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The Study of Household Waste Generation to Support Jababeka Smart Township Initiative

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Abstract. The problem of household waste faced in industrial areas is becoming increasingly urgent, considering that industrial areas are areas that are growing very rapidly. Jababeka Smart Township initiative is one of the efforts to provide services to the community, to improve sustainable living. In waste management, it takes the amount of waste generated to be managed, so that the measurement of household waste generation is the first step needed. **Objectives:** The objectives of this research are to know the waste generation at Jababeka residential, to know the waste generation of Mekarmukti village, and to analyze the waste generation in Jababeka area. **Method and results:** The method of measuring household waste generation used follows SNI 19-3964-1994. The population used in this study were Mekarmukti villagers, both living in housing and outside housing. Purposive sampling method used in find the sample, method of data collection was observation, and descriptive statistics used for data analysis. The result found that the average waste generation from people at Jababeka residential is 0.33 kg/day/person, and out of residential is 0.37 kg/day/person. In Mekarmukti village, center of waste recycle could used to manage the household waste Based on this average waste the potential technology could implemented the solid waste management. **Conclusion:** The average waste generation in Jababeka residential is 0.33 kg/day/person and outside of residential is 0.37 kg/day/person, and this amount still less than the average waste produced per person per day in Indonesia.

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1 Introduction

The results of calculations from SIPSN, 2020 obtained that each person produces 0.7 kg of waste every day. Total solid waste at year 2020 is 34,188,135.15 ton, higher compare from year 2019 is 33,290,319.57 ton. The amount of solid waste generated had significance relationship with the willingness to pay (WTP) of solid waste management facilities [1]. The increasing of solid waste is 29,135.23 ton from 2019 to 2020 in Bekasi district [2]. The fact, not all solid waste in Bekasi district transport to landfill. According to regional secretary of Bekasi district, only about 800 ton, garbage in Bekasi district transport to landfill, the rest could anywhere (bekasikab.go.id).

Based on the source of waste, the biggest source of solid waste is from households (Figure 1). During this pandemic, many employees have to work at home, which will increase the amount of household waste. Plus the higher the purchase of goods online which of course makes the packaging of goods more extra, to maintain the quality of the goods.

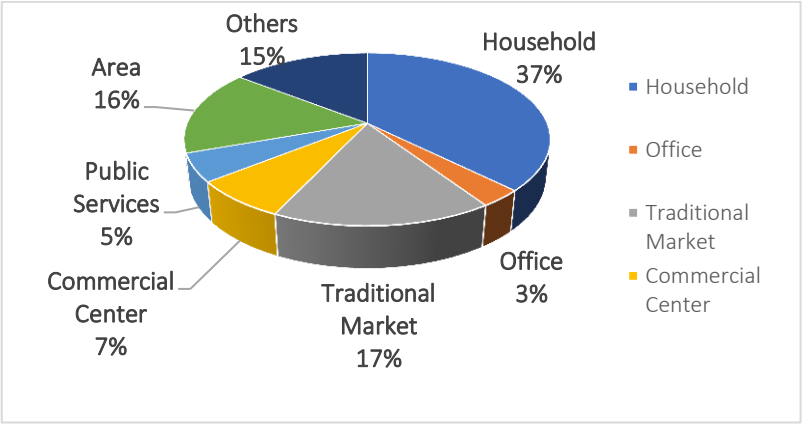

Fig. 1. The Source of Solid Waste in Indonesia, 2020

Source: SIPSN, 2020

The paradigm of waste management that the one responsible the waste is the producer of waste itself. This creates a behavior that makes garbage completion by making the trash invisible. Disposal of garbage in its place and also dumping garbage into rivers are solutions that are often taken to make garbage invisible.

The objectives of this research are to know the waste generation at Jababeka residential, to know the waste generation of Mekarmukti village, and to analyze the waste generation in Jababeka area.

2 Method

In this research, population used were residents of Mekarmukti village. Sample chosen purposively, and observation method used to collect data. The data collection method used SNI 19-3964-1994, that observe in 8 days. Descriptive statistics, such as average and total used to show the waste generation in society.

3 Results and Discussion

There are many waste processing technologies, especially organic waste and they are easy to apply. However, there are still many people who have not implemented it. The old waste management paradigm, in the form of "collect-transport-dispose" waste management activities, is time to change. The paradigm of waste management must change by making waste as a resource. Based on experience in Nkulumane Suburb, Bulawayo, Zimbabwe, the Community Based Solid Waste Management (CBSWM) program did not succeed in changing people's behavior in collecting their waste [2].

