Waste Management in Jakarta Recycle Centre: Case Study of Pesanggrahan, Jakarta

M I N Muhashiby1*, H S Hasibuan1 and S Wahyono1

1 School of Environmental Science, University of Indonesia, Jakarta, 10430, Indonesia, ORCID ID 0000-0002-5728-2120

1*duditnoor@gmail.com, 1hayati.hasibuan@ui.ac.id, 1swahyono@yahoo.com

Abstract. Waste management is collecting, transporting, processing, and recycling waste materials from the Household, 3R Waste Management Site / Integrated Waste Management Site, and the landfill. Optimal waste management can reduce the impact of environmental pollution caused by waste. The current community paradigm in waste management is still in the collect-transport-dispose. This paper describes how Pesanggrahan District manages its waste by applying a new paradigm, namely reduce-sorted-processing. This paper aims to evaluate the waste management system at the Jakarta Recycle Center (JRC), Pesanggrahan, South Jakarta, and identify peer-reviewed documents in the waste management system. This study approaches a semi-systematic review by reviewing relevant documents. The waste transportation scheme carried out in the JRC program is divided into four types on seven different days. The composition of the most significant waste in JRC is organic waste. Two methods carry out the processing of organic waste, namely composting and BSF. With the support of sufficient waste transportation and processing facilities from the government, the JRC can become a pilot program that can be applied in other areas in managing their waste.

1. Introduction
Waste is a cultural problem that cannot be avoided because humans always produce waste in all aspects of daily life. Solid waste will continue to grow along with the number of human activities accompanied by the increasing number of people in Indonesia, especially in the DKI Jakarta Province. Along with population growth and the development of urban economic activities, the need for a sanitary and systematic urban environment is also an essential element in urban life [1] because the growing population and an increase in the amount of income will lead to a consumptive lifestyle, which can lead to an increase in the amount of waste [2].

The increasingly complex waste problem in DKI Jakarta is not only caused by the increasing number of residents. However, it is also influenced by other factors such as the city community’s various socio-cultural and economic conditions and low public awareness of managing and handling the waste problems. The DKI Jakarta provincial government initiated a program to reduce municipal waste by developing Jakarta Recycle Center (JRC) in Pesanggrahan District, which focuses on sorting waste from each household. This program is also a derivative of the Governor's Regulation Number 77 of 2020 concerning waste management in the household community. JRC involved 1335 households in Pesanggrahan District.
The JRC program adapted the waste management system from Osaki, Japan. JRC involved 1335 households in Pesangrahan District. As a representative, residents are given assisted in sorting waste according to its type, which will later be transported separately and following a scheduled schedule. The JRC’s total waste generation in 2020 is 31.9 tons/month. This paper will discuss the waste management system in the JRC area. The aim is to provide an ideal waste management system so that the system sustainable in the long term and can be replicated in other areas in DKI Jakarta. Analyzing the problems in the waste management system in Indonesia, including the lack of a firm legal basis, Inadequate landfills, lack of effort in composting, and lack of proper landfill management systems [3]. The problem of waste management in Indonesia is seen from several indicators [4]: a large amount of waste produced, low waste management services, a limited number of landfills, waste management institutions and costs. Results by research [5] found that one of the problems in the crucial waste management in the city of Jakarta is the low level of processing of organic waste compared to the composition of existing organic waste. In a basic environmental sanitation survey circa 2008, The Ministry of Local Government, Ghana stated that nearly 76% of households in Ghana depend on improper waste collection and disposal methods. This situation reinforces the urgency to develop and implement appropriate solid waste collection or management and disposal services [6]. Research [7] also found that most people still use the old waste management paradigm, namely collect-transport-dispose. This paradigm model of waste management still relies on the local government and the lack of community participation in waste management.

The contribution of this research is to provide recommendations to the provincial government of DKI Jakarta on how to optimize the waste management system, which currently still applies the old paradigm, namely collect-transport-dispose to reduce-segregate. For achieving this goal, a research survey will be conducted in the JRC area of Pesangrahan District, DKI Jakarta Province, in 2021. This study also aims to update the latest literature on this gap, especially how to approach the community to apply a new paradigm in waste management and leave the old.

