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Evaluation of Waste Bank Management in Mojo Village, Gubeng Sub-district, Surabaya City

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ABSTRACT
Poor waste management can lead to environmental pollution. Waste banks, based on the 3R principles (reduce, reuse, recycle), are an effort to manage waste sustainably while enhancing community income. However, the effectiveness of waste bank operations is often hampered by low community participation, suboptimal operational mechanisms, and inconsistent application of standard operating procedures (SOPs). This study aimed to evaluate the management of waste banks in Mojo Urban Village, Gubeng District, Surabaya City. A cross-sectional observational method with descriptive analysis was employed. Variables assessed included waste generation, waste sources, operational mechanisms, and SOP components across seven waste banks. Data collection involved interviews and observations. Results showed the dominant waste types were plastic (1317.3 kg, average 219.55 kg), paper (1195.7 kg, average 199.28 kg), metal (217 kg, average 36.17 kg), and glass (81 kg, average 13.5 kg), with an overall average of 1.12 kg/day per neighborhood unit (RW). Waste originated entirely from residential areas. Operational mechanisms were rated 100% compliant, while SOP implementation reached 84.3%, categorized as good. It is recommended that waste bank managers conduct monthly community education sessions on waste separation and improve the implementation of two SOP components: waste collection and waste condition requirements. Strengthening these areas can further enhance the sustainability and effectiveness of waste bank management.

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INTRODUCTION

Cities in Indonesia, both large and small, are facing serious problems related to waste management. According to the Central Bureau of Statistics, Indonesia's population increased from 278.7 million in 2023 to 281.6 million in 2024, with a growth of 1.11%. (Indonesian Central Bureau of Statistics, 2024). This increase contributes to the growing volume of waste, which can have negative impacts on environmental and human health (Dewi and Syauki, 2022).

Waste, defined as unused items, causes various social, health, and economic problems. Any waste that is disposed of in its place will go through the process of being transported to a landfill site. However, if not managed properly, this pile of waste will continue to grow and worsen environmental conditions (Aqilla *et al.*, 2023).

The problem of environmental pollution due to plastic waste is in dire need of attention, especially in the waters. This waste not only pollutes the sea, but also damages coral reef ecosystems and disrupts the food chain. Microplastics released into the environment can cause harmful effects to marine organisms (Kurniawan *et al.*, 2023).

Inorganic waste also has a very long decomposition time, and some types cannot be

decomposed by nature. This causes clogging of waterways during the rainy season, which can lead to flooding (Sariyah *et al.*, 2023). The presence of inorganic waste in cities and neighbourhoods greatly affects people's quality of life.

The increasing use of plastics, especially single-use products, without proper management, further exacerbates pollution. Non-biodegradable plastics take years to decompose, and if burned can produce toxic gases that harm human health (Dalilah, 2021).

Public awareness is key to creating a healthy and clean environment. A clean environment supports human health and well-being (Khoiriyah, 2021). Efficient waste management requires active involvement from the community to reduce waste volume, which is influenced by social and economic factors (Kurniawan and Santoso, 2021).

Law No. 18/2008 on Waste Management explains the importance of integrated waste management. (Indonesia, 2008). Only with a holistic approach can the waste problem be addressed sustainably. Public awareness in managing waste can provide benefits for the economy and the environment (Prihandari and Wahyuni, 2023).

Waste banks have emerged as a solution to manage inorganic waste and provide economic value to the community. With proper management, waste banks can raise awareness for the community and create economic opportunities for the lower middle class (Khaira *et al.*, 2020). However, the main challenge for sorting waste is that community participation is still low and must be overcome so that the waste bank's goals can be achieved soon.

There is still mixed waste that will be weighed from the community, which is 50% of the total 10 bags, not all waste that can be reused goes to the waste bank. With the background of the problems that have been obtained, this study aims to evaluate the management of waste banks in Mojo Village, Gubeng District, Surabaya City. The results of this study are expected to provide suggestions for improving a more efficient and sustainable waste bank management system in the future.

RESEARCH METHODS

This research is a descriptive study with a cross-sectional approach conducted in Mojo Village, Gubeng District, Surabaya City, Indonesia. This location was chosen because it has a fairly active and representative waste bank activity in community-based waste management efforts.

The population in this study was all waste banks operating in Mojo Village. The research sample was determined using a total sampling technique, so that all active waste banks, as many as seven units spread across RW 02 and RW 03, were included in this study. The research subjects consisted of waste bank managers, who are the men or women responsible for the daily operations of each waste bank unit.