This paradigm shift in waste management is increasing with increasing awareness of the limited non-renewable resources, and the scarcity of resources [3]. In addition, the composition of organic waste still dominates other types of waste, according to data from SIPSN in 2020, 54 percent of waste is organic waste. In addition, the amount of waste generated continues to increase with the increase in population. In 2020, it was found that the amount of waste generated was 36,981,921.88 tons [2], with the total population of Indonesia in September 2020 was 270.20 million people (Population Census 2020), so each person produces 0.375 kg per day. There is still much to be done to reduce the amount of waste produced by every citizen, so that the increase in population is not followed by an

increase in the amount of unmanaged waste. The 3R (reduce, reuse, recycle) movement must continue to be campaigned until this movement becomes a habit. Knowledge of waste management through the 3 R's can be obtained from social media, training or brochures. From research [5] in Keemanshah, Iran, mothers with higher education levels have better knowledge, behavior and implementation of waste management than mothers with lower levels of education. If you look at the hierarchy of waste management as shown in Figure 2, the first management is to prevent waste generation, especially through consumption activities. Reduction activities can be done by changing the way of life (life style), after that do reuse (reuse) which will make the waste will return to provide benefits. For recycling activities, waste is used as raw material for other products, so that waste can provide value again.

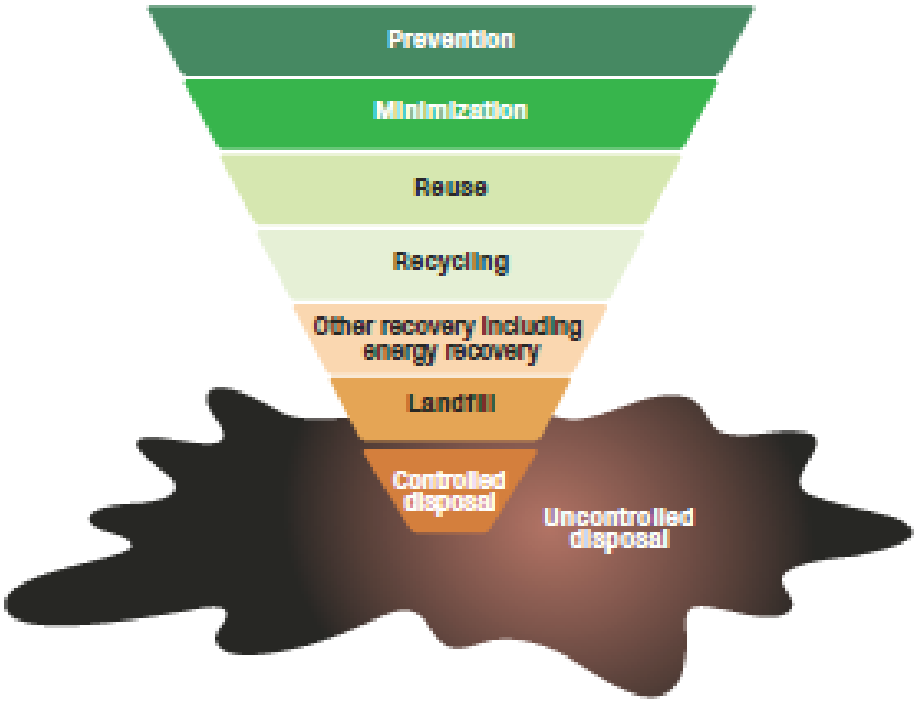

Fig. 2. Waste management hierarchy
Sumber: (*Glob. Waste Manag. Outlook*, 2016)

Waste management has been implemented in the community, but it still does not provide economic benefits [6]. One of the efforts to manage organic waste is to

turn it into liquid fertilizer and compost. The process of composting waste usually requires sufficient land, so that the composting process can take place properly. In addition, the resulting impact on the composting process is an unpleasant odor from the composting process itself. This usually makes people very limited in implementing composting technology for organic waste. Organic waste management carried out using a decentralized composting strategy has been proposed for organic waste management in Chicago [7]. However, it is realized that the management of organic waste by producing liquid fertilizer requires further activities that will utilize the resulting liquid fertilizer. It is necessary to purchase or use the liquid fertilizer, such as a program to buy back products produced from waste management [8].

The measurement of waste generation at Mekarmukti village, residential and non- residential showed on Table 1.

Table 1. Waste Generation at Mekarmukti Village

	Residential	Non Residential
Average (kg/day)	1.3	1.01
Average (kg/day/person)	0.33	0.37

The average waste generation per person per day in Mekarmukti village still lower compare with the average of waste generation national level. Solid waste facilities in Jababeka area could prepared based on this amount. The participation of society in Mekarmukti village need increase that make every one responsible to their waste. The Jababeka Smart township initiative as an application for Sustainable Living would give the information and interaction with society in manage the household waste.

4 Conclusions

The average of waste generation at Jababeka residential was 0.33 kg/day/person, and from out of residential was 0.37 kg/day/person. The application of Jababeka Smart Township is one solution to improve solid waste management among society.

