

Analysis of Waste Management Policy by the Dumai City Environmental Agency: Literature Review

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ABSTRACT

Waste management has become a strategic environmental issue for Dumai City, an industrial area with a high and continuously increasing volume of daily waste, thereby requiring policies capable of responding to environmental and operational challenges in a sustainable manner. This study aims to analyze the waste management policy implemented by the Dumai City Environmental Agency using Dunn's six policy evaluation indicators: effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness. The research applies a literature review method by examining local regulations, official government reports, news publications, and relevant previous studies. The findings show that Dumai's waste management policy is supported by a strong regulatory framework, including regional regulations and mayoral decrees, and is strengthened through various programs such as waste banks, the restructuring of the Mekar Sari landfill, expansion of the sanitation fleet, and collaboration with the Ministry of Environment and Forestry. However, policy implementation still faces several obstacles, including the high waste generation reaching 180 tons per day, limited landfill capacity, inadequate processing facilities, low public awareness of waste sorting, and uneven distribution of waste management services. These issues indicate that although the policy direction is appropriate and responsive to community needs, its effectiveness and adequacy require significant improvement through increased infrastructure capacity, additional processing technology, expansion of 3R programs, and intensified public education. This study underscores the need for a more comprehensive and sustainable strategy that integrates government efforts with active community participation to enhance the overall effectiveness of waste management in Dumai City.

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1. INTRODUCTION

Today, efforts to improve the quality of the environment have been carried out by several local and city governments in Indonesia through planning and implementation of various relevant programs. According to (Stuart & Darwin, 2006), the problem of waste has become the main problem faced by almost all cities in Indonesia. The success of waste management is highly dependent on the commitment of local governments and community participation. This commitment stems from understanding and awareness of the importance of waste management systems as a reflection of the cleanliness of city and regional governance. Waste has now become one of the serious problems because it can pollute the environment and ultimately reduce the quality of life of the community (Suwandana, W.T.L, & Nurliawati, 2022).

The problem of waste management in both urban and rural areas in Indonesia has not been solved in a sustainable manner. In practice, the system used still tends to be conventional, namely collecting, transporting, and disposing of waste. Waste is collected from the source, transported using a transport fleet, and then down to the Final Waste Processing Site (TPA) which is generally located quite far from the source and is stacked openly (Ruhayat et al., 2023). According to (Hadiwiyoto, 1983:23), emphasizing that waste management should include sorting, moving, transportation, processing, and final handling so as not to cause a negative impact on the environment. However, in practice, many regions still rely on the basic 3P management pattern (collection, transportation, disposal) which has not been equipped with adequate processing.

On the other hand, there are different approaches in determining the most effective waste management strategy. A number of studies emphasize that improving the fleet, facilities, and infrastructure of landfills is the dominant factor for successful waste management. However, other studies view that success is more determined by changes in people's behavior and the application of the reduce–reuse–recycle (3R) concept. This difference of views shows that the success of waste management does not only depend on technical policies, but also on community involvement and effective field implementation (Rahmah, Koestoer, & Yusuf, 2024).

Dumai City is one of the strategic areas in Riau Province which is located on the east coast of Sumatra Island. The city grew as an industrial area, port, and distribution center for various commodities. The increasing rate of population growth, along with economic development and the urbanization process, makes Dumai a city that is experiencing an acceleration of development. This situation has a direct impact on the increasing need for public services, including waste management services, thus demanding a stronger and more sustainable environmental governance system.

The waste problem in Dumai City is still a serious environmental issue. The increase in waste generation is mainly triggered by the high rate of population growth and socio-economic conditions of the community, including the poverty level. In addition, a practical lifestyle, low implementation of clean and healthy living behaviors, and limited garbage bin facilities cause the volume of waste to continue to increase. As a result, the amount of waste generated today cannot be fully accommodated by the existing Final Processing Site (TPA). A lot of waste that is not transported to the landfill ends up accumulating in various locations, thus triggering flooding and increasing the risk of various diseases (Neri Anggela, 2023).

