

Mapping of Waste Bank Management Area in Manado City

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Abstract. The problem of waste is very worrying because it has a direct impact on humans, especially the inclusion of plastic elements in the human body through fish and food exposed to microplastic. One way to overcome the problem of waste is to reduce waste from its source by sorting methods from the source and managed further through the process of recycling or upcycling into new products. Reducing waste from its source by sorting and then saving it in a Waste Bank is one promising breakthrough and can encourage people to actively participate in environmental management. The purpose of this study was to obtain a mapping model of the waste management service area in the city of Manado as needed. The research data was obtained through research on smash applications for waste banks supporting field research through observation and interviews. Data was analyzed by mapping the position of waste banks in the city of Manado. Furthermore, comparing the three garbage banks in Manado city to find a pattern of waste bank management with various indicators. The results of the study indicate that the current mapping of the position of waste banks in Manado consists of the center, the suburbs and outside the city. Furthermore, the results of the comparison of the three garbage banks conclude that the most effective waste bank is a waste bank in a residential area. An effective waste bank is one of the strategies for implementing 3R (Reuse, Reduce, Recycle) in waste management at its source at the community level. The implementation of the waste bank in principle is a social engineering to invite the public to sort out waste for environmental sustainability and public welfare.

1. Introduction

The most prominent issue in the global era in environmental management is waste disposal (Benjamin et al., 2010). The problem of waste is very worrying because it has a direct impact on humans, especially the inclusion of plastic elements in the human body through fish and food exposed to microplastic (Browne et al, 2011). One way to overcome the problem of waste is to reduce waste from its source by sorting methods from the source and managed further through the process of recycling or upcycling into new products (Al-Salem et al., 2009). Reducing waste from its source by sorting it then saving it in a Waste Bank is one promising breakthrough and can encourage people to actively participate in environmental management (Pimbert, M. P., 1997).

Environmental issues that have always been a big issue in almost all urban areas in Indonesia are garbage problems (Anastácio, A. S., 2008). The rate of economic growth in the city is possible to become an extraordinary attraction for residents to migrate to cities (urbanization). As a result, the population is



increasingly swollen, the consumption of urban people is soaring, which in turn will result in the amount of waste also increasing (Faizah, 2008).

For example in the city of Manado with population based on Manado City BPS data in 2017 amounting to 427,906 people. (Manado Dalam Angka, 2017). The average increase in volume according to Kasie TPA DLH Carlos Mawuntu SIP. He added, the production of garbage every day before Christmas and on the D-day reached an average of 394,200 Kg. Per month 12,220,200 Kg and per year 146,253,600 Kg is received by TPA. Ironically, the volume of processed waste is only around 10%.

According to Undang-Undang Nomor 18 Tahun 2008 Tentang Pengelolaan Sampah (Waste Management) there are 2 main groups of waste management, namely: First, waste minimization, which consists of reduce, reuse, and recycle. Second, waste handling, which consists of: Sorting: in the form of grouping and separation of waste in accordance with the type, amount, and / or trash properties. Collection: in the form of taking and transferring waste from the garbage source to a temporary shelter or integrated waste treatment facility. Transportation: in the form of carrying waste from the source and / or from a temporary waste collection place or from an integrated waste treatment facility to the final processing site. Processing: in the form of changing the characteristics, composition, and amount of waste (KLH, 2008).

Waste banks are one of the strategies for implementing 3R (Reuse, Reduce, Recycle) in waste management at the source at the community level. The waste bank in principle is a social engineering to invite people to sort waste. The implementation of a waste bank can provide a real output for the community in the form of job opportunities in implementing waste bank operations management and investment in the form of savings (KLH, 2012).

The development of waste banks in Indonesia has recently increased significantly. Statistics on the development of Waste Bank development in Indonesia in February 2012 were 471 pieces of Waste Banks that had been running with a total of 47,125 savers and the amount of waste managed was 755,600 kg / month with a turnover of Rp. 1,648,320,000 per month. This statistic increased to 886 pieces of Waste Bank running according to data in May 2012, with the number of savers as many as 84,623 people and the amount of managed waste amounting to 2,001,788 kg / month and making money amounting to Rp 3,182,281,000 per month (KLH, 2012).

