

Policy Implementation Process in the Management of Tanjungpinang City Waste Bank to Realize the Blue Economy

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Abstract. This research aims to analyze the implementation process of waste bank management policies in Tanjungpinang City by utilizing secondary data and triangulation analysis, based on Edward III's policy implementation theory. The research method is qualitative, relying on secondary data collected from government reports, academic publications, policy documents, and statistical data. Triangulation is used to cross-verify the information, aligning it with Edward III's theory, which includes four critical variables: bureaucratic structure, implementer disposition, resources, and communication. This approach allows for a comprehensive understanding of the factors influencing the effectiveness of policy implementation for waste management. The study identifies that efficiency and transparency in the bureaucratic structure, along with proactive behavior among implementers, are crucial for the success of the waste bank program. However, challenges such as a lack of public awareness and insufficient funding persist. The findings suggest that improving the competency of implementers, providing adequate infrastructure support, and enhancing communication between the government and the community are essential steps to overcoming these barriers. Therefore, this study not only provides an analysis of the current state but also offers practical recommendations to inform future policy adjustments and improve the waste management system in Tanjungpinang.

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1 Introduction

Tanjungpinang City is one of the cities in the Kepulauan Riau Province which has a serious problem in the management of waste. With the increasing population and high levels of public consumption, the better the waste generated. Thus, this is a serious problem for the local government to find the right solution in the waste management. One of the solutions is by waste bank program.

Waste bank program is one of the approaches that have been proved to be effective in reducing the amount of waste that is put into the final disposal site. By actively involving the community to sort and recycle the waste surely it can reduce the waste burden and assist to make the environment clean and healthy. Waste is the end of human activities or natural processes that are solid and there is no economic value [1,2]

Waste sources can come from various sectors, including households, agriculture, trade, offices, industry, roads, mining, livestock, and fisheries. In the context of preparing a waste master plan, waste sources are divided into two main categories: household waste (domestic) and non-household waste (commercial, social facilities, and public facilities) [3,4]. The sources of waste in Tanjungpinang City are very diverse. The main sources of waste in this city include household waste, restaurants, health facilities, lodging or hotels, offices, shops, schools, markets, and other public facilities. Each source has different waste characteristics, which require a specific management approach.

In Waste Production from Various Sources, Tanjungpinang City shows variations in waste production from year to year. For example, data taken from 2015 to 2019 shows fluctuations in the amount of waste produced. In 2015, waste production was recorded at 5.69 tons per day. This figure decreased slightly in 2016 to 5.08 tons per day but increased again in the following years to reach 5.2 tons per day in 2019.

However, the implementation of the waste bank management policy in Tanjungpinang City does not always run smoothly. Several internal and external factors become obstacles in the process of implementing this policy. Internal factors such as the lack of public awareness of the importance of sorting and recycling waste, as well as minimal support from related parties in managing waste banks [5,6]. Meanwhile, external factors such as inadequate infrastructure conditions and lack of trained human resources in waste bank management are also serious obstacles [[7,8].

In this context, research on the policy implementation process in waste bank management throughout Tanjungpinang City is important to conduct. By knowing the factors that influence the implementation of waste bank management policies, it is hoped that it can help the government and related stakeholders in increasing the effectiveness of the waste bank program. In addition, the results of this study are also expected to provide a significant contribution to the development of better waste management policies in the future [9–11]

By conducting this research, it is hoped that a deeper understanding will emerge about the process of implementing waste bank management policies in Tanjungpinang City. The results of this study are also expected to provide constructive recommendations for local governments and related stakeholders in increasing the effectiveness of the waste bank program so that it can have a positive impact on the environment and society of Tanjungpinang City as a whole.

2 Research Method

The study employs a qualitative approach [12], focusing on secondary data collection and triangulation analysis to provide an in-depth understanding of waste management policy implementation in Tanjungpinang City. The first stage of the study involved gathering secondary data from multiple sources, including government reports, academic publications,

policy documents, and relevant statistical data. This comprehensive collection provides a detailed overview of the waste conditions in Tanjungpinang, such as waste production, composition, and characteristics, as well as existing policies established by the local government.

