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Policy Implementation of Waste Management at Bintang Mangrove Waste Bank, Surabaya City

Eka Maidhatul Jannah[1], Sri Wibawani[1]
[1]Department of Public Administration, Faculty of Social, Cultural, and Political Sciences, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, Indonesia
Email: sri_wibawani.adneg@upnjatim.id.com

Abstract. *This study aims to describe and analyze the implementation of waste management policies at the Bintang Mangrove Waste Bank in Surabaya City, based on the Minister of Environment and Forestry Regulation No. 14 of 2021 and Surabaya Regional Regulation No. 1 of 2019. The research employed a descriptive qualitative approach with data collection techniques including observation, interviews, and documentation. The theoretical framework is based on the Policy Implementation theory by Randall B. Ripley and Grace A. Franklin (1986:232). The findings indicate that policy implementation was carried out through two main aspects: waste reduction and waste handling. Reduction efforts included recycling and reusing waste, which had both economic and environmental impacts. Waste handling involved sorting, collecting, processing, and delivering waste. The Bintang Mangrove Waste Bank also played a significant role in educating the community through the "River School" program and encouraged behavioral changes in sustainable waste management. Although the implementation has been relatively successful, challenges remain such as limited human resources for waste sorting and low market demand for recycled products. The study concludes that the Bintang Mangrove Waste Bank has effectively realized the 3R principles and implemented a circular economy model that provides ecological, educational, and economic benefits to the community.*

Keywords: *Waste Bank, Implementation Policy, Policy, Waste Management*

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INTRODUCTION

Local governments essentially hold the authority to manage waste within their respective regions, as waste management falls under their autonomous jurisdiction, provided it does not contradict existing regulations. To implement a comprehensive and integrated waste management system, ensure public rights and responsibilities, and fulfill the duties and authority of local governments in delivering public services, a legal framework in the form of a regional regulation is required. In line with this, the Surabaya City Government issued Regional Regulation No. 1 of 2019, which amends Regional Regulation No. 5 of 2014 concerning Waste Management and Cleanliness in Surabaya.

This regulation serves to establish legal certainty, clarify the authority and responsibilities of local governments, business actors, and community roles in managing waste within the city. This waste management policy is driven by the growing population, especially in urban areas, which has led to an increased volume of waste (Wilson & Velis, 2015). Surabaya, as one of Indonesia's major cities, had a projected population of 3.02 million in 2024 (Surabaya Central Statistics Agency, 2025). A larger population inevitably contributes to higher waste

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generation. According to data from the National Waste Management Information System (SIPSN), the total annual waste generation in Surabaya has increased over the past three years, as shown in the following table:

Table 1. Annual Waste Generation in Surabaya City

Year	Daily Waste (Tons)	Annual Wate (Tons)
2022	1.783,68	651.043,42
2023	1.800,05	657.061,64
2024	1.805,57	659.033,63

Source: National Waste Management Information System (2025)

As shown in Table 1, the total waste generated in Surabaya reached 659,033.63 tons in 2024, with a daily average of over 1,800 tons. The increase is driven by factors such as population growth, consumption patterns, and urbanization trends.

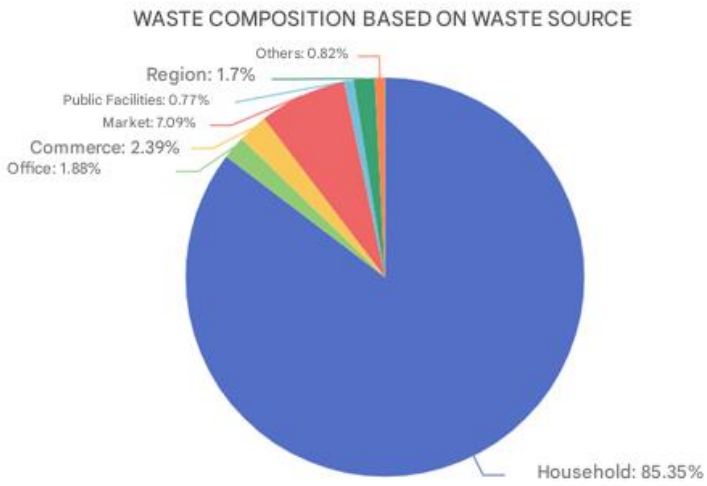

Figure 1. Waste Composition by Source in Surabaya City

Source: National Waste Management Information System (2025)

