



The Development of Waste Bank Management to Improve Household Income in Surakarta City

Pengembangan Pengelolaan Bank Sampah Guna Meningkatkan Pendapatan Rumah Tangga di Kota Surakarta

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ABSTRAK

Pendirian bank sampah di Kota Surakarta bertujuan tidak hanya untuk mengelola sampah rumah tangga, tetapi juga untuk meningkatkan perekonomian masyarakat setempat. Sejak 2014, Dinas Lingkungan Hidup (DLH) Kota Surakarta terus menggalakkan pembentukan bank sampah. Hingga tahun 2020, jumlah bank sampah yang tercatat di Kota Surakarta sebanyak 123; pada tahun 2021, hanya ada 70 bank sampah. Selain itu, tidak semua bank sampah dapat berjalan dengan baik. Oleh karena itu, penelitian ini mencoba untuk mengetahui bagaimana pengembangan pengelolaan bank sampah untuk meningkatkan pendapatan rumah tangga di Kota Surakarta. Penelitian ini menggunakan metode deskriptif dan analisis Miles dan Huberman dengan melibatkan 120 konsumen bank sampah dan 13 pengelola sebagai responden. Hasil penelitian menunjukkan bahwa kontribusi bank sampah terhadap pendapatan rumah tangga sebesar Rp 26.461/bulan. Hal ini menunjukkan bahwa ada beberapa aspek yang perlu ditingkatkan, yaitu sumberdaya manusia, sarana dan prasarana, manajemen waktu, insentif ekonomi, dan program bank sampah. Kajian ini memberikan rekomendasi bagaimana menjaga dan meningkatkan aktivitas bank sampah agar lebih bermanfaat bagi kesejahteraan rumah tangga dan meningkatkan kualitas lingkungan.

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ABSTRACT

Establishing a waste bank in Surakarta City is not only intended to manage household waste The waste bank can also serve to improve the community's economy. Since 2014, the Surakarta City Environmental Services (DLH) has been promoting the formation of waste banks. There were 123 waste banks recorded in Surakarta City until 2020; in 2021, only 70 remained. Furthermore, not all waste banks can run well. Therefore, this study examines how to develop waste bank management to improve household income in Surakarta City. This study used a descriptive method and Miles and Huberman analysis using 120 waste bank customers and 13 managers as respondents. The result showed that the waste bank contribution to the household income was IDR 26,461/month, which means that some aspects need improvements, such as human capacity, infrastructure and facilities, time management, economic incentives, and the program itself. This study provides recommendations on how to maintain and increase waste bank activities to enhance household welfare and environmental quality.

1. INTRODUCTION

1.1 Background

Five years ago, waste banks emerged as a trend in urban areas as a response to the urban waste problem. The term "waste bank" comprises two words: "bank," referring to an intermediary institution for financial transactions, and "waste," denoting all unwanted or unusable materials typically discarded by their owners (Pinheiro T, 2015). Essentially, a waste bank operates as a waste management initiative by purchasing waste in a savings-like system akin to the traditional banking (Pariatamby & Tanaka, 2014). These waste banks function similarly to financial institutions where communities and districts can deposit their waste or withdraw funds based on the value of the deposited waste (Friedberg & Hilderbrand, 2017). The development of waste banks has been observed in various Indonesian cities such as Bantul, Malang, Surabaya, Gresik, and Cilacap, expanding to almost every city and district in the country. This action is a commendable effort to address the waste issue.

The waste bank management model not only contributes to cleaning up environmental waste but also yields economic benefits. Waste banks establish connections with local communities, encouraging them to collect and manage their waste, thereby reducing waste and generating economic returns. According to Pariatamby & Tanaka (2014), the benefits of waste banks extend beyond environmental cleanliness, providing an additional source of income for the community. Waste banks play a crucial role in educating people about waste sorting, fostering public awareness of responsible waste management, and reducing the amount of waste sent to landfills (Asteria & Heruman, 2016). Innovations in waste management at the grassroots level, facilitated by waste banks, can enhance the income of the urban poor (Winarso & Larasati, 2011; Arief S, 2013).