Using secondary data is an effective starting point for researchers, as it involves analyzing information that has already been validated through previous studies. The collected data were systematically reviewed to ensure relevance and accuracy before being incorporated into the analysis [13]. To further verify and strengthen the reliability of this data, the study employed a classical triangulation method. Triangulation involves comparing and cross-verifying information from multiple independent sources to confirm consistency and ensure that the data aligns with the study's objectives [14].

In this study, triangulation was conducted based on Edward III's Policy Implementation Theory, which focuses on four key variables: bureaucratic structure, implementer disposition, resources, and communication. The triangulation process began by cross-referencing the secondary data from various independent sources, such as government documents, academic articles, and statistical databases. This comparison helped to identify patterns and discrepancies, ensuring that the information used was reliable and robust.

The data analysis process then applied Edward III's theory to evaluate how these four critical variables interact and affect waste management policy implementation in Tanjungpinang City. By triangulating information across multiple sources, the study was able to confirm the validity of the findings and gain a deeper understanding of the factors influencing the efficiency and success of policy execution in this context. This method allowed for a detailed examination of the bureaucratic structure, the attitudes and motivations of implementers, resource availability, and communication processes, all of which are critical to understanding and improving waste management strategies [15].

3 Results and Discussion

3.1 Waste Generation, Composition and Characteristics of Waste in Tanjungpinang City

1. Household Waste Generation

In this study, sampling was conducted to determine the amount of household waste generation in Tanjungpinang City. Data collection was carried out for eight consecutive days and the results were divided into three clusters based on household income type: permanent houses, semi-permanent houses, and non-permanent houses. The waste generation data was then analyzed to obtain the average value of waste generation per person per day, both in kilograms (kg) and liters (L).

Based on the results of the analysis, data was obtained that the average waste generation of permanent houses was 0.24 kg/person/day or 1.41 L/person/day. For semi-permanent houses, the average generation was 0.29 kg/person/day or 2.03 L/person/day. Meanwhile, non-permanent houses had an average generation of 0.28 kg/person/day or 1.65 L/person/day. Overall, the average household waste generation in Tanjungpinang City is 0.27 kg/person/day or 1.70 L/person/day.

2. Non-Household Waste Generation

In addition to household waste, this study also measured the generation of non-household waste originating from various public facilities in Tanjungpinang City. These facilities include shops, offices, schools, markets, roads, restaurants, hotels/lodgings, and other public

facilities. The measurement of waste generation is carried out using the same method as for household waste, but the units used differ depending on the type of facility.

The results of the analysis show that shops produce waste of 1.61 kg/employee/day, offices of 0.04 kg/employee/day, schools of 0.01 kg/teacher and student/day, markets of 31.97 kg/seller/day, roads of 0.005 kg/meter/day, restaurants of 0.15 kg/chair/day, hotels/lodgings of 0.06 kg/bed/day, and public facilities of 0.03 kg/square meter/day.

3. Waste Composition

Waste composition describes the types of waste produced by various human activities. Generally, waste composition is expressed in percentage of weight or volume of organic and inorganic waste. Knowledge of this waste composition is very important to determine the right and efficient waste processing method in the waste management system. In this study, waste is divided into eight main categories, namely food and leaf waste, paper, wood, cloth, rubber and leather, plastic, metal, and glass.

This study provides a comprehensive overview of waste generation, composition, and characteristics in Tanjungpinang City. The data obtained show that household and non-household waste in this city is dominated by organic waste, which covers more than 60% of the total waste generated. This high organic waste shows great potential for processing through composting methods or other organic processing that is more environmentally friendly and can reduce the volume of waste that must be transported to the final disposal site. For non-organic waste, the plastic waste category ranks second after organic waste, both in household and non-household waste.

This shows the need for more attention to plastic waste management, including efforts to reduce the use of single-use plastics, increase recycling, and educate the public about the dangers of plastic waste to the environment. Effective waste management requires a comprehensive approach and active participation from all parties, including the government, community, and private sector. Public education and awareness are important keys in efforts to reduce and manage waste sustainably. The government needs to provide adequate waste management infrastructure and systems, including recycling facilities and disposal sites that meet environmental standards.

