

WASTE MANAGEMENT STRATEGY BY THE ENVIRONMENTAL SERVICE OF TANJUNGPINANG CITY

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Abstract

Keywords:

Waste Management
Strategy, DLH,
Strategic Management,
Tanjungpinang

Tanjungpinang City faces increasing waste management challenges alongside demographic expansion and growing economic activities, resulting in continuous escalation of daily waste volumes. Environmental Department (DLH) records indicate that daily waste production rose from 152.65 tons in 2023 to 155.97 tons in 2024. This trend suggests that despite various waste management initiatives implemented by DLH, the effectiveness in curbing waste generation remains limited. Consequently, this research seeks to examine the strategies employed by DLH while identifying achievements and obstacles encountered during implementation. The study employs a descriptive qualitative approach using J. David Hunger and Thomas L. Wheelen's strategic management theoretical framework, encompassing four key indicators: environmental scanning, strategy development, strategy execution, and monitoring and control mechanisms. Research data was gathered through comprehensive interviews with DLH personnel, UPTD TPA Ganet staff, and waste bank coordinators, supplemented by documentation analysis and direct field observations. Findings reveal that DLH Tanjungpinang has established a reasonably structured waste management approach, spanning from environmental surveillance and annual program development to waste collection, segregation, and regulatory enforcement including direct penalties for non-compliance. Nevertheless, these strategies have not yet achieved substantial waste volume reduction, largely attributed to insufficient partnership with community groups and waste bank operators. The study proposes enhancing inter-sectoral cooperation and elevating public consciousness to ensure more effective and sustainable waste management strategies.

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INTRODUCTION

Cleanliness is a crucial factor in determining people's quality of life. As the population increases, the volume of waste generated also experiences a significant increase. This requires the government to take an active role in comprehensive waste management, as mandated by Law Number 18 of 2008 concerning Waste Management, which emphasizes the principles of responsibility, sustainability, economic value, and justice (Mamahit et al., 2021) . However, public awareness of the importance of cleanliness and waste management remains relatively low (Kurniawan et al., 2021) . This is despite economic growth, consumption patterns, and activities across various sectors having accelerated the rate of waste generation.

According to (Zakky, 2019) , every human activity inevitably produces waste, both organic and inorganic. Therefore, waste management should no longer be viewed as a purely technical responsibility, but as an integrated and sustainable system. (Mahyudin, 2014) Suwerda added that the main problem faced is the limited availability of adequate facilities and final disposal sites. In this regard, local governments play a crucial role in ensuring the availability of waste management infrastructure and facilities (Tanjungpinang City Regional Regulation No. 3 of 2015). If waste is not managed properly, it will have serious social and environmental impacts, as stated by Suwerda (Farhan, 2021) , such as the spread of disease, soil and water pollution, and the risk of flooding due to sedimentation in water bodies.

Previous research has emphasized the importance of community participation in waste management, both at the production and consumption levels. In the context of the Riau Islands Province, significant population growth, particularly in large cities like Batam and Tanjungpinang, has resulted in increased waste generation. Tanjungpinang City alone recorded a total population of 234,840 in 2023, which directly impacts the amount of waste that must be managed.

According to data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (KLHK), Tanjungpinang City produced 55,715.79 tons of waste in 2023. Of this amount, only 13,100.59 tons or around 23.51% was successfully reduced. The reduction strategy implemented refers to the 3R principle: Reduce, Reuse, and Recycle, as stated in Article 20 of Tanjungpinang City Regulation No. 3 of 2015. This effort is reinforced by the 2018–2023 RPJMD target which sets a reduction in annual waste generation of 27%.

