanja Daerah Kabupaten Batang, 2026

Based on the budget breakdown in Table 4, it is evident that the budget allocated to Unit Pelaksana Teknis Daerah (UPTD) for Waste Management—which serves as the waste management operator in Batang Regency—is significantly larger than the budgets allocated to other agencies. As the waste management operator, the UPTD Persampahan Management is responsible for implementing waste management activities; specifically, waste processing at the Randukuning Landfill falls under the UPTD's authority.

Table 4. Waste Management Program Budget

	2022	2023	2024	2025	2026
Dinas Lingkungan Hidup	1.391.324.850	1.388.896.650	1.896.626.100	4.817.584.306	8.705.679.230
UPTD Persampahan	6.524.869.550	6.940.484.850	6.791.653.690	6.955.667.040	6.654.401.290
Total	7.916.194.400	8.329.381.500	8.688.279.790	11.773.251.346	15.360.080.520

Funding for the Environmental Agency—which serves as a regulator and policy maker—is allocated solely within the Environmental Agency’s budget, as it is the agency responsible for waste management policy in Batang Regency. Furthermore, the percentage of the budget allocated for waste management in Batang Regency reflects the priority given to waste management programs in the Batang Regency APBD. This indicates that the budget for waste management programs is primarily used to support technical aspects of waste processing rather than policy formulation.

The availability of waste management infrastructure is of the utmost importance, in addition to planning and budgeting. Data from the Ministry of Environment’s Sistem Informasi Pengelolaan Sampah Nasional (SIPSN) states that community-based infrastructure—such as waste banks, composting facilities, and organic processing centers—exists, as well as intermediate waste processing infrastructure, including TPS3R and TPST facilities equipped with various waste processing technologies. The number of such facilities is limited and unevenly distributed across Batang Regency. To optimize waste processing, a consistent commitment is needed to achieve sustainable waste management solutions.

The waste management infrastructure in Batang Regency is expected to address the increasingly complex waste problem. According to data from Sistem Informasi Pengelolaan Sampah Nasional (SIPSN), 7.54% of the waste generated in Batang Regency—or 13,106.22 metric tons per year—will be managed by 2024. This amount of managed waste includes waste reduction at facilities such as waste banks, waste handling at facilities such as 3R-based Waste Processing Sites (TPS 3R), and final disposal at the Randukuning Landfill.

Table 5. Distribution of Waste Management Infrastructure in Kabupaten Batang

Tahun	TPS3R	Waste Bank Unit	TPA/TPST	Informal Sector
2022	0	6	1	Not Yet Recorded
2024	2	7	1	31
2025	12	9	1	32

Sumber: Sistem Informasi Pengelolaan Sampah Nasional, 2025

The budget for the waste management program in the Batang Regency APBD and the amount of waste generated show a correlation between fluctuations in budget availability and the amount of managed waste. We can see that the 2024 budget has decreased compared to the budgets for 2022 and 2023. Furthermore, based on records of managed waste generation, it is evident that the amount of unmanaged waste in 2024 has increased significantly compared to the unmanaged waste volume in 2022, which stood at approximately 50,576.88 metric tons. The increase in the total unmanaged waste generated in 2024 indicates that improvements in waste management processes have not been able to keep pace with the increase in the total amount of waste generated, resulting in a rise in unmanaged waste. One contributing factor may be the reduced budget allocation compared to 2025.

Table 6. Amount of Managed Waste and Unmanaged Waste in Kabupaten Batang

	2022		2024		2025	
	Waste Managed (ton)	Waste Has Not Yet Been Managed (ton)	Waste Managed (ton)	Waste Has Not Yet Been Managed (ton)	Waste Managed (ton)	Waste Has Not Yet Been Managed (ton)
Kabupaten Batang	50.576,88	156.478,53	13.106,22	159.342,89	50.155	124.229,8

By 2025, the amount of unmanaged waste is expected to decrease, even though overall waste generation continues to rise. The budget allocated for waste management programs has significantly increased. This increase in funding is intended to expand waste management infrastructure in Batang Regency. The enhanced budget for waste management corresponds with the rising volume of managed waste. As a result, this allocation will strengthen the region's capacity for effective waste management.

D. CONCLUSIONS AND SUGGESTIONS

The Batang Regency Government has made significant strides in integrated waste management by coordinating program planning, budgeting, and ensuring the availability of adequate infrastructure for waste management from its source to disposal. These efforts are clearly outlined in the comprehensive work plan for environmental affairs, which addresses both the processing of waste collected at the source and the final stages of waste treatment. Activities supported by a dedicated waste management budget have become a top priority in the budgeting process. The increasing budget allocation reflects the Batang Regency Government's commitment to prioritizing effective waste management implementation.

The implementation of waste management, supported by waste treatment infrastructure, is of utmost importance. Ensuring the equitable distribution of this infrastructure is crucial to achieving uniform waste treatment throughout Batang Regency. This represents the greatest challenge in providing infrastructure within Batang Regency and must be addressed to prevent a further increase in unmanaged waste. The availability of evenly distributed waste treatment infrastructure is also expected to help reduce the volume of waste that must be processed at the Randukuning Landfill.

The availability of funding for waste management programs is directly related to the volume of waste generated and properly managed. This relationship is evident in 2024, when a decrease in available funding resulted in an increase in the amount of unmanaged waste. Therefore, it is clear that the effectiveness of waste management methods in Batang Regency is closely linked to the availability of funding.

To improve waste management in Batang Regency, several factors need to be considered. It's important to optimize waste treatment infrastructure by increasing the capacity for processing waste and encouraging community participation in reducing waste generation. These measures are crucial for effective waste management. Additionally, to strengthen budgeting capabilities, it is essential to implement mechanisms that optimize the collection of waste management fees, ensuring that funds are available for these initiatives.

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