To gain a more comprehensive perspective on waste management policy implementation in Tanjungpinang, this study compares the city's program with successful waste management initiatives from other regions, such as Surabaya (Indonesia) and Curitiba (Brazil). Both regions have implemented effective waste management policies that provide valuable insights and benchmarks for Tanjungpinang's program.

- Surabaya, Indonesia: In Surabaya, the local government has established a well-organized waste management system focused on community engagement and infrastructure development. One key initiative is the “Kampung Berseri” (Clean Village) program, which promotes waste separation and composting at the household level. Surabaya's approach includes active collaboration with residents, providing waste banks with the necessary infrastructure, and offering incentives like reduced utility fees for households that participate in the waste management program. These efforts have resulted in a significant reduction in waste volume and increased recycling rates. Comparative Insight for Tanjungpinang: While Tanjungpinang's waste bank program shows promise, it could benefit from adopting Surabaya's incentive system to encourage greater public participation. Additionally, providing the necessary infrastructure, such as waste separation facilities and community-level composting stations, could enhance the effectiveness of Tanjungpinang's waste management efforts. This would help address the current challenges related to public awareness and insufficient resources.
- Curitiba, Brazil: Known for its innovative approach to urban planning and sustainability, Curitiba has implemented the “Green Exchange” program, which incentivizes low-

income families to exchange recyclable waste for food and transportation vouchers. This program not only encourages recycling but also addresses socio-economic challenges, creating a circular economy that benefits both the environment and local communities. Curitiba's program emphasizes strong communication strategies, using education campaigns and public forums to engage residents and raise awareness about the importance of waste management. Comparative Insight for Tanjungpinang: Tanjungpinang could draw from Curitiba's example by incorporating a similar reward-based system that aligns with its socio-economic conditions. Furthermore, improving communication strategies—such as organizing regular community workshops and awareness campaigns—can help bridge the communication gap currently hindering effective waste management in Tanjungpinang. Such initiatives could foster greater community involvement and create a more proactive approach among residents.

By comparing Tanjungpinang's waste management system with those of Surabaya and Curitiba, it becomes evident that while Tanjungpinang's program has established a foundational structure, there is potential for improvement, particularly in areas of community engagement, incentives, and infrastructure support. Learning from these successful models, Tanjungpinang can refine its policies to create a more effective and sustainable waste management system that not only reduces waste but also promotes the concept of the Blue Economy by integrating environmental, economic, and social benefits.

Emphasizing the practical implications of this study, the findings suggest several actionable recommendations that could inform future policies and adjustments within Tanjungpinang's existing waste management system. Firstly, enhancing the training and motivation of implementers is crucial, as their proactive engagement and commitment directly impact the effectiveness of the program. The government should invest in capacity-building programs and provide performance-based incentives to motivate these key actors.

Additionally, addressing the lack of public awareness through comprehensive communication strategies, such as educational campaigns, community workshops, and partnerships with local influencers, could significantly improve community participation in waste sorting and recycling initiatives. Increasing funding and resource allocation is also vital; this could be achieved by collaborating with private sectors and NGOs to mobilize resources and develop more sustainable financial models, such as public-private partnerships. Furthermore, integrating a reward-based system similar to those successfully implemented in other cities (e.g., offering reduced utility fees or vouchers for recyclables) could incentivize households to engage more actively in waste management practices.

Finally, strengthening the bureaucratic structure by establishing clearer roles and responsibilities, ensuring transparency, and promoting inter-agency coordination will enhance the overall efficiency and accountability of the waste management system. By implementing these targeted strategies, the local government and stakeholders can create a more sustainable, efficient, and community-driven waste management framework that aligns with the principles of the Blue Economy and supports Tanjungpinang's broader environmental and socio-economic goal.