2. Method

2.1. Case study location and period
The location of the research is in Pesangrahan District, South Jakarta. Pesangrahan Sub-district as the research location because in Pesangrahan area there is a Jakarta Recycle Center. Jakarta Recycle Center (JRC) is a waste management system by prioritizing waste sorting from the source. This activity is an innovation in waste management by involving various stakeholders to raise a culture of waste sorting for every citizen. Thus, an ideal transportation system is needed so that the Jakarta Recycle Center program can perform properly.

Pesangrahan sub-district consists of 5 regions, namely Ulujami, North Petukangan, South Petukangan, Pesangrahan, Bintaro with the northern boundary is Kembangan Sub- district, the eastern boundary is Kebayoran Lama Sub-district, southern boundary is East Ciputat sub- district, and western boundary are Larangan and Pondok Aren sub-district. The selection of the 5 areas was based on the pattern of waste management which was still mixed in without any sorting of waste at all.

2.2. Data collection and analysis
The study uses the literature review method with a semi-systematic review approach. By conducting a literature review, several explanations will be obtained from experts related to this study. [8] explains that literature review is a research method that aims to collect and take the principal element of several previous studies. This analysis starts by conducting a literature on Google Scholar in the 2007-2020 period. This time range is chosen because the reference source in a study is relevant to the topic to be studied.
3. Results and discussion

3.1. Jakarta Recycle Center (JRC)

The JRC is a program run by the DKI Jakarta Provincial Government, specifically the DKI Jakarta Provincial Environmental Service (DLH), in collaboration with the Osaki City Government, Japan, in order to optimize the management of waste generated from households. The JRC program itself has been included in Regional Strategic Activities (KSD) Number 26 – Reduction of Waste at Source, issued by the Governor of DKI Jakarta Province through Governor Decrease Number 1042 of 2018 concerning the List of Regional Strategic Activities. In general, the waste management carried out in the JRC program prioritizes the community’s active role with the support of qualified transportation and waste management facilities from the government.

Residents of the community must sort the waste before the waste is disposed of and then transported by the waste transportation team from DLH. The waste transportation carried out has referred to the transportation schedule according to each specified type of waste. The Jakarta Recycle Center activity is carried out by adopting and adapting the waste management system implemented in Osaki City, Japan. Waste management that has been running in Jakarta, where the majority are still using the collect-transport-disposal system, has been changed to a waste management approach that integrates the roles of the community, government, and the private sector.

3.2. JRC Area Model Overview

The JRC area model is a term for housing and an area that is used as a model and has performed the JRC program. The JRC program was initially implemented at the Bukit Mas housing estate and the Ozone housing estate in Bintaro in September 2019. Before the JRC program was implemented in this model area, integrated waste management unit, the South Jakarta Environmental Service, along with the Environmental worker of Pesanggrahan Sub-district, had prepared facilities, infrastructure, and technical activities such as waste processing machines that are biodegradable, a fleet of separated waste transporters, crews, and other infrastructure such as compartment and sacks for the transportation of sorted waste. In addition, socialization to the model area used as a pilot is also essential to run the JRC program because of the necessity to change people’s habits and mindsets in sorting waste from home.

3.3. JRC Waste Transport

The scheme of waste transportation is carried out in the JRC program. It is adjusted to the classification of waste sorting that residents in the model area have carried out. It is based on an agreement that has been agreed upon between residents and the government. It is done by anticipating the resident’s concern that the garbage sorted from the house will be remixed in the waste transportation fleet.

Total with 76% of Ghana relies on improper waste collection and disposal methods to not end up in landfills and end up in illegal landfills [6]. The type of recycled material waste, is divided into four types on seven different days. Biodegradable waste and residual waste will be transported every day, while hazardous waste will be transported on Sunday. The types of waste and the schedule for waste transportation can be seen in Figure 1.