Furthermore, data from SIPSN 2025, as depicted in Figure 1, shows that household activities are the primary source of waste in Surabaya (85.35%), followed by markets (7.09%). The Indonesian Central Statistics Agency (BPS) also predicts that the proportion of the urban population will increase from 65% in 2020 to 72.9% by 2045, further escalating the volume of waste. Given that the majority of waste originates from households, waste reduction efforts must effectively involve communities as the main contributors to the problem. One alternative solution is shifting the paradigm from conventional "collect and dispose" methods toward 3R-based waste management (Reduce, Reuse, Recycle), where communities participate directly in managing waste through waste banks that derive economic value from waste. According to a report by RadarSurabaya, environmental observer Wawan Some emphasized that the 3R principle is a foundational strategy for independent waste management by residents of Surabaya.

Article 2(1) of Ministerial Regulation No. 14 of 2021 on Waste Management in Waste Banks states that "The government, local governments, and the public are responsible for waste management." In line with this, the Bintang Mangrove Waste Bank has been operating since 2012 and is considered effective in implementing 3R-based waste management in Surabaya. As reported by tunashijau.id (2025), this waste bank won first place in the 2023 Waste Bank Competition organized by the Surabaya City Government through the Environmental Office (DLHK). The success of Bintang Mangrove Waste Bank's waste management activities is demonstrated by a consistent increase in the amount of waste collected, as shown in the following table:

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Table 2. Waste Collected by Bintang Mangrove Waste Bank

Year	Total Waste Collected (Kg)
2022	26.777
2023	30.074,5
2024	43.260

Source: Bintang Mangrove Waste Bank (2025)

The waste collected by Bintang Mangrove Waste Bank comes from local residents, neighborhood-level waste bank units, households, fishermen, and children. By 2025, the waste bank had registered 256 active users. It contributes not only to community economic improvement through waste sales, but also helps reduce waste volume at temporary disposal sites (TPS), while shifting community behavior towards better waste management practices. Several programs have been implemented by Bintang Mangrove Waste Bank, such as using waste to pay for electricity bills, a waste-based savings and loan system, access to healthcare through waste exchange, environmental education through the River School program, and environmental awareness initiatives. These activities align with the goals of the waste bank policy: to serve as a 3R-based waste management facility, a center for public education, behavioral change, and circular economy implementation. This is consistent with Van & Van (1975), who define policy implementation as transforming policy objectives into operational actions required to achieve those objectives.

Waste management at Bintang Mangrove Waste Bank represents community-based implementation, in accordance with Article 27A of Surabaya Regional Regulation No. 1 of 2019, which states that "in implementing 3R activities, communities or waste management institutions established by the community may establish waste banks." However, successful policy implementation is not easily achieved and faces various challenges. Research by (Masrifah & Hardjati, 2024) found that while community participation in sorting and managing waste at Bintang Mangrove Waste Bank reflected shared responsibility and partnership, transparency remained an issue. Meanwhile, Lisa Johnson in Rachman et al., (2024) argues that urban waste management also requires policy implementation and programs for waste reduction, reuse, and recycling, alongside public awareness and knowledge of sustainable practices and eco-friendly technology. The existence of the Minister of Environment and Forestry Regulation No. 14 of 2021 on Waste Management in Waste Banks, along with Surabaya Regional Regulation No. 1 of 2019 (amending Regional Regulation No. 5 of 2014 on Waste Management and Cleanliness in Surabaya), represents a policy framework centered on the implementation of 3R (Reduce, Reuse, Recycle) activities at the regional level.

These regulations empower communities or community-based waste management institutions to establish waste banks. Through this policy framework, it becomes possible to assess whether waste banks have effectively implemented 3R-based waste management practices in accordance with applicable regulations. Policy implementation plays a crucial role in this context, aligning with Robichau & Lynn (2009) view that the public policy implementation approach seeks to understand the actors involved in executing a given policy. Understanding these implementers is key to identifying the factors that lead to policy success or failure. Likewise, waste management activities at the Bintang Mangrove Waste Bank must reflect the consistent implementation of the policy across all stages, particularly in its waste processing operations. Therefore, the implementation of waste management policy at the Bintang Mangrove Waste Bank becomes an essential subject of observation and analysis.