The high amount of waste in Dumai City is inseparable from the population density in a number of villages, which causes household waste to accumulate in Temporary Disposal Sites (TPS) and is difficult to control. This condition also has a negative impact on the surrounding environment. In addition, transportation systems that still use open transportation methods make it easy for waste in trucks or transport vehicles to fly along the road to the landfill.

Previous research by (Sari et al., 2021) regarding waste management in Bengkulu City, it was found that even though the policy has been carried out according to procedures, various obstacles still occur such as lack of transportation facilities, lack of polling stations, weak socialization, and indecisive enforcement of sanctions. These findings show that there is a gap between the policies set and the conditions of implementation in the field, as well as the importance of community participation in supporting the success of the policy. A similar gap is also seen in waste management in Dumai City.

The Dumai City Environmental Agency (DLH) is a local government agency responsible for domestic waste management based on a clear legal basis, namely (Dumai City Regional Regulation Number 03 of 2021 concerning Waste Management). DLH's duties not only focus on counseling activities to the community, but also include supervision of residents' compliance in disposing and sorting waste according to the rules, as well as the implementation of administrative sanctions for violators. The Dumai City Environmental Agency is also regulated by (Regulation of the Mayor of Dumai Number 36 of 2022 concerning the Position, Organizational Structure, Duties and Functions and Work Procedures of the Dumai City Environmental Service).

Although the Dumai City Environmental Agency (DLH) has implemented various waste management programs, the conditions on the ground show that these efforts still face a number of obstacles. The limited transportation fleet causes the process of transporting waste from the source to the TPS and to the landfill is not optimal and often experiences delays. The lack of number and capacity of polling stations also triggers the accumulation of waste, especially in densely populated areas, which then has an impact on environmental cleanliness, public health, and flood risk. In addition to technical problems, changing people's behavior is also still a challenge. Although socialization regarding waste sorting and disposal has been carried out, the discipline of the residents has not been evenly distributed, so the effectiveness of the program has not been achieved (Environment Agency, 2025).

Based on these conditions, this study is important to analyze waste management policies by the Dumai City Environmental Agency through a literature study. This research is expected to provide theory-based recommendations and empirical findings to realize a more effective, sustainable, and sustainable waste management system according to the needs of Dumai City.

2. METHODS

This study uses a descriptive qualitative approach with a literature study method. The research data sources consist of policy documents, journal articles, books, official government reports, and websites relevant to waste management and policies of the Dumai City Environmental Agency. The data collection process is carried out through systematic tracing and collection of literature documents from various databases and official government sources. After the data is collected, content analysis is carried out by studying, grouping, and interpreting information in accordance with the main theme of waste management policy. This analysis stage is used to produce a comprehensive understanding of policy implementation and prepare recommendations that are relevant to the waste management situation in Dumai City.

3. FINDINGS AND DISCUSSION

Policy

According to the Great Dictionary of the Indonesian Language, policy is a set of concepts and principles that serve as a basic framework and guideline in planning and implementing a job, leadership, or action, both in the context of government, organization, and others. The policy also includes a statement regarding the ideals, objectives, principles, and managerial guidelines used to achieve certain goals.

Meanwhile, Carl J. Friedrich (in Agustino, 2008:7) explains that policies are a series of actions or activities proposed by individuals, groups, or governments in a given environment, which are faced with various challenges and opportunities, with the ultimate goal of realizing certain goals (Anirwan, 2025).

According to (Solichin, 2021), public policy is often explained simply as all actions or inactions carried out by the government. However, public policy is actually a process that also includes the implementation and evaluation stages. Therefore, a definition that only emphasizes what is proposed or implemented by the government is considered incomplete and inappropriate.

Policy is a series of actions or activities carried out intentionally or unintentionally by individuals, groups, or governments, which contain elements of decision-making in the form of choices among various available alternatives, with the aim of achieving certain goals and objectives.