3.4. JRC Waste Sorting

Based on the waste classification shown in Figure 1, the waste still has to be sorted again according to the specifications and components to be recycled effectively and efficiently in the recycling industry. For example, cans, glass, and metal are still mingled for the schedule for transporting recycled materials on Sundays. The types of waste still have to be separated again according to each type. The specified waste sorting is carried out by the sorting team, which is carried out in the Temporary Shelter/TPS 3R Pesanggrahan area. Separation of waste from source is the key to managing waste effectively [9].
3.5. Degradable Waste Processing

Readily biodegradable waste has a reasonably large composition, which can reach 50%. The amount is enormous if it is not processed and immediately disposed of at the Bantargebang landfill. Two methods carry out the processing of biodegradable waste in TPS 3R Pesanggrahan, namely composting and bioconversion of Black Soldier Flies (BSF). The use of BSF to process organic waste is growing worldwide. The tropical climate also supports BSF technology to solve problems related to organic waste. BSF can also be used as animal feed so that it can be economically profitable [10]. BSF has become the most popular species to promote a circular economy through the revaluation of organic waste [11]. The process of processing food waste using the BSF bioconversion method has been running at TPS 3R Pesanggrahan since September 10, 2020, with an average of food waste that is spent more than 100 kg/day. Meanwhile, the accumulated cashew produced has reached 280 kg.

4. Conclusion

The Jakarta Recycle Center, which has adopted waste management in Osaki, Japan, has started implementing scheduled waste transportation and sorting waste before being transported by the government’s truck. The sorting is divided into four types on seven different days according to the agreement made by the residents with the government. Then the waste is transported to the recycling center. In addition, the JRC also prepares penalties that have been agreed upon by the community and the government for residents who do not sort their waste. With the support of sufficient waste transportation and processing facilities from the government, the JRC can become a pilot program that can be applied in other areas in managing their waste. For further research, the authors suggest that researchers can evaluate areas that adopt JRC’s solid waste management.

Acknowledgements

This research was funded by Universitas Indonesia International Indexed Publications Social Humanities (PUTI) with the contract number NKB-5075/UN2.RST/HKP/05.00/2020

References

[1] Sulastri T, Chairil A, and Muh N S 2016 Analisis proyeksi pertumbuhan penduduk dan kebutuhan fasilitas persampahan di Kota Palu 2015-2025 Jurnal Katalogis 4 4 94–104
[2] Lasma R, Rohani, L. 2007 Perilaku masyarakat dalam pengelolaan sampah di Desa Medan Senembah Kabupaten Deliserdang dan di Kelurahan Asam Kumbang Kota Medan tahun 2007 Skripsi (Medan: Universitas Sumatera Utara)

[3] Mochammad C, Masaru T, and Ashok V S 2007 Municipal Solid Waste Management in Indonesia: Status and the Strategic Actions Journal of the Faculty Environmental Science and Technology Okayama University 12 1 41–49 http://doi.org/10.18926/fest/11432

[4] Abdoli, M. A., Rezaei, M., & Hasanian, H 2016 Integrated Solid Waste Management in Indonesia Global Journal of Environment Management, 07(8), 629–633, 2016.

[5] Aretha A, Tetsuo T, and Gert S 2012 Household solid waste management in Jakarta, Indonesia: A socio-economic evaluation Waste Management - An Integrated Vision 71-100

[6] Ministry of Local Government and Rural Development 2020 Environmental Sanitation Policy 2009 (revised)

[7] Sudiro, Setyawan, A, Nulhakim, L 2018 Residential Waste Management Model in Tunjungsekar Village, Malang City Plano Maldini Journal, 106-117, 2018.

[8] Hannah S 2019 Literature review as a research methodology: An overview and guidelines Journal of Business Research 104 333-339 https://doi.org/10.1016/j.jbusres.2019.07.039

[9] Elga A 2019 Analisis Perilaku Pemilahan Sampah di Kota Surabaya Jurnal Masalah-Masalah Sosial 10 2 https://doi.org/10.46807/aspirasi.v10i2.1424

[10] G D P da Silva and T Hesselberg 2020 Da Silva, G. D. P., & Hesselberg, T. (2020). A review of the use of black soldier fly larvae, Hermetia illucens (Diptera: Stratiomyidae), to compost organic waste in tropical regions Neutropical Entomology 49 2 151–162 https://doi.org/10.1007/s13744-019-00719-z

[11] Thomas K and Veysel T 2020 Suitability of Black Soldier Fly Frass as Soil Amendment and Implication for Organic Waste Hygienization Agronomy 10 10 1578 https://doi.org/10.3390/agronomy10101578