3.2 Analysis of the Policy Implementation Process of Edward III's Concept

1. Bureaucratic Structure

This variable refers to the organizational framework and procedures established by the local government to manage and implement the waste management policy. In Tanjungpinang, the bureaucratic structure includes local environmental agencies, waste management departments, and community-level waste banks. The effectiveness of the bureaucratic structure is assessed based on its clarity, efficiency, and transparency. An organized and well-

defined bureaucratic structure ensures that responsibilities are clearly assigned, decision-making processes are streamlined, and regulations are enforced consistently. In Tanjungpinang, the bureaucratic structure's efficiency impacts the coordination and collaboration between various stakeholders involved in waste management, such as local authorities, waste bank operators, and community members [16,17]

A bureaucratic structure is a formal system that is already used by organizations to regulate and control the condition of their activities. Especially on a big scale such as government or public institutions. Referring to the analysis of flow waste management in Tanjungpinang city, the analysis of the bureaucratic structure is being how it is organized and governed. In other words, how the management of an organization's waste uses bureaucratic organization to achieve efficiency and effectiveness. Based on the results presented in the document, this analysis covers several main aspects: organizational hierarchy, procedures and policies, and infrastructure and resources.

- a. **Organizational Hierarchy:** The bureaucratic structure of waste management in Tanjungpinang City shows that there are various levels of management and operations involved. This hierarchy includes the Tanjungpinang City Environmental Service as the main agency responsible, followed by implementing units such as the UPTD TPA Ganet and marine and land cleaning officers.
 - The Tanjungpinang City Environmental Service is responsible for planning, supervising, and enforcing regulations related to waste management.
 - The UPTD TPA Ganet manages the final disposal site and sorts and processes organic and inorganic waste.
 - Cleaning officers consisting of several teams, both land and sea, are tasked with collecting and transporting waste from various locations to TPS and TPA.
- b. **Procedures and Policies;** Procedures and policies in waste management are very important to ensure that each stage of the process is carried out systematically and in accordance with established standards.
 - **Collection and Transportation:** Waste is collected based on a daily schedule and a predetermined route, both for dump trucks, arm rolls, and garbage trucks. For example, dump trucks operate from 04.30 to 13.00 WIB with different routes every hour.
 - **Management at TPS and TPA:** TPS and TPA are managed to accommodate and process temporary waste before being transported to the final disposal site. For example, TPA Ganet has five waste storage zones and separates organic and inorganic waste for further processing.
 - **Waste Reduction Policy:** Public education and development of waste management infrastructure such as recycling facilities and compost processing sites.
- c. **Infrastructure and Resources;** Adequate infrastructure and sufficient resources are very important in supporting an effective waste management system.
 - **Waste Transport Equipment:** There are various types of waste transport equipment such as boats, compactors, dump trucks, armroll lorries, pick-ups, and two-wheeled vehicles. Each tool has a specific function in the waste management system.
 - **Temporary Disposal Sites (TPS):** Tanjungpinang City has several TPS with various conditions and plans to add to meet waste management needs.
 - **Final Disposal Site (TPA):** TPA Ganet managed by UPTD Ganet serves the entire city of Tanjungpinang with a large capacity to accommodate waste generated annually.

2. Disposition or attitude of the implementer

This variable focuses on the attitudes, motivations, and commitment of the individuals responsible for implementing the waste management policy, including government officials,

waste bank managers, and volunteers. In Tanjungpinang, the disposition of these implementers significantly affects the success of waste management initiatives. For instance, proactive and motivated implementers are more likely to engage communities, promote awareness programs, and ensure compliance with waste management practices. Conversely, a lack of commitment or negative attitudes among implementers can hinder progress, leading to inefficiencies and delays in policy execution. Therefore, understanding the disposition of implementers helps identify areas where training, incentives, or motivational strategies may be needed to enhance their performance and commitment [18,19].

In the context of the implementation of public policy, these disposition research variables are one of the key factors that need or must be considered so that in the implementation can be applied according to existing phenomena. The disposition or attitude of the implementer in the processing of existing waste is a variable that must be considered properly, because it will influence the effectiveness of the existing system. In the context of the City of Tanjungpinang dispositions of implementers include awareness, responsibility and willingness to act together to achieve the goal of sustainable waste processing. The awareness of who is the implementer in the City of Tanjungpinang and its community related to the importance of implementing good waste processing is still low. Many citizens in the City of Tanjungpinang are not accustomed to and do not routinely dispose and sort waste or reduce waste production. This explains the urgency of increasing and socialization.