Waste Management

By (Law Number 18 of 2008 concerning Waste Management), waste is defined as the residue of human daily activities and/or natural processes that are solid, which due to their concentration level and volume require special handling. Waste also includes material remnants that have gone through a certain process, where the main part has been utilized, so that from an economic point of view, it has no value, and from an environmental point of view it has the potential to cause pollution or disrupt environmental sustainability.

Management is defined as the ability and special skills to carry out an activity, either directly with others or through other parties, in order to achieve organizational goals (Sudjana, 2004). Meanwhile, waste management is a series of activities carried out systematically, comprehensively, and sustainably, which includes efforts to reduce and handle waste in accordance with Law of the Republic of Indonesia No. 18 of 2008. According to Waste Management (2021), waste management is the process of managing waste from the initial stage to final disposal, accompanied by monitoring and implementing waste management regulations (Diniyah et al., 2025).

The results of the literature review from several previous studies are as follows:

1. Research by (Sari et al., 2021) entitled "Analysis of Waste Management Policy at the Bengkulu City Environmental Office". Using a descriptive qualitative method. The results of the study show that even though waste management policies have been implemented according to established standards and procedures, in practice they are still faced with various obstacles such as limited facilities and infrastructure, lack of maximum socialization to the community, and low levels of public compliance so that waste is still scattered in various locations. In addition, the socio-economic impact of this policy has not been felt evenly, with positive changes more predominantly felt by certain community groups who manage waste as a source of income. Other findings suggest that the separation between organic and inorganic waste has not been effectively carried out in the final transport and treatment process, while the landfill has already reached its maximum capacity which requires attention for further development. Thus, even though the implementation of the policy administratively has gone well, implementation in the field requires improvement in order to realize the goal of effective waste management and have a wide impact on the people of Bengkulu City.
2. Research by (Fauzan, 2021) with the title "Analysis of the Implementation of Household Waste Management Policy in Garut Regency". This study uses a combination method with a qualitative approach with a triangulation method, as well as a quantitative approach. The results of the study show that the Garut Regency Environmental Agency has implemented a waste management policy in a good and procedural manner, with synchronous coordination between stakeholders. However, the effect of policy implementation on the effectiveness of household waste management was found to be influential but not statistically significant. The research also found that existing waste management systems and facilities, including the construction of modern landfills, have been directed to minimize negative environmental impacts. However, obstacles such as limited resources and the scope of socialization are obstacles in the implementation of policies. Overall, this study concludes that the strategy and implementation of waste management policies in Garut Regency have been running well, although their effectiveness still needs to be improved to have a significant impact on household waste management in the region.
3. Research conducted (Okhtafianny & Ariani, 2023) with the title "Analysis of the Implementation of Waste Management Policy in Payakumbuh City" shows that the implementation of Regional Regulation Number 4 of 2019 is still not running as expected. The research method used is qualitative with a case study approach. The results of the study revealed that policy socialization was only carried out once at the beginning of implementation so that information was not conveyed

evenly to the implementing and community levels. Implementation in the field is also constrained by limited human resources, minimal budgets, and inadequate waste management infrastructure. The findings of the study show a number of obstacles such as low public awareness in sorting and disposing of waste, the lack of strict implementation of sanctions, lack of technical personnel with environmental competence, and lack of fleet rejuvenation and processing equipment. This condition causes the implementation of policies to be ineffective, so it is necessary to improve communication, strengthen human resources, budget support, and involve the community more actively.