The Malang Waste Bank (BSM) stands out as a successful model in waste bank management in Indonesia. In 2014, BSM comprised 320 community BSMs, 176 school BSMs, 35 BSM agencies, 670 individual customers, and 15 collector units, serving over 23,000 customers in total. Household recycling behavior is influenced by factors such as attitudes, the environment, knowledge, and psychological perspectives, including social norms and peer pressure (Nixon & Saphores, 2009; Singhirunnusorn W, 2012; Hartono, Widiasih, & Ismowati, 2020). Waste banks in Padang, namely Waste Bank Hidayah and Waste Bank Sakinah, have successfully demonstrated to their customers that waste holds economic value after utilization, creating new employment opportunities and transforming people's waste management behavior (Ramadani, 2021).

1.2 Research Objectives

Studies on waste banks in Indonesia have explored various aspects, including their impact on environmental hygiene, innovative waste management models, and overall effectiveness (Suryani A S, 2014; Donna & Heru, 2016; Ramadani, 2021), most of them focused on the impact of waste banks on environmental hygiene, innovative waste management models, and the effectiveness of waste management. Several studies have also examined the role of

waste banks in improving the community's economy (Ibad & Ratna, 2020; Ghaffar et al, 2021; Mudviyadi, 2021; Silviana & Kaukab, 2021). However, the significance of the waste bank's role in the household economy needs to be better understood. Therefore, this study analyzed how waste bank management is developed in Surakarta to boost household incomes. This study focused on the waste bank model concerning the socio-economic conditions of urban communities.

2. METHODS

This research was a descriptive study with a qualitative approach that described the waste bank as a model of waste management to improve the community's economy. Surakarta was chosen for the study because of its waste problems, which can cause flooding and dirty environments that negatively impact public health. Although Surakarta has many waste banks, people still bury and burn rubbish around the neighborhood. The existence of the waste bank in Surakarta is expected to overcome the waste problem while reducing poverty, where 43.89 thousand residents are classified as poor (BPS Surakarta, 2023). The survey consisted of in-depth interviews and questionnaires, while the observation method included close observation of the object of study. In-depth interviews were conducted directly with respondents (waste bank managers, customers, and government) about the phenomenon from the assessed research. Questionnaires were distributed directly to 120 respondents and 13 waste bank managers to determine the extent of waste bank applications from customers/community. Using Miles and Huberman's qualitative data analysis model (Miles & Huberman, 1984), this study implemented an interactive model through data reduction, display of data collection, and verification (Figure 1).

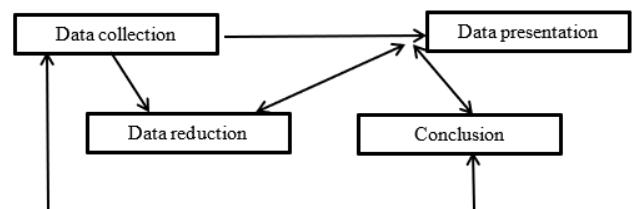


Figure 1. Analysis model of Miles and Huberman

3. RESULT AND DISCUSSION

Surakarta City is one of the areas in Central Java Province with a total area of 46.72 km². The city is located between 7° 36' and 7° 56' south latitude and between 110° 45' 15" and 110°45' 35" east longitude. Surakarta is classified as a lowland with a height of 92 meters above sea level. It has a tropical climate, with temperatures in 2021 ranging from 19.4 to 35 °C, and the highest rainfall is 303.4 mm. Administratively, Surakarta is divided into five sub-districts: Laweyan, Serengan, Pasar Kliwon, Jebres, and Banjarsari, which is further divided into 54 urban villages, 626 neighborhood units (RW), and 2,784 neighborhoods (RT). Banjarsari sub-district is the widest area in Surakarta, while the Serengan sub-district is the narrowest (Figure 2). Surakarta is a high-density city with a total population of 522,720 in 2021. The population is dominated by women and the age group of 15-64 years. The Surakarta City Environment

Service data shows that waste entering landfills per day was 294.73 tons in 2020 and 299.45 tons in 2021. This increase is mainly due to growing household and general public waste.