Example of Implementer Attitude, namely the Positive condition, several implementers have shown a proactive attitude in carrying out their duties, such as cleaners who clean up garbage in coastal and marine areas. While the Negative condition However, low awareness and lack of education often lead to apathy towards environmental cleanliness. The attitude of responsibility from the implementers is very important in ensuring effective waste management. In Tanjungpinang City, this responsibility can be seen from the efforts to separate organic and inorganic waste and the use of various waste transportation tools.

In the responsibility of the implementer, the addition and maintenance of waste transportation equipment, as well as efforts to separate waste at the Ganet TPA show a good commitment from the implementer. However, on the other hand, limited infrastructure and funds often hinder the implementer in carrying out their duties properly, which can reduce their sense of responsibility. Therefore, the importance of collaboration between the government, community, and private sector is very much needed to create a sustainable waste management system. The attitude of the implementer in working together can be seen from various initiatives and programs that have been carried out. For example, several education programs and cooperation with the private sector show the willingness of the implementer to work together in waste management. However, the fact that there are still wild garbage points shows a lack of good cooperation and coordination between various parties.

3. Resources

In Edward III's article, the resources variable is defined as the element that describes when a public policy is implemented [20]. This variable includes the financial, human, and material resources necessary for the effective implementation of the waste management policy. In Tanjungpinang, adequate funding is required to support infrastructure development, such as building waste collection centers, providing waste sorting equipment, and maintaining the operational needs of waste banks. Human resources, such as trained staff and volunteers, are also essential for managing waste collection, processing, and recycling activities. Insufficient resources in any of these areas can lead to significant challenges, such as inadequate waste facilities, limited public outreach, and poor service delivery. The study highlights that the scarcity of resources in Tanjungpinang is a major obstacle to achieving effective waste management, and it calls for increased investment and resource mobilization strategies.

The use of appropriate technology can improve efficiency and effectiveness in policy implementation. Therefore, resource management that is effective and efficient is needed for proper public policy implementation [21,22]. Analytically, resource variable is used as the focus of analysis in answering the extent to which a public policy can be implemented. Proper management of resources will make a big contribution to achieving the goals of the policy that have been set. Waste management in Tanjungpinang City covers the resource at 15 different sites as well as resource management in each area. This involves analysis of various aspects, including the available resources and how they are used to handle waste management. Through this analysis, several results will be produced, mainly on the resource aspects that is used in the management of waste. The analysis will be resource utilization analysis.

- a. **Waste Management Infrastructure;** Waste management infrastructure in Tanjungpinang City includes various means of transportation, temporary disposal sites (TPS), and final disposal sites (TPA). In 2022, the city has several types of waste transportation such as boats, compactors, dump trucks, arm roll lorries, pick-ups, and two/three wheels. Although there is investment in these means of transportation, additional units of transportation are still needed, especially for boats and pick-ups which are planned to be added in 2023. The condition of the TPS also shows variations in quality, with some TPS in good condition and others in need of repair. For example, of the 64 existing container bins, only 20 are in good condition while 18 are badly damaged and cannot be used anymore. Efforts to improve infrastructure such as the addition of permanent bins and communal bins are also planned.
- b. **Labor and Supervision;** Waste management in Tanjungpinang is supported by workers who are tasked with transporting waste on land and at sea. Marine cleaners, for example, are tasked with cleaning up waste in coastal and marine areas around the city. Despite efforts at supervision and law enforcement, challenges such as low public awareness and limited infrastructure still exist. **Labor Training and Education:** Provide training and education to workers on efficient and environmentally friendly waste management techniques. **Improved Supervision and Law Enforcement:** Improve supervision and law enforcement against waste management violations to create a deterrent effect and increase public compliance.
- c. **Policy and Regulation;** Policies and regulations play an important role in supporting sustainable waste management. Local governments are expected to issue policies and regulations that support waste management, including sanctions for violators of the rules. Currently, supervision and law enforcement are still weak, and many violators are not subject to sanctions. The importance of developing policies and regulations that support sustainable waste management, including incentives for companies that reduce waste production and recycle. Implementation of Sanctions is also needed in applying strict sanctions to violators of waste management rules to increase public compliance and awareness.
- d. **Technology in Waste Management;** Modern technology can be used to increase the efficiency of waste management. The use of sensor-based waste monitoring systems and applications for reporting illegal waste can help in better monitoring and management of waste.