4. Research by (Wati et al., 2021) entitled "The Effectiveness of TPST 3R-Based Waste Management Policy in Indonesia" aims to assess the extent to which waste management policies through TPST 3R are effective and provide input for the government in improving waste management policies which until now still face various obstacles, especially due to the increasing population and volume of waste. Using a qualitative approach through a literature study, this study found that the implementation of the 3R TPST policy is still not optimal. The effectiveness of these policies is assessed based on Campbell's indicators, namely program success, achievement of targets, community satisfaction, suitability of inputs and outputs, and achievement of overall goals.
5. Research (Dahlan, Yakin, & Pajammari, 2024) entitled "Analysis of Waste Management Policy of the Polewali Mandar Regency Environmental Office" aims to examine how waste management policies are implemented by the local DLHK. This research uses a qualitative descriptive method by utilizing primary and secondary data, and is supported by various documentation tools such as cameras and recorders. The research informants consisted of the head of the waste management section as key informants, as well as the head of the section and several staff in the hygiene sector as supporting informants. The results of the study show that DLHK plays an active role in waste management through various programs, including Clean Friday and Clean Action activities. In addition, DLHK has implemented a waste management policy in accordance with Regional Regulation Number 04 of 2018 by providing Temporary Disposal Sites (TPS) in various areas of Polewali Mandar Regency. Overall, the waste management policy is considered to have run optimally in accordance with applicable regulations.

Based on the analysis of several previous studies, it can be concluded that the main problems in the implementation of waste management policies in various regions generally lie in the limitations of facilities and infrastructure, lack of policy socialization to the community, and low public participation in sustainable waste management. Although most of the policies have been formally drafted and implemented according to procedures, their effectiveness in the field is still not optimal because it is influenced by a lack of human resources, limited financing, inadequate transportation fleets, and not optimal waste separation from sources. Some regions are also facing technical problems, including decreasing landfill capacity, 3R programs that have not developed optimally, and weak supervision and enforcement. These conditions show that the success of policies is highly dependent on consistency of implementation, the availability of appropriate infrastructure, the readiness of implementing personnel, and community support. These findings are an important foothold for analyzing waste management policies implemented by the Dumai City Environmental Agency.

To analyze waste management policies at the Dumai City Environmental Agency, the researcher used theoretical indicators according to (Dunn, 2019), which measures policy evaluation consists of:

- a. Effectiveness, namely the extent to which the goals are achieved appropriately, in accordance with the goals and directions of the set policy and its functions.
- b. Efficiency, which is a measure of how much effort or resources are required to achieve the desired outcome.
- c. Adequateness, which shows the extent to which the results achieved can solve the problem at hand.
- d. Equity, which is an assessment of whether the costs and available resources have been used and distributed equally.
- e. Responsiveness, namely whether the policy results are able to meet the needs, interests, and values of various specific groups.

- f. Accuracy, that is, the extent to which the results or goals achieved are really useful and have value for the party concerned.

The Dumai City Environmental Agency (DLH) is a local government agency responsible for formulating, implementing, and supervising policies in the environmental sector, including waste management, pollution control, and environmental conservation. DLH also manages programs and technical implementation units to improve the quality of the community's environment. The Dumai City DLH Office is located on Jl. Putri Tujuh, Dumai, Riau, Indonesia, becoming the center of coordination for all environmental management activities in this city (Environment Agency, 2025)

The vision and mission of the Dumai City Environmental Agency are:

Vision:

"The Realization of a Prosperous, Moral, Karimah and Competitive Dumai City"

Mission:

- a. Realizing effective environmental planning.
- b. Realizing a green economy through inclusive and participatory environmental control.
- c. Realizing strong and fair enforcement of environmental laws.
- d. Realizing good governance in the field of the environment.

Analysis of Waste Management Policy at the Dumai City Environmental Agency

1. Effectiveness

The Dumai City Environmental Agency (DLH) shows a strong commitment to improving the quality of waste management through regulatory enforcement and a more structured service arrangement. The implementation of Regional Regulation Number 3 of 2021 and Perwako Number 2 of 2022 is a strategic step by the city government to strengthen the legal basis while improving the work mechanism of waste management throughout the Dumai area. This effort is also accompanied by an ambitious target, namely increasing the waste management ratio to 71 percent as part of the performance improvement program of the Mekar Sari Landfill which is the center for handling municipal waste (Januarrini, 2025). However, the policy still faces significant structural and operational challenges. Waste production in Dumai reaches 180 tonnes daily, while the available processing capacity is only able to handle around 40 tonnes per day, so there is a huge gap between the volume of incoming waste and the management system's ability to process it (Ramlan, 2024). This condition is the main obstacle in assessing the effectiveness of policies, because although the regulatory framework has been strengthened, implementation in the field has not been able to keep up with the increasing growth in waste generation. This situation shows that the success of waste management is not only determined by the availability of rules, but also greatly influenced by technical capacity, infrastructure, transportation fleets, and community participation. The waste management policy in Dumai City already has a strong regulatory framework, but its effectiveness is still not fully optimal due to limited processing capacity, infrastructure, and high daily waste volume.

