

ANALYSIS OF WASTE MANAGEMENT IN BATANG HARI REGENCY

Arnild Augina Mekarisce¹, Yaya Intan Aminita Saragih¹, Adila Solida¹, Samsidar², Oka Lesmana S¹

¹Public Health Study Program, Universitas Jambi, Jambi, Indonesia

²Physics Study Program, Universitas Jambi, Jambi, Indonesia

Abstract

The waste problem in Batang Hari Regency continues to increase in line with population growth, with a daily volume of around 31 tons and 87% of temporary waste storage sites being illegal. This condition has an impact on public health, aesthetics, and environmental pollution. Waste management analysis is needed to improve management effectiveness, but such analysis has not been conducted comprehensively with involvement of stakeholders. The research aims to explore and provide an in-depth understanding of the social phenomenon being observed, focusing on detailed descriptions of field conditions. This research uses qualitative case study design. Data was collected through in-depth interviews, observations, and document reviews involving 10 informants. Data analysis was conducted using content analysis techniques, and data validity was ensured through triangulation of sources. The results show that waste management planning has been developed but has not been optimally implemented due to limitations in budget, fleet, and manpower. The implementation of collection and transportation is constrained by facilities and low public awareness of waste sorting. Evaluations are conducted but are not consistent, especially regarding illegal temporary waste storage sites. Follow-up actions in the form of socialization, additional facilities, and technical improvements have been carried out, but they have not completely resolved the problem. The implementation of management plays a crucial role in identifying weaknesses and promoting continuous improvement. Strengthening the budget, adding facilities, increasing the capacity of personnel, and active community participation are urgently needed to make waste management more optimal, sustainable, and positively impact health and the environment.

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Corresponding Author: Arnild Augina Mekarisce

Email: augina@unja.ac.id

INTRODUCTION

Indonesia, as a developing country, is experiencing significant population growth. The increase in population has a direct impact on high consumption and waste production, especially domestic waste. This condition poses a major challenge in environmental management, particularly in the aspect of solid waste management (1). Sources of solid waste (garbage) in urban areas come from residential areas, markets, shopping areas, commercial areas, office areas, and public institutions, industrial areas, animal farms, and other public facilities (2).

Data from the National Waste Management Information System (SIPSN) in 2023 shows that national waste generation reached 799.63 million tons. The composition of waste is dominated by food waste at 41.60%, followed by plastic at 18.71%. In terms of source, households are the largest contributor with a proportion of 44.37%. This figure reflects that the role of the community in the waste management system is crucial and must be a primary

concern in management strategies (3). This is in accordance with the definition stated in Undang- Undang Pengelolaan Sampah No 18 Tahun 2008 (4).

There are two types of waste disposal sites commonly found in Indonesia, namely Temporary Waste Disposal Sites and Final Disposal Sites (5). Both types of waste disposal sites are at the center of complex waste management issues that involve various stakeholders. One of the main challenges related to waste in Indonesia is the low level of public awareness and behavior in waste management (6).

In 2023, waste volumes have increased significantly worldwide in recent decades, and there are no signs that this trend will slow down. It is estimated that in the coming year, municipal waste generation worldwide will increase by about 70 percent to 3.4 billion metric tons. About 33 percent of total global waste is currently not properly managed (7). In 2023, Jambi Province produced approximately 799.63 tons of waste per day, which amounts to a total of 291,863.27 tons per year (8). The city of Jambi is the largest contributor of waste, followed by Bungo Regency, Tebo Regency, and Sungai Penuh City. The high volume of waste in this region poses a challenge, especially in terms of infrastructure management, transportation, and final disposal. This situation highlights the need for a more effective and collaborative approach to waste management at the regional level. Batang Hari Regency is one of the regions in Jambi Province facing similar problems (9). To date, preliminary surveys indicate that local government agencies have not conducted any in-depth studies to examine in detail and comprehensively the situation and root causes of waste-related issues, nor have they explored effective and efficient waste management practices, as their efforts have primarily focused on transporting waste to final disposal sites.

The amount of waste produced by Batang Hari Regency certainly has an impact on the distribution of legal and illegal temporary waste disposal sites. The distribution of legal temporary waste disposal sites in Batang Hari Regency only covers 13%, which is much lower than the percentage of illegal temporary waste disposal sites, which reaches 87% (10). The data obtained shows that there are 898 temporary waste collection points, of which 13% are legal temporary waste collection points with an average volume of 37.7 m³ and 87% are illegal temporary waste collection points with an average area of 21.01 m² (11). P Waste management in Batang Hari is also supervised by Peraturan Daerah Kabupaten Batang Hari Nomor 16 Tahun 2016 (12).