This study focuses on four main variables, namely the amount of waste generation, the source of waste, the working mechanism of the waste bank, and the standard operating procedure (SOP) component applied in waste bank management. Waste generation was measured based on the volume of waste types collected over six months, including plastic, paper, metal, and glass. The source of waste is identified based on the origin of the waste, whether it comes from residential areas, markets, or other sources. The working mechanism of the waste bank was assessed based on the suitability of the procedures carried out in the management activities, while the SOP component was evaluated to determine the extent to which operational standards are applied in daily practice.

Data were collected using two types of instruments, namely observation sheets and structured interview sheets. Observations were conducted directly at the waste bank location to assess the working mechanism, the type and amount of waste generation, and the implementation of the SOP. Meanwhile, structured interviews were conducted with waste bank managers to obtain information on waste sources, savings systems, withdrawals, and operational constraints faced. The instruments used have been prepared based on guidelines that refer to national regulations related to waste bank management.

All data collected was processed by coding and tabulation. Quantitative data was then analysed descriptively using simple statistics, such as frequency calculations, percentages, and mean values. The results of this analysis were presented in tables and narratives to provide a comprehensive picture of waste generation characteristics, waste sources, waste bank operational performance, and SOP implementation.

The assessment of the working mechanism of the waste bank is done by comparing the existing practices with the provisions in the Regulation of the Minister of Environment of the Republic of Indonesia Number 13 of 2012 concerning Guidelines for the Implementation of the 3Rs through Waste Banks. The "appropriate" category is given if all core procedures are implemented, while the "inappropriate" category is given if there are deviations from the provisions. Evaluation of the SOP components was conducted based on ten key indicators, and the results were categorised as good if the SOP achievement rate was at least 80%.

This research was conducted in accordance with the principles of social research ethics. Prior to data collection, the researcher provided an explanation to all participants regarding the purpose of the study, the procedures to be carried out, and the guarantee of confidentiality of the information provided. Participation in this study was voluntary with the consent of the respondents.

RESULTS AND DISCUSSION

The following are the results of research on the evaluation of waste bank management in Mojo Village, Gubeng Subdistrict, Surabaya City.

Table 1
Average Waste Generation in Garbage Banks RW 02 and RW 03 for 6 Months Mojo Village, Gubeng Subdistrict, Surabaya City

Garbage Bank	Type of Waste				Total
	Plastic (Kg)	Paper (Kg)	Metal (Kg)	Glass (Kg)	
1	411.1	257.3	38.5	30	736.9
2	138.4	135.9	24.1	10	308.4
3	188.9	173.5	30	7	399.4
4	146.9	149.5	38	11	345.4
5	201.5	135	35.1	0	371.6
6	86.8	115.6	23.8	11	237.2
7	143.7	228.9	27.5	12	412.1
Total	1317.3	1195.7	217	81	2811
Average	188.2	170.8	31	11.6	401.6

Table 1 shows that the average waste bank generation per 6 months for plastic waste is 188.2 kg, paper is 170.8 kg, metal is 31 kg and glass is 11.6 kg on average. The total amount of waste collected was 401.6 kg with an average of 2.23 kg per day in RW 02 and RW 03 of Mojo Urban Village, Surabaya City or an average of 1.12 kg/day per RW. There are 13 RWs in Mojo urban village, so it can be estimated that the waste collected in the waste bank is 14.50 kg/day. This result shows more economic value than in other urban villages in other districts/cities.

Research results Salwa *et al.*, (2024) the volume of waste generated by residents in Cibabat Village produces 8,759 kg/day. The dominating waste composition is 7.76% inorganic waste. An increase in the amount of waste is often closely related to economic growth, where the consumption of goods and services increases. This has an impact on the diversity of waste composition generated. The different types of waste that appear reflect the economic level of the community in each region, with more waste variation seen in areas with more developed economies (Setiawan *et al.*, 2022).

People only choose to dispose of waste in one bin, so waste segregation must be applied and distinguish between inorganic and organic waste, each household is recommended to have two different types of bins (Sukmaniar *et al.*, 2023). The types of waste that can be saved in a waste bank according to Permen LHK RI No. 14 of 2021 are waste containing B3 / B3 waste, waste that is easily decomposed by natural processes, waste that can be reused, waste that can be recycled and other waste. As stated in Permen LHK RI No. 14 of 2021 concerning the minimum weight of waste in saving waste that in order to make waste scales more efficient in recording passbooks, it is necessary to apply the provisions of the minimum weight requirements for saving waste, namely 1 kg for each type of waste (Indonesia and Ministry of Environment and Forestry, 2021). Savers are encouraged to first store their waste at home until it reaches the required minimum weight.

The sources of waste that cause waste generation in the 7 waste banks (RW 02 and RW 03) studied are as follows.