Year	Waste Reduction (Tons)	Waste Management (Tons)	Waste Discharged into the Environment (Tons)
2020	7,069.13	33,737.99	13,205.93
2021	11,812.74	32,302.50	11,251.08
2022	13,196.00	32,982.60	10,726.76
2023	13,100.59	35,585.68	7,029.52
2024	13,437.40	33,514.85	9,978.26

Tanjungpinang City has performed relatively better than other cities/regencies in the Riau Islands, such as Batam and Karimun. One strategic innovation successfully

implemented is the development of the Kuantan Bersih Waste Bank, which has won national awards and proven its effectiveness in educating the public and increasing active participation in recycling. To date, there are 69 waste banks spread across various areas of the city (Karlina, 2023).

Furthermore, the construction of a Reduce, Reuse, and Recycle Waste Management Facility (TPS3R) on Penyengat Island, capable of processing up to one ton of waste per hour, demonstrates the government's commitment to building infrastructure that supports a sustainable management system. This initiative even encourages recycling into value-added products such as compost and plastic waste-based handicrafts. Community involvement through education and training has increased awareness and a sense of ownership of environmental cleanliness.

However, the increase in waste volume from 152.65 tons in 2023 to 155.97 tons in 2024 indicates that the reduction strategy is not yet optimal. This requires an evaluation of the policy implementation currently implemented by the Tanjungpinang City Environmental Agency. Several strategies have been implemented, including promoting waste sorting, establishing waste management groups, conducting sting operations against sanitation violators, and implementing technical arrangements at the final disposal site.

In practice, waste management requires a collaborative approach involving various sectors and actors. Tanjungpinang City's success to date serves as a model for other regions in the Riau Islands Province to emulate in addressing similar issues. Community empowerment, infrastructure development, and regulatory strengthening are three key pillars that must be continuously strengthened. The government has also issued Tanjungpinang Mayoral Regulation No. 83 of 2021 as a follow-up to Regional Regulation No. 3 of 2015, which serves as the legal basis for the technical implementation of waste management.

This research focuses on the waste management strategy implemented by the Tanjungpinang Environmental Agency (DLH) for the period 2023 to 2024. The study focuses on how the strategy was formulated, implemented, and evaluated. This focus is crucial for understanding the effectiveness of strategic management in the environmental sector and its impact on waste reduction outcomes. This approach is expected to generate strategic recommendations that can strengthen future environmental management policies.

The research problem formulation is: What is the waste reduction strategy in waste management by the Tanjungpinang City Environmental Agency? The purpose of this study is to determine and analyze the strategies implemented by the Environmental Agency in waste reduction efforts. Theoretically, this study can serve as a scientific reference for further studies on waste management in urban areas. Practically, these findings can provide input for local governments in improving environmental policy strategies, as well as educate the public about the importance of effective and participatory waste management.

REVIEW LIBRARY

This research is based on a number of previous literature on waste management, which serves as a reference to avoid duplication and as a basis for developing theory and analysis. Several relevant studies serve as important references to strengthen the conceptual framework of this study.

According to (Rustiana et al., 2024) In their article on waste management in the Situ Bagendit tourist area, Garut Regency, they used a qualitative descriptive approach through observation and interviews. They found that although waste disposal facilities such as trash bins and Temporary Shelters (TPS) were available, their number and placement were still suboptimal. The proposed management strategy focused on sorting organic and inorganic waste and improving collaboration with stakeholders. The main obstacles encountered included a lack of cleaning staff, limited budget, and visitors' disregard for environmental cleanliness.

According to (Amalia, 2023) examined the effectiveness of waste management by the North Lampung Regency Environmental Agency (DLH) and identified three main problems: the waste management objectives do not support a clean environment, ineffective outreach, and limited cooperation between parties. Waste management remains limited to collection, transportation, and disposal without any sorting process, despite large-scale monitoring reports.

According to (Indra & Lalopa, 2022) This study discusses waste management strategies in Morotai Island Regency, using observation, interviews, and documentation. This study found that waste management strategies are still simple and communal. Limitations include facilities, infrastructure, funding, and labor. Furthermore, the management system does not yet fully encompass sorting, processing, and recycling, and is still not fully compliant with Law Number 18 of 2008.