Until now, Manado City has 24 waste banks spread in each sub-district (www.banksampah.id data). It is expected that the increasing number of waste banks in each city can also increase community participation in its management so that it effectively reduces the volume of waste in cities. This paper presents a mapping of the waste bank area from the city center to the periphery. Then made a comparison of the effectiveness of garbage banks in the city center, suburbs and out of town.

2. Method

This study focused on the Waste Bank in accordance with the position on the map starting from the city center of Manado, the Suburbs of Manado and Outside the City of Manado, using the smash application (www.banksampah.id). The results of research data were obtained by conducting observations and interviews on May 17, 2018. First, interviews with SMA 7 Waste Bank Managers in the City Center, Second Waste Bank Agape Malendeng near of city center, and Third Waste Bank Managers SIMPONI Waste Bank Managers Outside Manado City.

3. Result And Discussion

3.1. Mapping Area Waste Bank In Manado

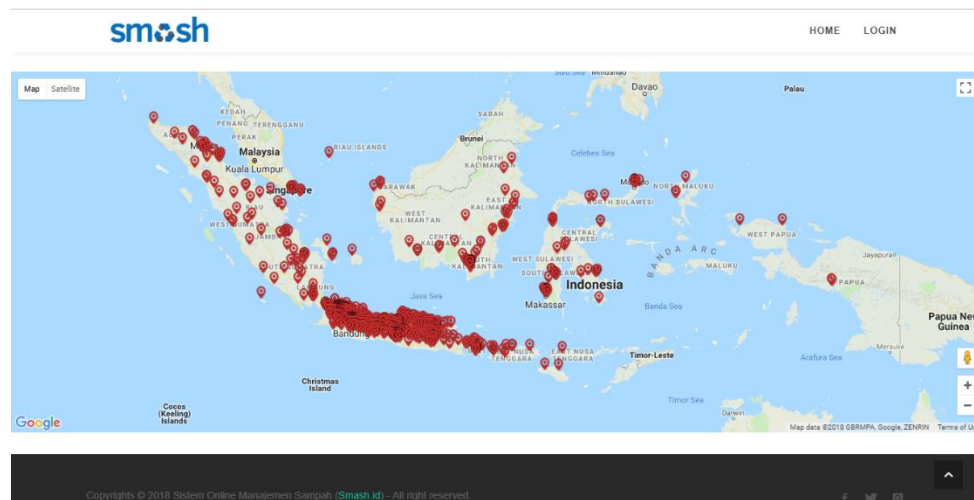


Figure 1: Mapping Waste Bank in Indonesia

The results of the mapping through the smash application (www.banksampah.id) regarding the mapping of waste bank locations documented in the application show that the position of waste banks in Indonesia in a row is dominated in areas (1) of Java and Bali, then in (2) Sumatra, (3) Kalimantan, (4) Sulawesi and (5) Papua. Most of the Waste Banks are concentrated in the city center.