Table 2
Source of Waste Managed by Garbage Bank RW 02 and Rw 03 Mojo Village, Gubeng District, Surabaya City

Garbage Bank	Source of Waste
1	Resident Settlement
2	Residents' Settlement
3	Residents' Settlements
4	Human Settlement
5	Residents' Settlements
6	Residents' Settlements
7	Residential

Table 2 shows that the source of waste managed by waste banks comes from residential areas. Based on research Amaliah, (2020) Waste bank management needs to be carried out as close as possible to the source of waste and adhere to the basics of 3R-based waste management. Yogyakarta City has similar domestic waste sources including shops, lodging facilities, markets, houses, and other public spaces.

People need to separate waste according to the 3R principles. The use of single-use products should be minimised, while the utilisation of recycled products can help reduce the volume of waste in settlements. The establishment of waste banks is necessary to initiate waste segregation at the source. The aim of waste banks is to reduce the amount of waste going to landfill as well as reduce pollution caused by poor waste management.

Plastic is packaged differently depending on its specific function, plastic is a lightweight material and is suitable for various types of needs and lifestyles from the pattern of people who like to buy food or drinks made from plastic (Dalilah, 2021).

So that this produces various types of waste such as organic material, metal, plastic, and paper.

The existence of waste generation that is managed must have a good waste bank work mechanism, the following are the results of the assessment of the work mechanism in Table 3.

Table 3
Working Mechanism of Garbage Bank RW 02 and RW 03 Mojo Village, Gubeng Subdistrict, Surabaya City

Category	Frequency	Percentage
As per	7	100%
Not suitable	0	0%
Total	7	100%

Table 3 shows that the working mechanism of the waste bank is 100% categorised as appropriate. The working mechanism of the waste bank serves as a support in the management of the waste bank. The working mechanism of the waste bank consists of several activities that must be carried out so that the waste bank manager performs according to the procedure.

Activities carried out when managing a waste bank are sorting waste according to the type of waste, handing over waste according to the type of waste, weighing for each type of waste, recording a savings book from the results of weighing waste from members, the sale of waste that is entered into the savings book and profit sharing between savers and implementation. The activities carried out by the waste bank manager are regulated in the Regulation of the Minister of Environment of the Republic of Indonesia Number 13 of 2012. (Ministry of Environment, 2012).

Waste sorting activities are carried out by classifying and separating waste based on its nature, type and amount. In order for the sorting process to run well, savers are advised to group waste into 4 categories: metal/glass, plastic, paper and hazardous waste. Waste segregation from the source is one of the important aspects of waste bank management. Based on research conducted by Haryanti *et al*., (2020) In the implementation of the waste bank programme in Yogyakarta City, the manager requires customers to sort waste at their respective homes.

After the waste segregation process, the next step is waste handover, where customers bring their waste to the waste bank. Waste handover is done within a certain period. Plastic waste is the most common type of waste that is handed over to waste banks, as it has a high value and can be recycled.

When handing over waste, weighing and recording is also done based on the type of waste. This recording is done in each waste bank in accordance with the waste bank's working mechanism procedures. Every waste that is deposited, will be valued according to the market price and recorded in the savings book as proof. Customers will receive money according to the amount of waste sold to the waste bank. This activity is in line with research conducted by Sari *et al*., (2021) The recording is carried out by the officer by recording the results of the waste scales and then converting them into rupiah which is then written in the savings book.

Profit sharing activities are carried out by each waste bank in accordance with Permen LH RI No. 13 of 2012 concerning the working mechanism of waste banks. The proceeds from the sale of waste do not all belong to the customer, but some are set aside for the future operation and development of the institution. (Chotijah and J, 2019). The results obtained after socialising to savers and implementers are 85% for customers and 15% for the implementation of waste banks which will be used as waste bank cash and waste bank operational activities. However, there are also waste banks that use a profit sharing system of 80% back to the customer, 10% administrative assistance and 10% wages for the management. (Astuti *et al*., 2020).

In addition to the work mechanism, the standard operating procedure (SOP) component was also assessed with the following results.

Table 4
Components of Standard Operating Procedure (SOP) of Waste Bank RW 02 and RW 03 Mojo Village, Gubeng Subdistrict, Surabaya City

		Frequency of Waste Bank	
No	**Variable**	**Yes**	**No**
1.	Working Hours	7	0
2.	Savings and Withdrawal System	7	0
3.	Garbage Pick-up	1	6
4.	Type of Waste	7	0
5.	Minimum Weight	7	0
6.	Pricing	7	0
7.	Garbage Condition	2	5
8.	Rubbish Container	7	0
9.	Profit Sharing System	7	0
10.	Wage Provision	7	0
	Total	59	11
	Percentage (%)	84.3	15.7
	Category	Good	

The Waste Bank Standard Operating Procedure (SOP) is very important to maximise and sustain its operations which are determined so that the implementation and implementation of the waste bank is regular and according to established guidelines. From table 4, the standard operating

procedure (SOP) component of the RW 02 and RW 03 waste banks in Mojo Village, Gubeng Subdistrict, obtained a score of 84.3% so that it was categorised as good and there were still 2 SOPs that had not been implemented by all waste banks, namely the SOP for waste pickup and waste conditions.