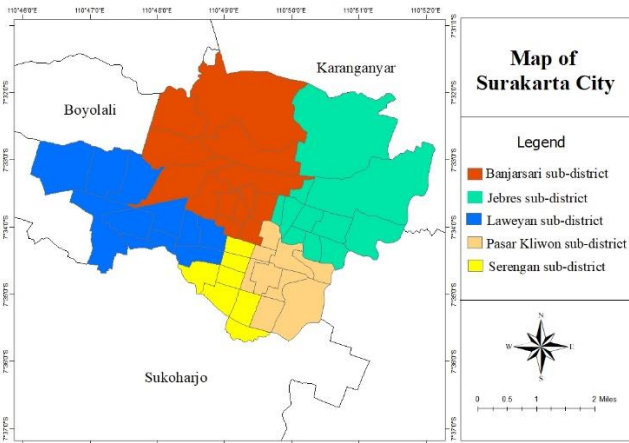


Figure 2. Map of Surakarta City

Table 1. Characteristics of the respondents

Variable	Average	Min	Max	SD
Gender:				
Male (people)	18	-	-	
Female (people)	102			
Age (years)	51	29	74	10.44
Education (years)	11	2	16	3.32
Household size (people)	3	1	8	1.42
Income (IDR/month)	4,341,833	100,000	25,000,000	4,503,222.37
Income from selling trash to the waste bank (IDR/month)	26,461	2,300	161,000	29,295.88

The dataset in Table 1 offers a comprehensive overview of diverse demographic and socio-economic aspects within a specified population. Concerning gender distribution, waste bank customers were dominated by women. Household waste management might be perceived differently by women and men, as their definitions of waste management, the concept of waste, and what qualifies as waste could vary. Additionally, their approaches to waste management and priorities for disposal may differ. Previous research indicates that women tend to exhibit greater interest in recycling than men (MORI, 2002). Similar to the previous research, the data shows that most women (102, on average) are more concerned about environmental cleanliness than men (18, on average).

Regarding age distribution, the mean age stands at 51 years, with a minimum of 29 years and a maximum of 74 years. The standard deviation of 10.44 years signifies a moderate degree of variability in age across the population. In the domain of education, the average years of education for the population are 11, ranging from a minimum of 2 years to a maximum of 16 years. The standard deviation of 3.32 years underscores the dispersion in educational attainment among individuals.

Household size is characterized by an average of 3 people, with a minimum of 1 person and a maximum of 8 people. The standard deviation of 1.42 people suggests a relatively tight distribution around the mean, indicating a

certain level of consistency in household sizes. Economic indicators, such as monthly income, unveil an average income of IDR 4,341,833. The range extends from a minimum monthly income of IDR 100,000 to a maximum of IDR 25,000,000. The standard deviation of IDR 4,503,222.37 emphasizes the substantial variability in income levels within the population. Lastly, income derived from selling trash to the waste bank demonstrates an average income of IDR 26,461, with a minimum income of IDR 2,300 and a maximum of IDR 161,000. The standard deviation of IDR 29,295.88 indicates the extent of fluctuation in income from this specific source.

Waste is a pervasive issue faced by communities. According to data from the (Ministry of Environment and Forestry, 2021), household activities account for 40.91 percent of the total waste. Historically, waste management has been limited to collection, transportation, and disposal in landfills. However, the limited space for landfill sites poses a new challenge, as existing sites are currently over capacity (Novianty, 2013). The substantial amount of household waste generated, coupled with the scarcity of landfill space, necessitates every household to manage its waste. This management is crucial to shield communities from various impacts of waste, such as disruptions to water pH, air pollution, and the spread of various diseases (Hasibuan, 2016).