METHODS

This research uses a qualitative approach with descriptive methods. Qualitative research methods are research methods used to research on natural object conditions, where researchers are key instruments, data collection methods are triangulated, data analysis is inductive, and

qualitative research results emphasize meaning rather than generalization (Abdussamad, 2021). The data collection techniques used, namely observation, interviews, and documentation, are carried out to obtain data results that match the conditions in the field. Observation is carried out by researchers by observing the situation in the field directly. Documentation is used in this study by collecting photos and supporting research documents such as activities in the field and recap documents owned by the Bintang Mangrove Waste Bank. Meanwhile, interviews were conducted using a structured method that began by compiling interview guidelines to focus on the research topic. The selected informants are the Environmental Counseling and Community Empowerment Team, Surabaya City Environmental Service, Bintang Mangrove Waste Bank officers and customers.

The determination of informants was carried out using the snowball sampling technique. This technique is carried out by conducting initial identification starting from a problem or individual that matches the research criteria. The data used in this research are primary data and secondary data. Primary data was obtained through in-depth interviews with several competent resource persons (Abdussamad, 2021). Secondary data is generated from documents, records, reports, and other bookkeeping that can be used to obtain in-depth information about. After the data is obtained, the data is then analyzed using data analysis techniques, namely the first data collection. Second, data display in this study the data presented are in the form of interview results, research documentation, and tables of results. Third, data condensation, at this stage the researcher collects the interview data that has been collected so that the data obtained can really be focused according to the level of need in the research. Fourth, conclusion drawing/verification, in the stage of analyzing qualitative data is drawing conclusions and verification. The findings during the research can be in the form of a description of the object of research and can be in the form of a description that was previously unclear, so that it becomes clear after the research is completed (Schmucker et al., 2017). Furthermore, the data is analyzed with the focus of the research, namely with Randall's Policy Implementation theory. Mubarok et al. (2020).

RESULTS AND DISCUSSION

Waste management policies are formulated by the government in response to the increasing complexity of waste-related issues in Indonesia, driven by population growth and shifts in consumption patterns. Moreover, the misalignment between waste management techniques and environmentally friendly principles further exacerbates the problem. These policies therefore place responsibility on both the government and the public to manage waste in accordance with established regulations. To ensure a policy achieves its objectives, effective implementation is required. Policy implementation, in essence, is the process of translating policy goals into concrete actions (May, 2012). In the context of waste management at waste banks, implementation involves carrying out a series of operational activities related to waste handling, thereby ensuring that the objectives of the policy are achieved effectively. Waste banks must adhere to and operationalize waste management policies in order to support accurate and rule-compliant waste management practices. To understand how these policies are implemented at the Bintang Mangrove Waste Bank in Surabaya, the researcher analyzed field findings using three dimensions of successful policy implementation, as outlined in Nampira & Pramestyawati (2024) theory:

Success Must Be Measured by The Level of Compliance of Bureaucratic Subordinates to Their Superiors or by the Overall Level of Bureaucratic Compliance with the Specific Mandates Stated in the Regulations

Compliance refers to the extent to which subordinate bureaucrats adhere to their superiors' directives, or the extent to which policy implementers comply with the legal mandates outlined in the policy (Xiao & Zhu, 2022). Waste management policies relevant to waste banks are regulated under the Minister of Environment and Forestry Regulation No. 14 of 2021, Article 4(1), which outlines that "waste management includes: (a) waste reduction and (b) waste handling." Additionally, Surabaya Regional Regulation No. 5 of 2014, Article 27B, states that "3R

activities implemented through waste banks by community members or community-based waste management institutions include: (a) waste sorting; (b) waste collection; (c) waste delivery to waste banks; and (d) expansion of waste banks." Based on the findings, this first dimension of the study focuses on how the policy implementers staff and users of the Bintang Mangrove Waste Bank, as well as the Environmental Education and Community Empowerment Team from the Surabaya Environmental Agency carry out the waste management policy. This aligns with Edelman & Talesh (2011), who argue that regulatory compliance must be followed by individuals, companies, and organizations in society. Field findings show that the Bintang Mangrove Waste Bank implements the waste management policy as follows:

Waste Reduction

The implementation of waste reduction at the Bintang Mangrove Waste Bank is carried out through waste reutilization activities based on the principles of reduce, reuse, and recycle (3R), as stated in the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia No. 14 of 2021 concerning Waste Management in Waste Banks, specifically Article 5. This article stipulates that waste reutilization involves reusing all or part of the waste for the same or different function without undergoing any prior processing. In practice, the Bintang Mangrove Waste Bank adopts two approaches to waste reutilization: recycling and reusing. Recycling is applied to inorganic waste such as plastic, used bottles, and paper. The process begins with sorting the waste according to type and its suitability for the intended product. Once sorted, the waste is thoroughly cleaned to ensure hygiene before being processed into new products.