According to (Rusmanto, 2022) examined household waste management strategies in Bandung Regency. The regency does not have its own landfill and relies on the Sarimukti landfill. The Bandung Regency Environmental Agency has developed programs such as POKASI, LCO, and waste banks. Challenges faced include low public awareness and a lack of supporting facilities. Strategic efforts include the formation of environmental awareness groups, training, the construction of official TPSTs and TPSs, and the optimization of transportation fleets.

Salsabila et al., (c2024) highlighted the problem of waste management in the Kosgoro residential area, Tanjungpinang City. The main problem is the lack of public awareness and weak implementation of Regional Regulation No. 03 of 2015. The settlement's location above the sea exacerbates pollution. The local government is considered less active in providing practical solutions and public awareness. Policy optimization and supporting facilities are needed to enable the community to actively participate in waste sorting and recycling.

Chandra (2006) in (Salsabila et al., 2024) Waste is defined as the unwanted solid residue of natural processes and human activities. Jatna (2021) classifies waste into three types: organic, inorganic, and hazardous waste. Organic waste decomposes easily, while inorganic waste takes a long time to decompose. Hazardous waste is highly hazardous and requires special treatment.

Putranto (2023) in (Zahra et al., 2024) states that the 3R principle (Reduce, Reuse, Recycle) is an important approach to waste management. According to Zahra & Muliawati (2021), waste management encompasses the entire process from collection to final disposal, with supervision and regulation. (Muchsin & Saliro, 2020) emphasize the importance of a new paradigm in waste management, one that views it as an economic resource.

Strategy is a way to achieve goals through systematic steps (Della, 2023) . Strategy functions as a tool for decision-making, coordination, and communication (Maklassa &

Sitti, 2023) . According to Noble (1999) in (Kurnianingsih, 2023) , strategy formulation includes environmental analysis, goal identification, and plan development, and is an ongoing process that must be adapted to external changes.

(Sutardji, 2023) added that strategic management consists of four stages: environmental assessment, strategy formulation, implementation, and evaluation-control. This aligns with Rahim & Radjab (2015), who stated that strategic management is the art and science of managing cross-functional decisions.

Hunger & Wheelen (2006) state that SWOT analysis is a systematic approach to formulating strategy. SWOT encompasses internal strengths and weaknesses as well as external opportunities and threats. This analysis is essential for designing adaptive and measurable strategies (Rahim & Radjab, 2015) .

Strategy formulation is the development of long-term plans based on internal and external analysis. This includes establishing an organization's vision, mission, and goals, as well as selecting alternative strategies (Rahim & Radjab, 2015) .

This stage translates strategy into concrete actions through work programs, budgets, and procedures. Strategy implementation often requires structural and cultural adjustments (Sutardji, 2023) . Strategy evaluation compares actual results with targets and determines necessary corrective actions (Rahim & Radjab, 2015) . Control can be directed at outputs, processes, or resources, depending on the evaluation's objectives.

Based on the strategic management theory by Hunger & Wheelen in (Sutardji, 2023) , this research framework utilizes four basic elements: environmental monitoring, strategy formulation, implementation, and evaluation and control. With the increasing waste generation in Tanjungpinang City, an effective management strategy needs to be implemented through these four stages.

The environmental assessment included a SWOT analysis. External factors included opportunities such as national programs and community collaboration, and threats such as increasing waste volume. Internal factors included strengths such as the Environmental Agency's organizational structure, and weaknesses such as limited equipment and a nearly full landfill.

Strategy formulation is carried out through the Tanjungpinang City Environmental Agency's Strategic Plan, which includes program and activity formulations. Strategy implementation is carried out through standard operating procedures (SOPs), program implementation, and cross-sectoral collaboration. Evaluation and control are carried out through regular monitoring, community involvement, and corrective action if targets are not met.