The first Waste Bank was established in Indonesia in 2008. In 2012, the Ministry of Environment implemented regulations regarding the development of Waste Banks in 250 cities across Indonesia (Dhewanto et al., 2018). The Environmental Department of Surakarta City continues to support the establishment of Waste Banks in various areas of the city to address household waste issues. The Waste Bank operates on a banking system that involves saving and borrowing activities, where the deposited waste is assigned a monetary value. Customers deposit their waste, and the Waste Bank purchases it, subsequently selling the collected waste to different partners (Dhewanto et al., 2018). The Waste Bank is a strategic implementation of the 3R concept (Reduce, Reuse, Recycle) in household waste management (Selomo et al., 2017). It plays a crucial role in reducing the amount of waste entering landfills and achieving integrated waste management from the smallest unit, households, to the government. The Waste Bank holds a dual value, encompassing both tangible benefits and the enhancement of environmental quality (Masruroh et al., 2022).

In 2020, the number of Waste Banks in Surakarta was 123, including those without formal recognition. However, as time progressed, not all Waste Banks could function effectively. Some became inactive due to various reasons, such as the impact of the pandemic preventing community participation in Waste Bank activities. By 2021, only 70 Waste Banks remained in the official records. To sustain the active Waste Banks, the Environmental Department of Surakarta City has undertaken various initiatives, including providing training to Waste Bank administrators and offering support in terms of facilities and infrastructure. The waste management and sorting processes in several Waste Banks in Surakarta are generally successful due to the community's awareness of the importance of preventing indiscriminate waste disposal. While some community members may not fully participate in

waste sorting, there are still shortcomings at the collector level that need improvement, especially in enhancing more effective two-way communication. The community generally shares the responsibility for waste management and sorting in these Waste Banks, particularly at the household level.

Nonetheless, if community members are unwilling to sort their waste, the Waste Bank administrators still bear responsibility for the sorting process. According to (Nisa & Saputro, 2021), changing community behavior to sort waste based on its type habitually is a challenging task. Behavioral changes do not occur spontaneously (Celestino *et al.*, 2022). It requires socialization, firmness, and collaboration from various parties, including the government. A community aware of the importance of waste management is more easily directed and supportive of existing waste management programs. Some Waste Banks, such as the active Gajah Putih Waste Bank, engage in socialization efforts related to waste management for the community, although the pandemic has disrupted these activities. The programs promoted waste weighing, savings, pre-cooperatives, and the implementation of the 3R principles (Reduce, Reuse, Recycle), such as the production of liquid fertilizer, maggot, and catfish farming, as well as the utilization of plastic waste in the creation of other items.

The administrators and non-administrators of waste banks share equal responsibility in preserving and managing the environment to keep it clean. Improper waste disposal without management can negatively impact the environment, creating an uncomfortable impression, unpleasant odors, and air pollution due to waste incineration. The main challenge commonly faced by waste banks is the lack of effectiveness in socialization activities, particularly concerning advanced waste management. The community often needs more leisure time and is not fully aware of the importance of these measures. Additionally, some community members refrain from engaging in waste sorting for sale to the Waste Bank. Knowledge about improper waste handling is influenced, among other factors, by insufficient information and awareness campaigns within the community (Setyowati & Mulasari, 2013). Integrating citizen participation into the community-based waste bank project is crucial to altering the mindset regarding household waste management and minimizing waste generation at its source (Singhirunnusorn *et al.*, 2012). Support from all parties, including the government, communities, and the public, is considered crucial for the sustainable development of Waste Banks. The role of mothers or women in Waste Banks is considered essential, as housewives play a crucial role in household waste sorting and act as educators to instill environmental awareness in their children (Safitri & Hariyanto, 2023). Housewives are also involved in program management, such as regular weighing, socialization, pre-cooperatives, and children's savings. While Waste Banks do not explicitly involve neighborhoods or enhance the knowledge of Family Welfare Management (PKK), the role of women in waste management within this community is quite significant.