2. Efficiency

In terms of efficiency, the Dumai City Environment Agency is trying to maximize the use of the available fleet and infrastructure, but limited operational capacity remains the main obstacle. Every day, DLH deploys 13 trucks and 3 collapsed vehicles to transport waste from various urban areas, an effort that shows optimal resource utilization even though it has not been able to fully adapt to the high volume of daily waste. The government also plans to add processing machines as a measure to improve work efficiency, with the hope that waste processing capacity can increase so that the pressure on landfills can be reduced (Ramlan, 2024). However, the limited number of field personnel, transportation fleets, and inadequate processing facilities make the expected level of efficiency not fully achieved.

3. Adequacy

Waste management policies in Dumai City are prepared through various complementary steps, ranging from the implementation of waste sorting through waste banks, rearranging the Mekar Sari Landfill, to stopping open dumping practices and strengthening collaboration with the Ministry of Environment and Forestry to realize more environmentally friendly landfill management (Public Info, 2025). Although the policy direction is considered comprehensive, the high daily generation of waste shows that the current efforts have not been able to solve all problems comprehensively. This condition is exacerbated by the projection that landfill capacity will reach the maximum limit in the next few years if the volume of waste continues to increase. Thus, even though the policies implemented are sustainable, the level of adequacy still needs to be improved through the expansion of processing capacity and strengthening the waste sorting mechanism from the source.

4. Equitable

The Dumai City Government continues to strive to realize the equitable distribution of waste management services by forming and strengthening waste bank administrators at the sub-district and sub-district levels, so that waste management is not only concentrated at the landfill, but also carried out gradually in residential areas (Diskominfo Dumai, 2025). This effort is also strengthened through the "Waste Sorting, Gold Tube" program involving Posyandu cadres to encourage active community involvement in sorting waste from households, thereby creating a culture of reducing waste from the source. However, the challenge of equity is still seen in the distribution and transportation service aspects, as some polling stations require restructuring—including relocation to integrated polling stations to improve efficiency and ensure that each region receives the same services. Therefore, even though the equity policy has been designed and has begun to be implemented, the realization is not completely even, and it still needs to be strengthened in infrastructure, coordination, and service patterns so that the quality of waste management can be enjoyed equally by the entire community.

5. Responsiveness

The policy implemented by DLH Dumai City shows a fairly good level of responsiveness to community needs, as seen from the collaborative initiative with the Posyandu to form a waste bank unit that directly targets households and provides economic benefits through the sale of segregated waste (Diskominfo Dumai, 2025). The steps to organize the Mekar Sari Landfill, including the cessation of open dumping practices, also show the government's response to health and environmental issues that are of public concern. Nevertheless, a number of obstacles still arise, especially related to low public awareness in waste sorting, as well as the limited intensity of socialization and supervision at the village level. This condition shows that even though the policy is responsive to various problems, its implementation still needs to be strengthened in order to be able to answer the needs of the community more comprehensively.

6. Accuracy

The waste management policy implemented in Dumai City can be considered appropriate because it adjusts to the needs of the area with the character of an industrial city with a high and growing volume of waste. Efforts to organize landfills, develop waste bank networks, and increase hygiene fleets are relevant steps to maintain environmental quality while improving community welfare. In addition, the support from the Ministry of Environment and Forestry and the strengthening of regional regulations shows that this policy is not just a formality, but has strategic value for the sustainability of the city in the long term (Public Info, 2025). However, the accuracy of the policy will only have an optimal impact if DLH ensures that all programs run consistently, obtain adequate budget support, and be accompanied by education to the community so that environmental and socio-economic benefits can be felt equally by all Dumai residents.