One of the crucial issues in Batang Hari is the lack of legal temporary waste storage sites. Based on 2024 data, of the 898 temporary waste storage sites, only 13% are legal, while 87% are illegal. This has led to the indiscriminate disposal of waste in locations that do not have permits and do not meet environmental management standards. The existence of illegal temporary waste disposal sites has the potential to pollute the soil and water, as well as worsen the quality of the environment for the surrounding community (13).

In theory, effective waste management requires a structured managerial approach. Good management will generate and achieve the desired objectives. Management is a systematic effort to achieve specific objectives by involving cooperation from various parties, and can be applied to many aspects, including the fields of health and the environment. According to W. Edwards Deming, management processes and activities consist of the

functions of plan, do, check, and act. In the context of waste management, the planning function encompasses all activities related to planning waste management operations, from the household level to the final waste disposal site; the do function involves the implementation of all planned activities intended to resolve waste management issues, the check function involves activities to ensure that all actions align with waste management standards, the act function include taking follow-up actions based on the results of the check function in waste management. The success of waste management also heavily depends on synergy between local governments, the community, and regulatory support. In Batang Hari, waste management efforts have been regulated through Local Regulation No. 16 of 2016. However, implementation on the ground still faces various challenges, ranging from budget constraints, low public awareness, to a lack of technical facilities (10).

Based on these facts, it can be concluded that the management of temporary waste storage sites in Batang Hari Regency is still far from ideal. A comprehensive evaluation of the existence and distribution of temporary waste storage sites is needed, in terms of legality, capacity, and its role in a sustainable waste management system. This research is important to provide strategic recommendations that can assist local governments in formulating more effective, efficient, and environmentally sustainable waste management policies.

METHODS

This study uses a qualitative case study design. This design was chosen to gain a detailed, in-depth, and comprehensive understanding of waste management in Batang Hari Regency. The population in this study was all parties involved in the waste management process in the region. Informants were selected purposively, considering the relevance and adequacy of the information needed. A total of 10 informants were selected, consisting of the Head of the Waste Management Technical Implementation Unit, the Waste Management Coordinator, sanitation officers, village heads, neighborhood association heads, and community members who were considered to have relevant knowledge and experience on the research topic. Data collection was carried out through in-depth interviews, field observations, and reviews of relevant documents. The data analysis technique used content analysis with the steps of coding, recontextualization, and categorization and compilation. Data validity was strengthened through source triangulation to ensure consistency and validity of information (14). This research was conducted in Batang Hari Regency from October 2024 until the final results of the research were compiled.

Table 1. In-depth interview informants

Informant	Initials	Position	Gender
Key Informant	BM	Waste Management Coordinator, Environment Agency, Batang Hari Regency	Male
Primary Informant	K	Head of the Waste Management Technical Implementation Unit, Environment Agency, Batang Hari Regency	Female

Supporting Informant	J	Garbage Collector, Environmental Agency, Batang Hari Regency	Male
Supporting Informant	A	Street Sweeper, Environmental Agency, Batang Hari Regency	Female
Supporting Informant	MT	Head of Household 18 Muara Bulian Subdistrict	Male
Supporting Informant	J	Head of Rengas Condong Village	Female
Supporting Informant	ZK	Head of Household 06 Citra Palem, Rengas Condong Village	Male
Supporting Informant	T	Head of Muara Bulian Village	Male
Supporting Informant	SM	The people of Batang Hari Regency	Female
Supporting Informant	Y	The people of Batang Hari Regency	Male

RESULTS

This study is based on in-depth interviews with 10 informants consisting of 1 key informant, 1 main informant from the Batang Hari Regency Environment Agency, and 8 supporting informants including 2 garbage collectors, 2 village heads, 2 neighborhood association leaders, and 2 community members in the Batang Hari Regency. The informants who were successfully interviewed in depth included BM, K, J, A, MT, T, ZK, SM, Y, and J.

Plan

Work Program Planning

Research findings indicate that the waste management work program in Batang Hari Regency has been developed through a targeted annual program; however, not all areas can be served optimally, and there are challenges in allocating limited resources. The planned program includes a schedule for transporting waste from temporary collection sites to final disposal sites, as well as waste sorting activities at the final disposal sites. As the following quote states:

“An annual work plan is in place, but its implementation is often disrupted due to budget and labor constraints.” (K)

Cross-Sector Cooperation

The Batang Hari Regency Environment Agency has also established cross-sector cooperation in supporting waste management. This cooperation takes the form of a written agreement known as a “MoU,” which is a waste transportation agreement with third parties such as schools, hospitals, and private institutions. As the following quote states:

“We have partnerships with several institutions, such as hospitals and schools, through a memorandum of understanding system. This means that waste from these places can continue to be transported without disruption.” (BM)

Human Resources

In terms of human resources, the Batang Hari Regency Environmental Agency has 200 staff members spread across 8 subdistricts, 14 urban villages, and 110 rural villages. However, the number of sanitation workers is still insufficient to serve the entire service area. However, there are still not enough sanitation workers to cover the entire service area. As the following quote states:

“There are currently around 200 workers, but it is not enough to cover all areas, especially during the rainy season when the volume of waste increases.” (T)

Funding and Infrastructure

Funding for waste management activities comes from local revenue. Meanwhile, planning for supporting infrastructure such as trucks, trash bins, and cleaning equipment is carried out in a planned manner through annual data collection that is included in local planning documents. As the following quote states:

“For tools and vehicles, we submit requests based on the results of field data collection, so it's not sudden. Everything goes through the annual planning process in regional documents.” (J)

Do

The waste management process is carried out according to a schedule set by the Environmental Agency, which runs from 6:00 a.m. to 11:00 a.m.–1:00 p.m. for the morning shift, and from 2:30 p.m. to 5:30 p.m.–6:00 p.m. for the afternoon shift. However, in practice, waste transportation is not yet fully optimized due to limited facilities and vehicles. In addition, coordination between field officers and sub-district officials has been going quite well, although its implementation is sometimes hampered by technical conditions in the field, such as delays in transportation due to vehicle breakdowns. As the following quote states:

“We are still short of vehicles in the field, so waste transportation cannot be done every day. Sometimes one car serves several sub-districts.” (MT)

Check

Evaluations are conducted periodically to ensure that waste management activities are proceeding according to plan. Inspections of operational vehicles are carried out daily before the start of the workday to ensure that the vehicles are in safe technical condition. In addition, evaluations of illegal waste collection sites have also been conducted, though not consistently. As the following quote states:

“Usually every morning before leaving, we check the car first, in case there are oil leaks or the brakes are not working properly. If there are minor problems, we fix them immediately.” (SM)

“Evaluations are carried out, but not regularly. Illegal waste collection points are sometimes difficult to control due to limited personnel and costs.” (A)

Act

Follow-up on the evaluation results is carried out through coaching and socialization activities for the community, as well as efforts to improve supporting facilities such as adding trash bins and procuring new vehicles. In addition, the Batang Hari Regency Environmental Agency also continues to conduct field monitoring to ensure that follow-up actions are carried out properly. As the following quote states:

“There has been socialization from the agency and the addition of trash bins, but there are still many residents who are not aware of the need to sort trash.” (ZK)

“We continue to monitor and call on groups if there are problems in the field, so that they can be resolved quickly.” (BM)

DISCUSSION

Planning in Waste Management in Batang Hari Regency

The results of the study show that the waste management planning process in Batang Hari Regency has been carried out through the preparation of annual programs and cross-sectoral cooperation between sub-districts, villages, and the Environmental Agency. The local government has also regulated the division of tasks for sanitation officers and set transportation schedules and work areas. However, there are still obstacles in terms of limited human resources and facilities and infrastructure, especially the transportation fleet and storage areas (15).

The interpretation of these findings shows that the planning process is already underway, but it is not yet fully effective because it is not supported by comprehensive needs mapping, such as human resource mapping based on workload analysis, analysis of the need for temporary waste storage sites along with their mapping and provision in a manner that is affordable for the community and environmentally safe, as well as other infrastructure for which the need has not yet been analyzed based on factual data from the field. This has resulted in some areas not being optimally served by sanitation workers. This finding is in line with W. Edwards Deming's (1950) theory in the Plan concept of the PDCA cycle, which emphasizes the importance of data-based planning and problem mapping so that the actions taken are on target (16). These results are also in line with Sari's (2021) research in Jambi City, which found that the success of waste management is influenced by cross-sector coordination and structured planning (17). As an intervention measure, the government needs to strengthen the planning process by updating waste generation data, increasing the sanitation budget, and involving the community and private sector in participatory planning.

Implementation in Waste Management in Batang Hari Regency

Waste management in Batang Hari Regency has been carried out in accordance with the division of tasks and schedule set by the Environmental Agency (18). Some of the obstacles encountered include operational challenges such as a lack of fuel and vehicles, caused by insufficient funding, and implementation is still hampered by a lack of community participation in sorting waste at the source; this is because the community feels that sorting waste is pointless since it gets mixed back together at the temporary collection site due to the lack of containers categorized by waste type (19).