The waste bank is viewed as an income-generating activity (Nugroho, 2022). The economic worth of Waste Bank operations, particularly in the classification of plastic waste, paper and cardboard, iron, and organic waste, is noteworthy

(Wardany *et al.*, 2020). The customers generate diverse types of waste; some have economic value, and some do not (Wulandari *et al.*, 2017). The waste bank and the partner collectors adjust the variations of types and prices of waste. The price given to the public is also fluctuating (Savira *et al.*, 2023) which eventually affects household income. Overall, these statistical insights provide valuable information regarding the diversity and distribution of crucial demographic and economic variables within the population of interest.

The waste bank management model not only helps clean up environmental waste but also has economic benefits (Wulandari *et al.*, 2017; Haryanti *et al.*, 2020). The act of saving waste had a beneficial impact on earnings, suggesting that a higher level of waste savings could lead to an increase in income (Nugroho, 2022). The waste bank management model is also linked with local communities to collect and manage their waste, reducing waste, and also receiving economic benefits. The benefits of a waste bank for the community are helping to clean the environment and extra money for the community (Wardani *et al.*, 2016; Hartono *et al.*, 2020; Mulyantini & Irawatie, 2022). Waste banks teach people to sort waste and increase public awareness of managing waste wisely to reduce waste that goes to landfills (Asteria & Heruman, 2016). Waste management innovation through waste banks at the household level can increase their income, particularly for the poor population of the city (Winarso & Larasati, 2011). Despite this, consumer inconsistency arises when implementing 3R (reduce, reuse, recycle). The findings indicate that the waste bank needs to improve some aspects to provide optimal benefits, not only for cleaning the environment but also for improving household income by exchanging waste that has economic value.

The results show that only 57% of waste banks in Surakarta have received training in waste bank management, and only 28.6% have adequate facilities and infrastructure. In addition, 22.8% of waste banks in Surakarta did not have facilities or infrastructure. Meanwhile, inactive waste banks accounted for 13 (18.6%).

Women constituted the majority of administrators, ranging from 2 to 49 people. Similarly, women make up a large portion of waste bank customers. Women are constantly involved in household waste management processes (Mujahiddin *et al.*, 2018). The presence of a waste bank has encouraged capacity building for customers and administrators by seeking the formation of self-reliance and self-sufficiency of citizens through the formation of awareness, knowledge, and abilities that encourage participation in managing the environment in their communities. For women residents, in particular, knowledge and skills in managing waste have stimulated creativity and innovation in the waste recycling crafts (Donna & Heru, 2015). The salaries of waste bank administrators were also not standard, often even below the minimum wage. Although the wage is not standard, waste banks can help women whose households need additional income (Ramadani, 2021).

The average turnover of waste banks in Surakarta was only IDR 240,273/month, mainly used for waste bank operations such as administrator staff salaries. One of the reasons for this small turnover was the collection time and

weighing cycle, which was carried out on average once every two weeks or once a month. Due to this scheduling, residents or customers could not deposit trash at any time.

The turnover of waste banks in Surakarta from the inorganic waste collection was IDR 10,000– 1,000,000 per month. Most of the waste collected at the waste bank was still in the form of inorganic waste, which was IDR 20,425 kg/month (Figure 3). The types of inorganic waste collected at the Surakarta city waste bank were generally paper, plastic bottles, cardboard, metal, and others (Figure 4). A large amount of inorganic waste is cardboard, which accounts for 22% of the waste, followed by plastic bottles, which account for 21%. The use of single-use bottled drinks in Surakarta was still relatively high, mainly because it was considered more practical than refillable bottles. Other inorganic waste included 19% of household items no longer in use, such as plastic buckets and tires.