Effective waste management in Tanjungpinang City requires cooperation from various parties, infrastructure improvements, public education, and the use of modern technology. With these steps, Tanjungpinang City can overcome challenges in waste management and create a clean and healthy environment.

4. Communication

Communication is crucial for ensuring that all stakeholders—government agencies, waste bank operators, community members, and other organizations—are well-informed about the waste management policies, procedures, and goals. In Tanjungpinang, effective communication involves not only disseminating information but also fostering dialogue between authorities and the public. This helps build trust, promote public awareness, and encourage community participation in waste management efforts. However, the study found that communication gaps exist, resulting in a lack of awareness and engagement among residents. Strengthening communication channels, such as through regular public forums, educational campaigns, and digital platforms, is essential for bridging these gaps and enhancing the overall effectiveness of the waste management program [21].

In accordance with Edward III's article 1980:92, mentioned in the background research, implementing public policy, one can assume that good communication between the government and the community, as well as other institutions, will allow them to share clear and accurate information that will also help to ensure that there is no misunderstanding of public policy and adjacent conflicts that could impede the public policy implementation process [22]. Besides, the good communication between the mentioned parties will provide the community with an opportunity to participate in different decisions as well as help them to increase public power and underscore the policies' legitimacy.

In this context, communication variable will require the government to create appropriate and open channels of communication that will address community issues and collect data from them. The second variable that will be influenced by the chosen communication will ability of the government to identify and respond to unmet needs of the community that might change and thus affect public policy implementation. By acknowledging the communication variable, one will make it possible to make sure that public policy is adjusted to case study situation in the field.

4 Conclusion

The conclusion that can be drawn from this analysis is that efficient waste management in the city of Tanjungpinang necessitates a holistic approach and active participation of all parties. Most notably, an efficient and clear bureaucratic structure is required to make sure that every stage within the process of waste management is conducted in the systematic manner and in accordance with standards. Organizational hierarchy, proper routines, and sufficient equipment compose the set of the factors that should be constantly improved to achieve the necessary levels of efficiency.

While the conducted research indicated some good practices on the side of the local governments, low public awareness and a lack of funds are still present as the challenging issues requiring surmounting. Another crucial aspect of efficient waste management is the disposition or attitudes of the process implementers. Proactive and realizing their high levels of responsibility for the state of the environment in the city at the levels of the waste management companies and local administrations could help the level of effectiveness of the system, while apathy and lack of the needed education hinder the process.

For this purpose, some form of the ongoing environmental education and awareness is required to be carried on both amongst the community and the implementers. The fusion of the efforts of the government, private sector, and the community carried on within the sight of various education programs and initiatives might be helpful in terms of creating a more efficient waste management system.

Finally, appropriate communication is crucial for the realization of waste management policies. Public education, appropriate choice of the communication mediums, and

transparency of the report represent the examples of the measures that might help raise the level of support and participation from the public. Furthermore, the use of the contemporary technology for monitoring and reporting the cases of the illegal waste disposal might help raise the efficiency of the waste management. Ongoing communication and transparency are also important in terms of building the public trust that, in turn, will result in the cleaner and healthier environment in Tanjungpinang.

The findings indicate that waste management in Tanjungpinang City faces several challenges, particularly the lack of public awareness and insufficient funding. The low level of public participation is due to the limited outreach and educational campaigns conducted by local authorities. To address this, community-based education programs, social media campaigns, and the introduction of waste management education in schools are recommended. Meanwhile, insufficient funding affects the availability of proper infrastructure and adequate staffing. Solutions include fundraising through partnerships with private entities, incentive programs for communities actively participating in waste management, and seeking support from international organizations that provide funding for sustainability projects. These strategies aim to effectively overcome these obstacles.

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