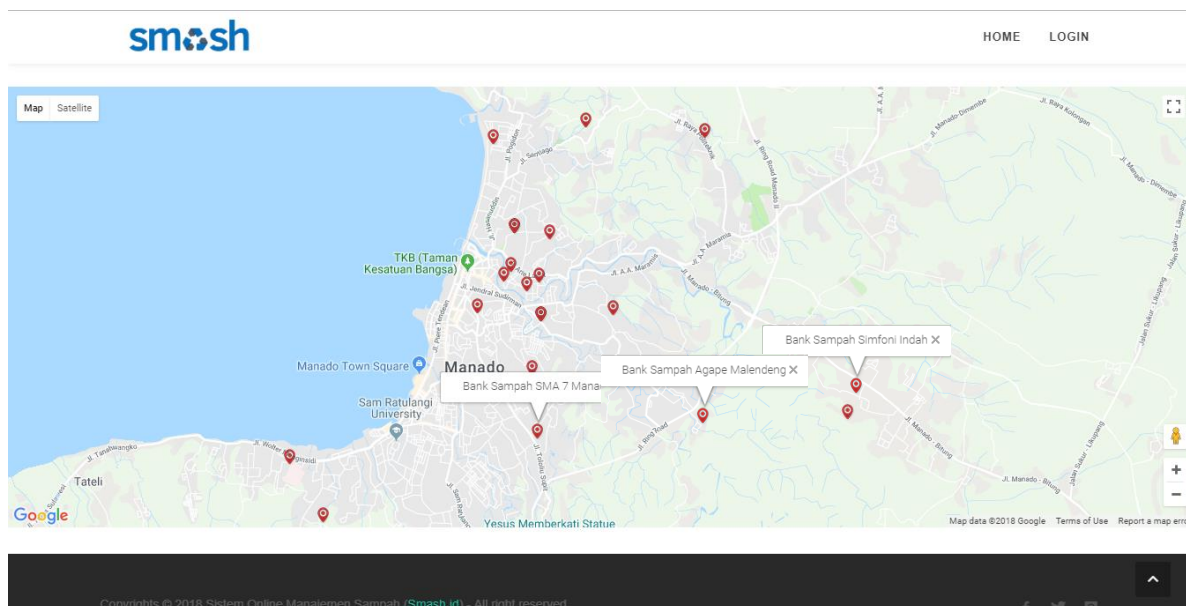


Figure 2: Mapping Waste Bank In Manado City

The results of mapping through the smash application for Manado City are three types of Waste Banks according to regional mapping conditions, namely City Center Waste Bank namely Manado 7 High School Waste Bank, City Waste Bank, Agape Malendeng Waste Bank and Outer City Waste Bank, Symphony Waste Bank.

3.2. Comparative Results Bbetween Waste Banks In Manado City

The results of the observations and interviews conducted were divided into several indicators of waste bank mapping based on the location. These indicators include: sources and classifications of waste, methods and management human resources, and management objectives. Each of the above indicators will then be explained in the sub-section below.

Good sources of garbage in all three come from household waste, such as: plastic food wrap, plastic bottles, glass bottles, cans, and paper, both newsprint, HVS, or cardboard. In Indonesia, the classification of waste that is often used is as follows: (a) organic waste, or wet waste, which consists of leaves, wood, paper, cardboard, bones, livestock food scraps, vegetables, fruit, etc. and as (b) inorganic waste, or dry waste consisting of cans, plastics, iron and other metals, glass and mica.

The garbage received at the two garbage banks that have been operating is classified as inorganic waste. Because this type of waste can still be sold to collectors or used as handicrafts. Whereas organic waste cannot be utilized because of the limited facilities, infrastructure, and human resources managing the waste bank, which are still used in the form of takakura baskets.

A striking difference is in the SMA 7 Bank where the manager of the waste bank is actively providing training to residents in terms of managing organic waste into compost and also helping the development and opening of new waste banks in all affordable regions.

In terms of the method of waste management, the three waste banks have the same method, namely waste originating from households has been separated by type. Then the waste is weighed and recorded by the waste bank manager. The implementation of these two garbage banks is open every two to three weeks. Using a tube system, so when customers come carrying garbage, the garbage is not immediately cashed, but stored first. Then if the volume of waste is possible, the manager sells it to the head, the money that is earned is then recorded in the savings book of each customer.

The HR managers of Manado 7 High School Waste Bank are Teachers and Students, Agape Waste Members Church members and garbage banks Symphony is mothers in the housing complex. Especially for the manufacture of handicrafts from used goods, the waste bank manager also provides training to several assisted people. These fostered people made their creations by utilizing various used items, such as packaging wrappers, mineral water straws, plastic bags and others. The handicraft products that are produced also range from small bags, wallets, tablecloths, medical supplies and others. Each waste bank often participates in environmental exhibitions. This Waste Bank Manager often gets invitations to share experiences in various places and visits from various parties.