Figure 1. Recycled Products from Waste
Source: Personal Documentation, 2025

As shown in Figure 1, recycled products include tote bags made from detergent packaging, mesh bags from plastic cup rings, coin banks from used bottles, pencil cases, decorative flowers, and hats made from paper waste. These items are sold to customers and the general public through a pre-order system. The marketing is supported by the Environmental Education and Community Empowerment Team from the Surabaya Environmental Office. This recycling practice complies with Article 6(5) of Ministerial Regulation No. 14 of 2021, which lists recyclable materials as plastics, paper, metals, glass, rubber, and textiles.

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Figure 2. Waste Reduction at Bintang Mangrove Waste Bank, 2024
Source: Bintang Mangrove Waste Bank, 2025

In reference to Figure 2, the waste reduction activities implemented by the Bintang Mangrove Waste Bank have contributed to a yearly decrease in the volume of collected waste by approximately 3 to 4 percent. In addition to recycling, the bank also reuses waste for the same function (reuse). This is done with waste that is still intact and suitable for use. Customers deposit waste, which is then re-sorted and cleaned for reuse. Examples include wallets and hats made from fabric, keychains, and glass-based souvenirs. Bank staff assess usability based on the physical condition of the waste, particularly its cleanliness and completeness (Soegoto et al., 2018). These reuse activities comply with Article 6(4) of Ministerial Regulation No. 14 of 2021, which states that reusable waste includes plastics, paper, metals, glass, rubber, and textiles. Despite the success of these reduction activities, there are still issues related to waste residue from the recycling process, such as scraps from multilayer packaging, damaged bottles, and unusable paper. To address this, the waste bank still requires supporting equipment such as a plastic shredder to break down materials for resale or further processing. In summary, the level of compliance by staff and customers with the waste reuse policy is relatively high, as evidenced by the alignment between implemented activities and applicable regulations, particularly Articles 5 and 6 of the Ministerial Regulation. The implementation of waste reduction policies at Bintang Mangrove Waste Bank not only supports sustainable waste management but also provides economic benefits and raises public awareness about responsible waste handling.

Waste Handling

The waste handling activities at Bintang Mangrove Waste Bank are guided by the Minister of Environment and Forestry Regulation No. 14 of 2021, particularly Article 4(1)(b), which outlines procedures for waste handling. Article 4(3) further explains that waste handling may include: a) waste sorting, b) waste collection, and c) waste processing. These provisions align with Surabaya Regional Regulation No. 5 of 2014, Article 27B, which states that community-based 3R (Reduce, Reuse, Recycle) activities through waste banks shall include: a) sorting, b) collecting, and c) delivering waste to the waste bank. Accordingly, policy implementers at the waste bank are expected to comply with these procedures as follows:

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Waste Sorting

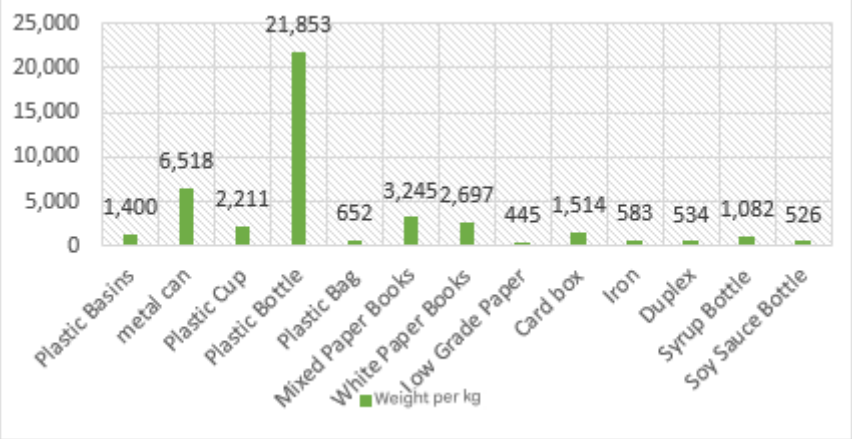

Figure 3. Waste Sorting Volume at Bintang Mangrove Waste Bank, 2024
Source: Bintang Mangrove Waste Bank, 2025