METHOD STUDY

This research uses a descriptive qualitative approach that produces data in the form of words for analysis. Denzin & Lincoln (1994) in (Anggito et al., 2018) stated that qualitative research is conducted in a natural setting with the aim of interpreting phenomena using various available methods. This approach concentrates on human elements, objects, and institutions and their relationships or interactions, with the aim of understanding events, behaviors, or phenomena (Safrudin et al., 2023) .

The research object is the waste management strategy of the Tanjungpinang City Environmental Agency. Sugiyono defines a research object as the characteristics or values of a particular person, object, or activity that researchers choose to study and analyze. The research object serves as a scientific target that helps researchers understand

and explain existing problems and find appropriate solutions (Untung & Yudha, 2024) .

The research location is the place where information is collected to obtain the required data, namely the area or environment where the research process is carried out (Siagian et al., 2022) . The research was conducted at the Final Waste Management Site (TPA) located in Ganet. Sigit Hermawan (2016:46) in (Saekan, 2023) explains the research focus as a detailed and detailed research question so that its direction and scope are clearly and definitively known. The focus of this research is the waste management strategy of the Tanjungpinang City Environmental Agency, specifically the results of the strategy provided in waste management that influence waste reduction, strategy implementation, and evaluation and control.

Arikunto (2013) in (Fadiilla, 2023) states that the data source refers to the subject from which the data is collected. Data is divided into primary and secondary data based on the collection method.

Primary data is information obtained directly by researchers from the object or source through interviews, observations, or research. The primary data in this study consisted of notes from interviews and direct field observations from the Tanjungpinang City Environmental Service, which required further processing (Andra, 2018) .

Secondary data is data obtained indirectly from the research object, collected by other parties through various commercial and non-commercial means. Secondary data typically requires no additional processing and can come from books, reports, journals, and the Central Bureau of Statistics (BPS) (Supriatna, 2021) .

Data collection techniques are strategic and systematic ways of obtaining research-relevant information to ensure the data is valid and factual. These techniques include various methods such as questionnaires, interviews, observations, tests, and documentation, with the aim of ensuring the accuracy and relevance of the information (Salma, 2023) .

Techniques used in this research:

1. **Interviews** - Used to obtain primary data. Sugiyono (2016) in (Ayuliamita, 2023) stated that interviews can be chosen as a way to collect data on a specific research topic and learn more about respondents. Susan Stainback explained that the interview method can be applied to explore the conditions and situations of observed symptoms.
2. **Documentation** - A data collection technique that involves searching for accurate evidence. In qualitative research, documentation can include policy documents, biographies, diaries, newspapers, and magazines (Waruwu, 2023) . Documentation was conducted by analyzing the strategic plan documents of the Tanjungpinang City Environmental Agency.

Moleong (2008) in (Rukin,2021) explained that the determination of informants was carried out using a purposive method, where researchers selected informants based on the assumption that they could provide the information needed according to the focus of the research. The research informants consisted of 4 people: Head of Waste and Hazardous Waste Management Division of the Tanjungpinang City Environmental Service (Anna Primadona, SE), Head of the Ganet Landfill Technical Implementation Unit (UPTD) (Asa'at Siregar, S.IP), Ganet Landfill Worker (Endang), and Director of the Bintang Siambang Waste Bank (Sadam Alief Magala, S.IP).

Data analysis in qualitative research is a continuous activity throughout the research process, from data collection to report writing. The data collection and analysis

processes are interrelated and inseparable (Umrati & Hengki, 2020) . Researchers employ an interactive data analysis method involving three elements: data reduction (focusing on waste management strategies), data presentation (organizing information from interviews, observations, and documentation), and drawing conclusions that provide answers to the research problem formulation.

RESULTS AND DISCUSSION

The research uses the strategic management theoretical framework of J. David Hunger and Thomas L. Wheelen (2003), which consists of strategy formulation, strategy implementation, and strategy evaluation and control. These three stages form a continuous cycle in organizational management.