The working hours of the 7 waste banks are open on Saturdays and Sundays, starting at 10.00 am to 1.00 pm. People who want to weigh in at the waste bank unit only weigh in once a month. The unit waste bank manager is still not available to weigh every day due to the factor of the main job The community is encouraged to collect waste first at home in order to reach the minimum limit. There are still many waste banks that have not

The savings and withdrawal system used by the 7 waste banks is that customers withdraw their savings when they weigh their waste at the waste bank unit in each region, at the earliest within 3 months. However, customers are advised to withdraw their bank savings once a year so that the value of the waste deposited gets more value. From research Astuti *et al.*, (2020) there are 5 waste banks where savings withdrawals are made once a year, namely during Lebaran.

Of the seven waste banks, only one has conducted waste pick-up, namely the Sinar Lestari waste bank. However, the waste bank that does not do pick-up has more interest in managing waste than the waste bank that does pick-up. It is not a problem for people in these waste banks to bring their own waste to the waste bank.

The 7 waste banks accept hazardous waste, waste that is easily decomposed by natural processes, waste that can be reused and waste that can be recycled. The Parent Waste Bank or Unit Waste Bank accepts any type of rubbish that can be managed again or that cannot be managed again.

From the seven waste banks observed, it was found that all waste banks apply a minimum weight standard of 1kg of waste per type of waste deposited by the customers. According to research conducted by Widyantika *et al.*, (2022)The minimum weight set is the result of customer agreement with the manager.

The prices applied in the 7 waste banks are set according to market prices. The price is adjusted to the type of waste needed by the industry for recycling and based on the agreement between the waste managers and the Indonesian Waste Bank Association or ASOBSI. According to research conducted by Fadhillah *et al.*, (2023) The price of waste can change following the price of collectors in general. Any price changes will always be informed.

Of the 7 waste banks studied, the condition of the waste in 2 waste banks was clean and intact. Meanwhile, the other 5 waste banks were not in a clean condition, but the waste was intact. In the apr study, it was explained that waste must be clean and intact according to the specific criteria of the waste collector.

The waste containers used in the 7 waste banks are in accordance with the SOP. The sorting process took place well in the way that savers brought 4 large groups of waste in 5 different bags. The bags include the first bag for plastic waste, the second bag for paper waste, the third bag for metal/glass waste, the fourth bag for organic waste, and the fifth bag for hazardous waste. Waste segregation done by sorting by customers is in accordance with research conducted by Riyanto *et al.*, (2023) In the Sami Asih waste bank, the waste deposited by customers must have been sorted according to the types of plastic, glass, metal, and coconut shell waste.

The profit-sharing system used in the 7 waste banks studied was agreed upon through a waste bank board meeting. Where, 85% for savers, and 15% for implementers. This is in accordance with research conducted by Sari *et al.*, (2023) The results of this study show that the management of an independent waste bank in RW 28 Mojosongo Village Surakarta uses a profit-sharing system, 85% for savers and 15% for the implementation of waste bank operations.

Wages in these 7 waste banks are paid on a voluntary basis or in accordance with the waste bank SOP component. This is in accordance with research conducted by Soimah *et al.*, (2023) where employee payroll is done by voluntary management because some waste banks have not managed waste banks properly and professionally.

CONCLUSION

This research shows that the waste bank management in Mojo Village, Gubeng Sub-district, Surabaya City has been running quite well. The average waste collected for six months includes 188.2 kg of plastic waste, 170.8 kg of paper, 31 kg of metal, and 11.6 kg of glass. The main source of waste managed by the seven waste banks observed came from residential areas.

All waste banks in this study have implemented working mechanisms in accordance with standardised procedures, showing a 100% compliance rate. In addition, the implementation of standard operating procedures (SOPs) recorded a compliance rate of 84.3%, which is categorised as good, although there are two aspects of the SOPs on waste pick-up and waste condition that have not been fully implemented consistently.

SUGGESTIONS

It is recommended that waste bank managers in Mojo Village actively and continuously

provide education and motivation to the community at least once a month about the importance of sorting waste from home. This aims to improve the quality and quantity of waste deposited according to established standards. Education focuses on two aspects of the SOP that have not been fully implemented, namely the waste pick-up SOP and the waste condition SOP. Managers need to consider developing a structured pick-up schedule and providing visual guidance on the condition of waste that is suitable for deposit (clean and intact), so that the operational process of the waste bank runs more optimally and according to standards. In addition, it is recommended to conduct regular monitoring and evaluation of the implementation of all SOPs to ensure the consistency and sustainability of the waste bank programme.

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