At Bintang Mangrove Waste Bank, waste sorting involves categorizing waste based on type. As shown in figure 3, the sorting procedure includes classification of cans, plastics, cardboard, plastic bottles, glass bottles, and paper. Sorting is conducted meticulously, especially for plastics, which must meet specific criteria to be marketable. For instance, plastic drink bottles must be separated from their labels and caps, while other plastic items like basins are sorted based on color (Akhras et al., 2023). Certain types of waste, such as polymailer wrappers, bubble wrap, bottle labels, and multilayer plastics, are not accepted due to non-compliance with recycling standards. The sorting process reflects compliance with Article 6 of Ministerial Regulation No. 14 of 2021, which requires that waste be categorized into: (a) hazardous waste (B3); (b) biodegradable waste; (c) reusable waste; (d) recyclable waste; and (e) other types of waste. Field observations and interviews revealed that sorting is conducted through two primary methods: directly at the waste bank and at the household level. Customers are required to pre-sort their waste before delivering it to the waste bank. Upon receipt, staff re-check the waste to ensure compliance with sorting criteria. The consistency in this routine demonstrates compliance with Article 7(1) of the same regulation, which states that "waste sorting shall be conducted at the waste source and/or at the waste bank." Thus, the waste sorting activities at Bintang Mangrove Waste Bank align with effective waste management principles and applicable regulations.

Waste Collection

Figure 4. Waste Collection Process by Bintang Mangrove Waste Bank
Source: Personal Documentation, 2025

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Based on research findings, waste collection at Bintang Mangrove Waste Bank is conducted through two main mechanisms. First, customers can bring their pre-sorted waste directly to the bank. Second, the bank provides a pickup service using a pickup truck operated by staff, especially when the collected waste has reached a certain volume. The waste is transported in mesh sacks to prevent scattering during transit, reflecting compliance with Article 8(b) of Ministerial Regulation No. 14 of 2021, which mandates the use of transport equipment that prevents waste spillage As shown in Figure 4, staff also collect waste through the "Waste Donation Program," which involves placing collection bins for plastic bottles and cups at various locations in Gunung Anyar Tambak. This program encourages active public participation in environmental protection. According to Keith Davis (in Millner et al., 2019), participation reflects the emotional and mental involvement of individuals in fulfilling shared responsibilities

As shown in Figure 4, that the waste bank also collects marine waste to help maintain coastal cleanliness. This waste includes used bottles, plastics, cans, and other containers. Customers are required to pre-sort their waste and deliver it in mesh sacks or large plastic bags. This procedure is in line with Article 7(2) of Ministerial Regulation No. 14 of 2021, which mandates that waste generators must deliver sorted waste to the waste bank. Thus, waste collection at Bintang Mangrove Waste Bank demonstrates compliance with regulatory provisions and encourages active community involvement in sustainable waste management.

Figure 5. Waste Collection from Coastal Areas
Source: Personal Documentation, 2025

Waste Processing

According to Prof. Dr. John Smith, urban waste management is a systematic process involving the collection, transportation, processing, and disposal of waste generated by urban populations (Rachman et al., 2024). Based on the study findings, Bintang Mangrove Waste Bank carries out waste processing through two main methods: composting and material recycling.

Figure 6. Composting Process
Source: Personal Documentation, 2025

As shown in Figure 5, Composting is conducted using organic waste, particularly fruit peels, obtained from environmental education activities like the River School, as well as organic waste generated by the bank staff. These materials are placed into compost bags. The process aligns with Article 9(2) of Ministerial Regulation No. 14 of 2021, which specifies that composting should involve microorganisms and/or other materials to produce compost fertilizer. Additionally, the bank processes inorganic waste such as plastics, bottles, and cans deposited by customers by transforming them into value-added products like coin banks and pencil holders. This process aligns with Article 9(3) of the same regulation, which defines material recycling as converting waste into useful products. The policy also permits energy recycling, as stipulated in Article 9(4), which allows waste to be converted into energy through biological, physical, or chemical processes. However, Bintang Mangrove Waste Bank currently lacks the capacity and infrastructure to implement this energy recovery method.