Environmental monitoring is an important initial step in strategic management as explained by J. David Hunger and Thomas L. Wheelen (2003), where organizations need to monitor both the external and internal environment to identify opportunities and threats.

The Environment Agency's primary opportunity comes from support from national programs such as Jakstranas and the Adipura evaluation program. The Functional Policy Analyst for Pollution Control, Ms. Dynche Novalina, ST, stated in an interview on May 14, 2025, that Tanjungpinang has won the Adipura award 12 times due to its cleanliness and excellent waste management, with the TPA being ranked number one in Indonesia.

Another opportunity comes from informal community participation and the existence of 69 waste banks in Tanjungpinang City. In an interview on July 10, 2025, Sadam Alief Mangala, S.IP., Director of the Bintang Siambang Waste Bank, emphasized that waste banks are a business concept that requires full government support.

External threats include low public awareness in disposing of waste with 35 illegal waste points, growth in waste volume due to population growth, and budget limitations that affect the consistency of environmental monitoring.

The DLH's internal strength lies in its 24-hour field monitoring system, with supervisors spread across various functions. Anna Primadona, SE, Head of the Waste and Hazardous Waste Management Division, explained in an interview on May 7, 2025, that daily monitoring of lorries, dump trucks, TPS (landfill sites), street sweepers, and levies is carried out, with coordination through a WhatsApp group for real-time response.

Technical capabilities include the use of AKIMS for air monitoring and ONLIMO for water monitoring, both connected online to the center. The Environmental Agency (DLH) also conducted a waste composition analysis, which showed 59% food waste and 28% plastic.

Internal weaknesses include budget and human resource limitations, limited equipment and infrastructure at the Ganet landfill, and the threat of the landfill's nearing capacity. In an interview on July 5, 2025, a resident near the landfill, Mrs. Sri, stated that while the odor is sometimes present, it is tolerable and does not disrupt activities.

The Tanjungpinang City Environmental Agency (DLH) formulated a strategy based on Presidential Regulation Number 97 of 2017 concerning the National Waste Management Strategy Policy as outlined in Mayoral Regulation Number 43 of 2018. Based on the DLH Strategic Plan for 2024-2026, the Waste and Hazardous Waste Management Sector has one waste management program with two main activities.

The waste management program includes the preparation of regional policies, waste management through sorting-collection-transportation-processing-final processing, increasing community participation, coordinating the provision of infrastructure, and fostering supervision of private waste management.

The challenges in formulating the strategy remain internal and do not fully involve the community or non-governmental partners. The Director of the Waste Bank highlighted that the strategy development process needs to be improved in terms of inclusivity and cross-sector participation.

The waste management strategy is implemented through structured daily activities. In an interview on May 7, 2025, Head of Division Anna Primadona explained that every morning, trucks are directed to the designated waste disposal sites (TPS) according to their routes to prevent congestion, with coordination with sub-districts to address illegal TPSs.

Waste management achievements exceeded the Strategic Plan targets: 2021 (32,302.50 tons), 2022 (32,083.50 tons), 2023 (35,585.68 tons of the target of 31,700 tons), and 2024 (33,514.85 tons of the target of 31,500 tons). The Ganet Landfill Technical Implementation Unit (UPTD) has 19 dump trucks operating according to the transportation schedule from 4:00 AM to 1:00 PM WIB, 9 armroll units, and 54 containers.

Implementation challenges include limited human resources and fleet, minimal waste sorting at source, and suboptimal cross-sector collaboration. Residents near the Ibu Sri landfill, interviewed on August 5, 2025, assessed that the government has managed the landfill well through routine waste collection and the presence of sanitation staff.

The evaluation is conducted through the preparation of performance reports and monitoring of the Waste Information System (SIPSN). In an interview on May 7, 2025, Head of Division Anna Primadona explained that the evaluation can identify field challenges such as decreased waste bank production or disruptions to transportation operations.