This finding is in line with Rahman's research (2020) (20). In Muaro Jambi Regency, it was stated that waste management that is not accompanied by active community participation will result in low program effectiveness (21). Furthermore, these results support Deming's

(1950) theory that the Do stage must be carried out based on a well-thought-out plan and requires participation from all parties in order for the results to meet the targets (22). As an intervention, the government can improve the effectiveness of implementation through technical training programs for sanitation workers, improving the incentive system, and expanding public education through outreach activities and household-based waste bank programs.

Inspection and Evaluation in Waste Management in Batang Hari Regency

In terms of supervision, the Batang Regency Environmental Agency has been conducting periodic evaluations of the condition of operational vehicles and of illegal temporary waste storage sites, however there is no comprehensive documentation or reporting of the results of the evaluations that have been conducted. Furthermore, there has been no evaluation of the performance or headcount of the cleaning staff. The inspection and evaluation phase should be carried out periodically by the Environmental Agency together with the sub-district authorities through field monitoring activities and monthly evaluation meetings (23). This evaluation focuses on staff performance, environmental cleanliness, and operational constraints such as damaged or unroadworthy vehicles (24). However, the reporting system is still not digitally structured, so oversight is not yet optimal. These results show that oversight mechanisms are in place but are still administrative in nature and not yet based on robust evaluation data (25).

These findings are in line with Lestari's (2022) research in Banyuasin Regency, which states that unsystematic monitoring and evaluation have an impact on delays in handling hygiene issues. Theoretically, these results also support the Check stage in Deming's Plan-Do-Check-Action theory, where an inspection process is needed to ensure that the results of implementation meet standards and serve as a basis for determining corrective actions. Interventions that can be implemented include developing a digital monitoring system based on daily reports, strengthening internal oversight functions, and involving the community in environmental monitoring through a rapid reporting system (e.g., via social media or local applications).

Act in Waste Management in Batang Hari Regency

The corrective action phase in Batang Hari Regency was implemented by addressing the evaluation findings identified in the field, such as community outreach and awareness-raising activities, as well as efforts to improve supporting facilities, such as adding trash bins and procuring new vehicles. However, there is a need to increase the number of sanitation workers, and to conduct active and intensive collaborative activities on a regular basis with the community and the private sector (26). Interpretation of these findings shows that the follow-up efforts are a form of the government's commitment to improving waste management performance, even though they have not been implemented systematically.

These results are in line with the Act concept in Deming's PDCA theory (1950), which emphasizes the need for corrective action based on evaluation results so that the quality

improvement cycle can be sustainable. In addition, research by Pratama (2021) in Palembang City also found that the success of waste management improvements is highly dependent on the consistency of follow-up on evaluation results and cross-sectoral commitment. As an intervention, the government needs to design an integrated follow-up system, strengthen partnerships with the community and the private sector, and develop technology-based innovations to support sustainable waste management (27).

CONCLUSION AND RECOMMENDATION

Based on the results of research and discussion, it can be concluded that waste management in Batang Hari Regency has been implemented through the PDCA (Plan, Do, Check, Act) management approach, although it still faces several obstacles. In the planning stage, the Environmental Agency has developed an annual program, established cross-sector cooperation, and organized the workforce, but its implementation is still constrained by limited human resources and inadequate infrastructure. The implementation stage has been carried out in accordance with operational standards, involving sanitation officers and community self-help groups, but it has not been optimal due to limited fleets and low community participation in waste sorting. The checking stage shows that there are monitoring activities for the fleet and the use of personal protective equipment, but their distribution is not yet evenly spread across all areas. Meanwhile, the follow-up stage has been carried out through routine evaluations and socialization of waste reduction and the control of illegal temporary waste storage sites, but the level of public awareness in maintaining cleanliness remains a major challenge. Overall, the waste management system in Batang Hari Regency has implemented the Plan-Do-Check-Act principle, but its effectiveness still needs to be improved through strengthening human resources, improving facilities, and increasing the active role of the community.

Based on the results of this study, it is recommended that the number and capacity of human resources and sanitation facilities be increased so that waste management in Batang Hari Regency can be carried out more optimally. Cross-sector collaboration between the Environmental Agency, households, community groups, and the private sector also needs to be strengthened to create a more integrated waste management system. In addition, education and socialization to the community regarding proper waste sorting and disposal need to be carried out continuously in order to increase environmental awareness. Evaluation and monitoring of waste management should be carried out regularly and involve all stakeholders so that technical and social obstacles can be immediately overcome. For further research, it is recommended that a qualitative study be conducted on the social and cultural factors that influence community behavior in waste management and the development of a participatory model based on Plan-Do-Check-Act as a sustainable improvement effort.

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