Delivery to the Central Waste Bank

According to Surabaya Regional Regulation No. 1 of 2019, which amends Regional Regulation No. 5 of 2014 concerning Waste Management and Cleanliness, Article 27B(c) stipulates that community-based 3R (Reduce, Reuse, Recycle) activities through waste banks include the delivery of waste to a waste bank. At Bintang Mangrove Waste Bank, the delivery process is carried out through two channels: from customers to the waste bank, and from the waste bank to the Surabaya Central Waste Bank. Based on the research findings, customer deliveries are facilitated through a waste savings scheme. Customers deliver pre-sorted waste, which is then weighed and recorded in the bank's bookkeeping system. Each customer holds an individual savings account that can be withdrawn as needed. This system aligns with (Rachman et al., 2024), who define urban waste management as a systematic process involving waste collection, transportation, processing, recycling, and final disposal. Once received, the waste is further managed by the bank's staff. Periodically, Bintang Mangrove Waste Bank delivers part of the collected waste to the Surabaya Central Waste Bank, as part of a tiered waste management network. However, not all waste is sent to the central bank; some is sold directly to local waste buyers. The decision on where to deliver the waste is based on pricing considerations, which vary between the central bank, local buyers, and factories. This allows the waste bank to optimize the economic value of the waste it manages.

The Success of Implementation is Marked by the Smoothness of Routines and the Absence of Problems.

Based on the research findings, the second focus of this study highlights the routine operations and functional roles of Bintang Mangrove Waste Bank in implementing waste management policies. (Matland, 1995) states that policy implementation involves specific mechanisms and methods to achieve predetermined objectives. In this context, routine waste management activities must be carried out optimally and in accordance with regulations to ensure effective policy execution. This aligns with (Spillane et al., 2002) view that a policy can be deemed successful when operations at the implementation level proceed without administrative obstacles and are conducted consistently and efficiently. At Bintang Mangrove Waste Bank, most activities have been implemented effectively, although some technical challenges remain. The implementation of waste bank activities refers to the Minister of Environment and Forestry Regulation No. 14 of 2021, Article 4(1), which addresses waste management through two primary aspects: waste reduction and waste handling. These components are reinforced by Surabaya Regional Regulation No. 5 of 2014, Article 27B, which outlines the activities of sorting, collecting, and delivering waste to waste banks. Accordingly, the routines and functions carried out by Bintang Mangrove Waste Bank reflect adherence to these regulatory provisions and demonstrate genuine efforts toward sustainable waste management, as follows:

Waste Reduction

Efforts to reduce waste at Bintang Mangrove Waste Bank are carried out by transforming plastic waste, used paper, and food wrappers into marketable crafts, as well as reusing items that

are still functional. These activities are conducted by waste bank staff and participants of the River School Program, with the finished products being sold for profit. This reflects the successful implementation of waste reduction routines and active participation, in line with Moeljarto Tjokrowinoto's view in (Lu, 2011) that participation is an individual's active involvement in achieving collective goals. However, recycling activities have not yet reached optimal performance due to challenges in marketing. Recycled products still face limited public acceptance, as many perceive them as lower in quality compared to conventional products. Promotion has been conducted through online platforms, word-of-mouth, and support from the Environmental Education and Community Empowerment Team. These challenges have limited product absorption by the market, reducing the effectiveness of the waste reduction efforts. Even though there are no specific regulations outlining waste reduction targets, these activities are essential to reduce waste accumulation at landfills while also empowering the community. Through these processes, waste bank customers gain a better understanding of environmentally friendly waste practices and their economic potential. This aligns with Chambers' perspective (in Suaib, 2023), and building capacity within the community.

Waste Handling

As outlined in the previously mentioned waste management regulations, the routines and functions related to waste handling at Bintang Mangrove Waste Bank include sorting, collecting, processing, and delivering waste. This is consistent with the view of (Volkery & Ribeiro, 2009), who asserts that one element of public policy implementation involves follow-up activities after the policy is established, such as decision-making and operational or strategic execution to realize the policy and achieve its goals. Based on research findings, Bintang Mangrove Waste Bank has implemented various activities related to waste handling in line with the applicable policies. However, in practice, a number of obstacles were encountered both from the side of the staff and the customers which affected the effectiveness of waste handling implementation on the ground. These issues are detailed as follows:

Waste Sorting

The waste sorting activity at Bintang Mangrove Waste Bank involves categorizing waste by type to facilitate further management processes. Sorting is one of the core routines in the implementation of waste management policy, as each type of waste requires different handling methods. In practice, however, the waste bank still faces challenges, particularly due to limited human resources. The research found that the number of staff is insufficient to perform large-scale sorting simultaneously. Moreover, most of the staff have primary occupations outside of the waste bank, which limits sorting activities to Sundays or public holidays. According to waste management regulations, sorting may be conducted either at the source (households) or at the waste bank. However, field findings indicate that many customers do not sort their waste at home. Some perceive sorting as an unpleasant, dirty, and time-consuming task. As a result, recyclable waste such as plastic and paper often becomes unusable due to being mixed with organic (wet) waste. This reduces the efficiency of waste collection and processing and increases the amount of residual waste that must be discarded. To address this issue, Bintang Mangrove Waste Bank actively educates the public on proper household waste management. The educational efforts include guidance on sorting, processing organic waste, recycling, and saving waste through the waste bank system. These initiatives aim to shift public behavior from the traditional "collect and dump" approach to a more sustainable waste management model. As Suryani et al., (2023) points out, education is a process of enhancing knowledge and skills through practical and applicable learning methods.

Waste Collection

One of the key routines in the implementation of waste management policy at Bintang Mangrove Waste Bank is the waste collection process, which follows the sorting stage. Waste is collected by both the waste bank staff and the customers themselves. Staff conduct pickup services for sorted waste from households, community-based waste bank units, and designated

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drop-off points as part of the "Waste Donation Program" in Gunung Anyar Tambak. Based on interviews and field observations, these collection activities run smoothly without significant obstacles. This indicates that the collection routine has been implemented effectively in accordance with existing policies, supported by an organized system and active public participation

Waste Processing

The next routine function carried out by the Bintang Mangrove Waste Bank is waste processing through composting and material recycling. Composting is conducted regularly once a week using organic waste collected from the River School activities and waste bank officers. The organic waste used for composting mainly consists of fruit peels, which are placed into compost bags. The next material recycling process involves the recycling of plastic waste. Plastic waste recycling is carried out every two weeks through the River School activities. In addition, recycling is routinely conducted whenever Bintang Mangrove Waste Bank receives orders for recycled products. However, the Bintang Mangrove Waste Bank is not yet able to carry out the process of energy recovery from waste. This is due to the lack of capacity, particularly the absence of equipment that can convert waste into energy. Moreover, the waste bank does not practice waste landfilling, where methane gas from decomposed waste could potentially be utilized as an energy source.

Delivery to the Central Waste Bank

The next routine in the policy implementation process is the delivery of waste. This is carried out through two mechanisms. First, customers deliver pre-sorted waste to Bintang Mangrove Waste Bank. After receiving the waste, the staff carry out additional processes such as collection, sorting, and processing. According to the research findings, this delivery process proceeds smoothly without major issues. Second, the Bintang Mangrove Waste Bank delivers processed waste to the Surabaya Central Waste Bank. The waste sent is part of customer deposits that have already been sorted and processed. However, not all waste is delivered to the central bank due to fluctuating price considerations among central banks, collectors, and factories. For this reason, the waste bank also sells a portion of the waste to buyers offering higher prices.

Successful Implementation Produces Desired Performance and Program Impact

According to the Minister of Environment and Forestry Regulation No. 14 of 2021, a waste bank is defined as a waste management facility that applies the 3R principles (Reduce, Reuse, Recycle) and functions as a means of education, behavioral change in waste management, and circular economy implementation. In line with this provision, the third focus of this study is to examine how the Bintang Mangrove Waste Bank has effectively implemented programs and policies that yield positive and measurable impacts for the community. Ripley & Franklin in their book Policy Implementation and Bureaucracy, assert that "A major aspect of successful implementation is the smooth functioning routines and activities necessary to deliver the policy's intended effects." This suggests that successful policy implementation relies heavily on the seamless execution of routines and activities designed to achieve the intended policy outcomes. Therefore, the series of waste management activities carried out by the Bintang Mangrove Waste Bank must be capable of generating real and measurable impacts for the community, aligned with the direction and objectives of the policy. Based on the research findings, Bintang Mangrove Waste Bank has consistently implemented various waste management activities in accordance with existing regulations, and these activities have produced a range of positive impacts, as outlined below:

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Education

Figure 7. River School Activities
Source: Personal Documentation, 2025

According to Andrini (2016), education is a process of increasing knowledge and skills through practical and instructive learning methods. To promote environmental awareness, the Bintang Mangrove Waste Bank established the River School program an informal educational initiative aimed at enhancing community environmental consciousness. Based on the findings, this program is attended by children at the kindergarten and elementary school levels in the Gunung Anyar Tambak area. As shown in Figure 6, the River School program is designed to foster understanding of waste management, environmental preservation, and river ecosystem conservation. Activities are conducted every Sunday and include training on waste sorting and transforming waste into crafts. All activities reflect Dovemark (2010) notion that education aims to promote positive individual and collective behavior. The initiative was inspired by the geographical location of the Bintang Mangrove Waste Bank, which is situated in a riverfront area often polluted by marine waste. Moreover, the area is surrounded by mangrove trees that serve as a natural barrier against environmental disasters. Therefore, the River School has become an essential part of efforts to preserve the environment and river ecosystems. This educational objective also aligns with Yusriani's emphasis on guidance and the delivery of new knowledge in the learning process.

Behavioral Change in Waste Management

The primary purpose of waste banks is not only to provide a 3R-based waste management facility, but also to educate the public on proper waste handling. Education plays a key role in driving behavioral change, encouraging communities to manage waste independently and sustainably. Bintang Mangrove Waste Bank fulfills this role through a series of activities that go beyond the technical aspects of waste processing by also focusing on awareness-raising and community engagement including among children in Gunung Anyar Tambak. Based on research findings, behavioral change efforts were carried out by Bintang Mangrove staff through educational initiatives that emphasize the importance of waste sorting, household waste processing, and environmental preservation. These messages were delivered through direct outreach and creative programs offered to the public. Among the most notable programs are "saving with waste," "getting healthcare with waste," and "paying electricity bills with waste." These programs provide economic incentives, which effectively encourage community participation in waste management. These efforts have successfully changed the behavior of some community members those who previously disposed of waste indiscriminately, including into rivers or by burning it into individuals who are now more responsible in handling waste. This educational and empowerment-based approach has produced a significant shift toward independent and environmentally sustainable waste management practices.

Circular Economy Implementation

A circular economy is an economic model focused on maximizing product life cycles through reducing, reusing, repairing, and recycling materials during production, distribution, and

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consumption (Kirchherr et al., 2017) . The Bintang Mangrove Waste Bank applies this concept through systematic, comprehensive, and sustainable waste reduction and handling activities. As a 3R-based waste management facility, the bank allows community members to deposit their waste and earn financial returns while also contributing to reduced waste volumes at the final disposal site (TPA). In practice, Bintang Mangrove Waste Bank provides information regarding which types of waste are accepted and their unit prices, facilitating customer transactions. Beyond the economic aspect, the waste savings program also promotes cleanliness and environmental awareness. This aligns with Kirchherr et al., (2017), who assert that the core principle of the circular economy is to optimize product usage while balancing economic growth with environmental conservation and resource sustainability.

CONCLUSION

Based on the findings of this research on the implementation of waste management policy at the Bintang Mangrove Waste Bank in Surabaya City, it can be concluded that policy implementation has proceeded in accordance with the Minister of Environment and Forestry Regulation No. 14 of 2021 and Surabaya Regional Regulation No. 1 of 2019. Policy implementation was carried out through two main aspects: waste reduction and waste handling. Waste reduction was implemented through the application of circular economy principles, particularly by engaging in recycling and reuse activities. Plastic waste, paper, and other inorganic materials were repurposed into economically valuable craft products. In addition to reducing the volume of waste, these activities provided financial benefits for waste bank customers and promoted community empowerment. However, the marketing of recycled products remains a challenge due to low consumer interest and limited market access. Waste handling included sorting, collection, processing, and delivery of waste. These processes were carried out systematically and involved active public participation. Nonetheless, several issues were encountered in practice, including a lack of human resources, limited operational time, and low awareness among residents about the importance of sorting household waste. The Bintang Mangrove Waste Bank also played an educational role through its *River School* program, aimed at children in the Gunung Anyar Tambak area. This program increased environmental awareness and emphasized the importance of river ecosystem preservation among younger generations.

SUGGESTION

Overall, the Bintang Mangrove Waste Bank has demonstrated effective policy implementation by fostering synergy among regulations, public participation, and economic benefits. However, the sustainability of its waste management programs requires further reinforcement of capacity, supporting facilities, and more targeted education and marketing strategies.

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