When compared to previous research in other areas such as Bengkulu, Garut, and Payakumbuh, the condition of Dumai shows a relatively similar pattern, namely: policies have been formed and emphasized, but implementation in the field has not been running optimally. The regulations made have provided a clear framework for DLH in carrying out its duties, but the biggest challenge lies in the technical and social aspects.

First, the high production of waste indicates that the reduction from the source has not been effective. In the context of modern waste management theory, the government should not only focus on transportation and disposal, but also maximize the 3R (Reduce, Reuse, Recycle) program. Dumai has started to initiate this strategy through waste banks, but it has not been able to cover the entire city area, so the impact has not been significant.

Second, the role of the community is a key factor that affects the success of the policy. The news shows that public awareness in sorting waste is still low, and some residents lack discipline in disposing of waste. This condition hinders DLH's workflow because unsorted waste will increase the load at TPS and TPA.

Third, the limitations of the fleet, operational equipment, and final processing facilities cause the process of transporting and handling waste to be carried out optimally. With a volume of 180 tons per day, the landfill must work beyond its ideal capacity. This is similar to the findings of previous research on the burden of landfills in other areas which also reached a critical point when the volume of waste increased.

Overall, the discussion shows that Dumai City has been on the right track in building a sustainable waste management system, but it requires strengthening technical aspects, human resources, and socialization strategies so that policies can provide optimal results.

Supporting Factors and Inhibiting Factors of Waste Management Policy

Supporting Factors

a. Clear regulations

The existence of Regional Regulations and Perwako provides a strong legal basis so that DLH has official guidelines in regulating, supervising, and following up on waste management activities throughout the Dumai area.

b. Supporting programs and collaborations

The presence of waste banks, the "Waste Sorting, Gold Tube" program, and collaboration with Posyandu and the Ministry of Environment and Forestry help expand community participation and present alternatives to reduce waste from the source.

c. Local government commitment

The government has shown support through the arrangement of the Mekar Sari Landfill, the cessation of open dumping, and the plan to add processing equipment so that the policy direction becomes more planned and sustainable.

Inhibiting Factors

a. Limitations of Facilities and Infrastructure

The number of fleets is not proportional to the daily volume of waste, the capacity of the landfill is close to the limit, and the processing facilities are still minimal, so the transportation and handling process does not run optimally.

b. Low public awareness

Many residents have not gotten used to sorting waste and lack discipline in disposing of waste, so DLH's workload is getting heavier and the waste reduction program is not running effectively.

c. Limited human resources and lack of socialization

The number of field officers is insufficient, while uneven socialization makes some people not understand the rules and the importance of correct waste management.

4. CONCLUSION

This study aims to analyze waste management policies by the Dumai City Environmental Agency through a literature review using Dunn's policy evaluation indicators. Based on the results of the study, it can be concluded that the waste management policy in Dumai City has a strong regulatory basis, diverse program support, and the local government's commitment to improving the environmental management system. However, the findings of the study show that the implementation of the policy is not fully optimal because it is still faced with various obstacles, such as limited infrastructure, lack of waste separation from sources, low public awareness, and landfill capacity that is close to the maximum limit. Thus, policy objectives have moved in the right direction, but the achievement of results still requires strengthening technical, institutional, and community participation aspects so that the effectiveness of waste management can be realized in a sustainable manner.

For further research, it is recommended that a field study be conducted that assesses the effectiveness of policies based on empirical data, including direct measurement of waste volume, community compliance levels, and the effectiveness of waste banks in each village. Further research can also be directed to the analysis of technology-based waste management models or waste-to-energy that are relevant to the characteristics of Dumai City as an industrial city. In addition, an in-depth study of people's behavior in sorting waste and government communication strategies can be an important focus to strengthen policy implementation in the future.

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