Corrective action is implemented through a responsive approach with cross-stakeholder coordination. The Environmental Agency (DLH) conducts sting operations against littering violators, involving Public Order Agency (Satpol PP), sub-districts, district heads, neighborhood units (RT), and community units (RW).

The Head of the Ganet TPA UPTD, Asa'at Siregar, in an interview on May 9, 2025, stated that formal written evaluations had not been carried out periodically, more technical in nature based on field obstacles with monthly reports to the Head of the Service.

The evaluation's weaknesses include minimal involvement of various stakeholders and the lack of regular evaluations involving the community. The evaluation forums between waste banks that previously existed are no longer consistent, even though waste management relies heavily on community participation.

CONCLUSION

Based on research on waste management strategies by the Tanjungpinang City Environmental Service (DLH) which was analyzed through four strategic management indicators, the following conclusions were obtained:

Waste management strategies in Tanjungpinang City are still influenced by external factors such as low community participation in waste sorting, increasing annual

waste accumulation, limited government budgets, and minimal third-party involvement. Internally, there are opportunities for community collaboration and the economic potential of waste bank activities, although these have not been maximized due to limited facilities and training.

The strategies formulated by the Environmental Agency (DLH) are still normative and have not addressed concrete development aspects at the implementation level. The DLH has not fully established waste banks as a key pillar of community-based waste management. Strategy formulation is largely carried out independently by field managers based on experience and local environmental conditions. Coordination between agencies and waste bank managers has not been optimal.

Waste management strategies have been implemented by various parties, including the Environment Agency (DLH) through its landfill transportation and management system, and the community through waste banks. However, implementation still faces challenges such as limited landfill space, a lack of heavy equipment, and inconsistent incentives for the community. Innovations by waste bank managers, such as data digitization and waste processing into recycled products, demonstrate significant potential with proper support.

Evaluation and control of waste management strategies are not yet structured and sustainable. Reporting systems are still manual, evaluations are purely administrative, and there are no clear benchmarks for assessing the strategy's success. Community involvement in the evaluation process has not been systematic, even though the community is a crucial component of the success of environmentally-based strategies.

Overall, the Tanjungpinang City Environmental Agency's waste management strategy has been effective, but improvements in community involvement and intersectoral coordination are still needed to ensure more effective and sustainable waste management. The community has significant potential as active actors in waste management, but it requires more robust policy support, guidance, and coordination.

Based on the results of research on waste management strategies by the Tanjungpinang City Environmental Service, researchers provide the following suggestions.

The Environmental Agency (DLH) needs to strengthen coordination and communication with all waste bank managers and landfill technical implementation units (UPTD TPA), and begin developing a more integrated digital performance reporting system. Clear success indicators for each strategy must be established so that evaluations are not merely formalities. Community involvement in the evaluation process is also essential to foster a sense of ownership in the program.

The Technical Implementation Unit (UPTD) is expected to actively propose landfill development plans, both in terms of land expansion and operational equipment improvements. Synergy between the UPTD and the Environment Agency (DLH) is needed to design a more efficient and environmentally friendly waste disposal and management system, given the increasingly limited landfill space.

Waste banks play a crucial role as partners with the Environmental Agency (DLH) in community-based waste management. Managers need to maintain existing innovations, such as digital systems and recycling processing. They are also advised to continue building collaborative networks with the private sector, NGOs, and universities to expand their impact and improve management capacity.

City governments are expected to pay greater attention to waste management

strategies, not only through budget allocations but also through policies that support the strengthening of waste bank institutions and the improvement of waste management infrastructure. Government support is key to fostering a sustainable waste management system that involves all stakeholders.

Public awareness of waste sorting and management still needs to be improved. Active community involvement is needed to support waste bank activities, not just relying on the government. Behavioral changes at home will have a direct impact on the success of broader environmental programs.

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