More fully illustrated the results of mapping the effectiveness of waste bank management in the three areas of Manado city and it can be concluded that wherever the location of the waste bank can be in principle, it is a social engineering to invite people to sort waste and make waste as an additional source of income new and contribute to environmental sustainability.

Table 1: Comparative Results between Waste Banks in the City of Manado

Indicator	Waste Bank SMA Negeri 7	Waste Bank Agape Malendeng	Waste Bank Simponi
Location	City Center	Countryside	Out of town
Source of Trash	School	Household	Household
Waste type	Anorganik	Anorganik	Anorganik
HR Management	Student Community	Congregation Community	Housing Community
Management Cycle	Customer → garbage bank → (weighed, recorded, collected and sold) profit → Waste bank → customer	Data collection → Customer → Waste Bank	Customer → garbage bank → (weighed, recorded, collected and sold) Profit → garbage bank → customer

Indicator	Waste Bank SMA Negeri 7	Waste Bank Agape Malendeng	Waste Bank Simponi
Management Outreach	Manado city	Village and Church	Housing Area
Management Base	One Community Representation	Representation of various communities	Representation of various communities
Management Effectiveness (Achieving Goals, Integration and Adaptation)	<ul style="list-style-type: none"> • Extension to the community / assisted people about managing organic waste into compost • Dissemination to schools regarding the use of trash into crafts • Active in environmental exhibitions Effective 	<ul style="list-style-type: none"> • Stages of socialization • Extension to the community / assisted people about managing organic waste into compost • Socialization to the congregation regarding the use of garbage 	<ul style="list-style-type: none"> • Extension to the community / assisted people about managing organic waste into compost • Dissemination to schools regarding the use of trash into crafts • Active in environmental exhibitions
Conclusion	Effective +++	Effective +	Effective ++

4. Conclusion

From the above discussion it can be concluded: Waste banks are one of the strategies for implementing 3R (Reuse, Reduce, Recycle) in waste management at the source at the community level. The implementation of a waste bank in principle is a social engineering to invite the public to sort waste; Based on the results of research and discussion on the focus of Effective Management of Waste Bank effectiveness, then:

1. Achievement of the Objective: the process of implementing the cycle and utilization of the Waste Bank has been achieved according to what was expected, by seeing the completion of 1 cycle stage and utilization of the Waste Bank.
2. Integration: The stages of socialization that occur in the Waste Bank Implementation Process have been effective through the cycle stages
3. Adaptation: In research on the quality of implementation on environmental sustainability the difference in community base is an obstacle to the ineffectiveness of the implementation of the Waste Bank Program.

Recommendations The results of the study show several things related to the lack of adaptation due to differences in the background of the board. Thus it is suggested to the actors of the development of the waste bank program by developing empowerment by:

Changing people's behavior to be empowered and motivated and directly involved in waste bank activities through a persuasive pattern of assistance because the community is the subject of empowerment because of that the active role of the community must be improved so as to strengthen the community's capacity and understanding of the importance of protecting the environment through programs garbage bank.

1. There needs to be an intense socialization before the planning process is carried out, such as adding socialization through print media, electronics etc.
2. To support and accelerate the achievement of a participatory community, the need for understanding the community about the objectives, benefits and sanctions in the socialization process so that matters relating to delays in the process of activities can be minimized as early as possible.

Acknowledgements

The results of the study regarding the mapping of waste management areas in the city of Manado through the waste bank program. For these results, the authors would like to thank the managers of Waste Banks in Manado City and the community, intellectuals who have agreed to be respondents in this study include FGDs involved in the formulation of research results and their implications for the three pillars of sustainable development, namely social, economy and environment. In the end, with this mapping, the ultimate goal of environmental sustainability and improvement of the community economy can be achieved.

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