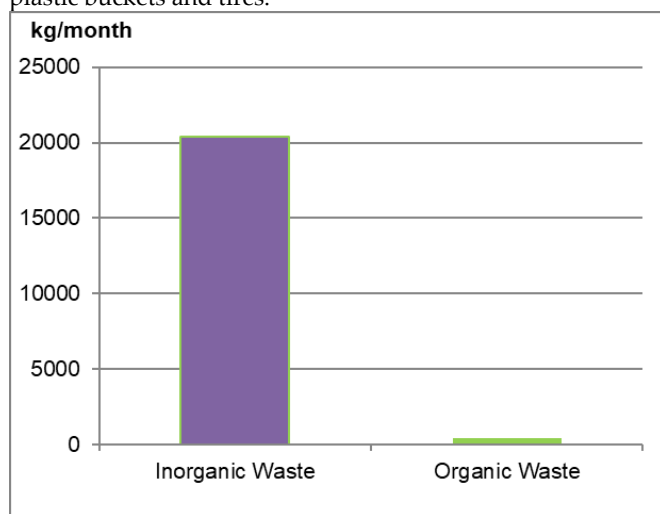


Figure 3. Waste collection per month

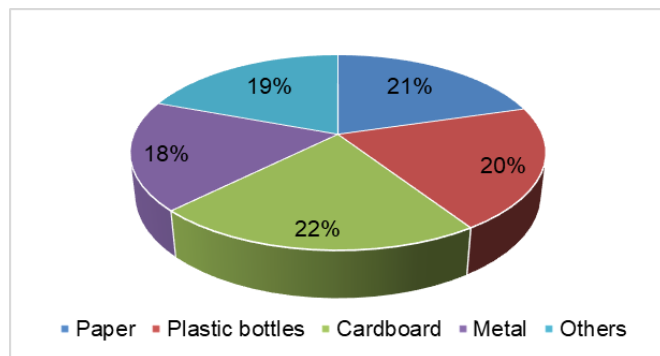


Figure 4. Types of inorganic waste

In addition to inorganic waste, households also produce organic waste. Even though household organic waste was also significant, it had yet to be managed optimally. In Surakarta, only 40% of waste banks accepted organic waste, while most did not. Furthermore, the organic waste was processed into liquid or solid organic fertilizer. Another critical factor in developing waste bank management is increasing skills and knowledge through training and adequate waste bank facilities and infrastructure (Hartono et al., 2020). In 41% of waste banks, the staff or administrators had never received training in managing waste banks, while 60% lacked adequate infrastructure and facilities. Those findings indicate that in the development of waste bank management, it is necessary to

provide training to the management of the waste bank and assistance in the form of facilities and infrastructure. The obstacles encountered in many waste banks were the lack of integration of the role of the government and the private sector in household waste management based on waste banks, related to support in socialization, technical training, facilities and infrastructure for waste banks, and marketing networks for creative waste recycling products (Ibad & Ratna, 2020). A good waste bank model empowers the community and improves the local economy through the collaboration of the community, waste banks, and government (Wulandari et al., 2017).

Waste banks need to increase the flexibility of waste collection and weighing days. Waste banks also need staff or administrators who actively manage and serve garbage pick-up services to customers' homes. The staff or administrators must have adequate salaries to maintain and improve their performances. Waste banks should continuously innovate on how to use waste, collect, and save systems so it becomes a regular income generating for their customers. Since most waste bank administrators and customers are women, adding activities related to the household can increase women's engagement with the waste bank, ultimately improving household income. Maintaining and increasing the activity of the waste bank is crucial for household welfare and environmental quality.

Training significantly enhances the knowledge of Family Welfare Management (PKK) mothers in managing waste, and knowledge influences waste management in daily life. Preserving the environment should begin at the individual level, commencing with small actions (Astheria & Heruman, 2016). Waste management awareness can also be disseminated through explanations, group discussions, benchmarking, reading pamphlets, or papers. Public education is crucial for socialization, encouraging community participation, and promoting proper waste management practices following established guidelines and regulations (Mulyadi & Husein, 2010; Mohamad & Sutra, 2012). The better the knowledge, the better the behavior in managing the environment. Good knowledge influences good behavior, while conversely, poor knowledge harms behavior (Martiyani et al., 2023).

4. CONCLUSION

Despite waste banks' proven ability to increase household incomes and solve waste problems, their contribution to household incomes still needs to be increased. The waste bank needs to improve in some areas due to its management shortcomings, including adding the waste-collecting schedule, processing organic waste, and improving infrastructure, facilities, human resources, management training, and operational funds. If the weaknesses of the waste bank management can be addressed, the role of the waste bank in increasing the income of urban households can be successful.

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