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APPENDICES

Waste generation at non Residential

Total Weight											
House hold	Family Member	H1 Thursday	H2 Friday	H3 Saturday	H4 Sunday	H5 Monday	H6 Tuesday	H7 Wednesday	H8 Thursday	Average (kg/day)	Average (kg/day/person)
		14/10/21	15/10/21	16/10/21	17/10/21	18/10/21	19/10/21	20/10/21	21/10/21		
R1	3	3.0	0.8	1.8	0.4	1.6	3.2	1.6	1.2	1.70	0.57
R2	8	4.0	1.8	2.0	2.6	1.8	2.2	0.8	1.2	2.05	0.26
R3	4	1.8	0.8	0.6	1.2	3.0	0.4	1.0	1.8	1.33	0.33
R4	5	3.0	2.6	2.6	0.8	1.4	1.0	2.2	1.4	1.88	0.38
R5	4	2.4	2.6	4.4	5.0	6.0	4.2	3.4	6.0	4.25	1.06
R6	4	2.2	2.4	0.4	1.2	1.0	1.0	0.4	1.0	1.20	0.30
R7	4	1.3	1.2	1.6	1.6	1.3	1.2	1.0	2.2	1.43	0.36
R8	5	2.4	1.2	0.8	1.2	2.0	0.6	1.8	1.4	1.43	0.29
R9	1	0.8	1.2	1.4	0.6	1.6	1.0	2.0	1.4	1.25	1.25
R10	2	2.2	1.0	2.0	1.6	4.0	1.2	4.0	1.2	2.15	1.08
R11	5	0.7	2.6	1.8	0.6	1.0	1.2	3.2	1.0	1.51	0.30
R12	6	0.2	0.5	0.6	0.4	0.4	0.1	0.3	0.4	0.36	0.06
R13	3	1.0	0.6	0.4	0.8	0.2	0.8	0.6	0.8	0.65	0.22
R14	4	0.2	0.2	0.2	1.4	0.2	1.8	0.1	0.2	0.54	0.13
R15	3	0.8	0.2	0.2	0.2	0.3	0.5	1.4	0.2	0.48	0.16
R16	2	1.6	1.0	0.6	1.2	0.9	0.8	0.2	0.5	0.85	0.43
R17	4	0.7	0.4	0.2	0.2	0.2	0.2	0.4	0.2	0.31	0.08
R18	3	0.5	0.2	0.1	0.4	0.4	0.2	0.3	0.4	0.31	0.10
R19	3	0.5	0.2	0.4	0.1	1.0	1.0	0.4	0.4	0.49	0.16
R20	2	0.8	0.0	0.2	0.1	0.2	0.2	0.1	0.1	0.21	0.10

Total Weight											
House hold	Family Member	H1 Thursday	H2 Friday	H3 Saturday	H4 Sunday	H5 Monday	H6 Tuesday	H7 Wednesday	H8 Thursday	Average (kg/day)	Average (kg/day/person)
R21	1	0.8	2.2	1.5	1.3	1.7	1.2	1.5	1.0	1.40	1.40
R22	9	2.0	1.8	1.8	0.9	1.1	1.5	1.8	0.9	1.48	0.16
R23	1	3.6	1.3	1.2	2.0	1.5	1.0	1.3	2.4	1.78	1.78
R24	3	0.8	0.1	0.1	0.2	0.2	0.1	1.3	0.3	0.38	0.13
R25	4	2.8	0.8	0.6	0.8	1.0	1.0	1.8	1.5	1.29	0.32
R26	3	0.6	0.4	0.4	0.9	0.7	1.1	0.6	2.7	0.93	0.31
R27	1	1.8	0.9	0.9	0.5	1.3	0.2	1.3	0.6	0.93	0.93
R28	1	1.0	0.5	0.5	0.3	0.5	0.2	0.2	0.4	0.45	0.45
R29	4	0.5	0.3	0.2	0.4	0.2	0.2	0.3	0.1	0.28	0.07
R30	3	1.4	0.8	0.7	1.5	1.7	0.3	0.9	1.3	1.08	0.36
R31	6	1.6	1.6	1.6	0.7	1.2	0.8	0.8	1.3	1.20	0.20
R32	4	0.8	0.8	0.3	0.3	0.2	0.5	0.3	0.7	0.49	0.12
R33	3	1.2	0.9	0.3	0.3	0.5	0.6	0.8	0.5	0.64	0.21
R34	4	1.0	0.4	0.4	0.2	0.3	0.4	0.3	0.4	0.43	0.11
R35	4	0.8	0.9	0.3	0.6	0.4	0.7	1.2	0.8	0.71	0.18
R36	4	0.6	0.7	0.7	0.2	0.6	0.6	0.1	0.4	0.49	0.12
R37	6	0.8	1.4	1.4	0.4	0.3	0.2	0.5	0.3	0.66	0.11
R38	6	1.2	0.8	0.8	0.5	0.3	0.7	0.1	0.0	0.55	0.09
R39	3	0.0	0.8	0.3	0.3	0.8	0.5	0.1	1.3	0.51	0.17
R40	3	1.2	0.4	0.4	0.2	0.5	0.5	0.0	0.3	0.44	0.15
											0.37

Waste Generation Residential

House hold	Household member	21/01/20 Tuesday	22/01/20 Wednesday	23/01/20 Thursday	24/01/20 Friday	25/01/20 Saturday	26/01/20 Sunday	27/01/20 Monday	28/01/20 Tuesday	Average (kg/day)	Average (kg/day/person)
1	4	1.50	1.00	2.00	1.00	1.60	1.50	1.00	1.60	1.40	0.35
2	3	1.00	0.80	1.00	1.50	2.00	0.90	0.80	2.00	1.25	0.42
3	4	0.80	1.50	0.90	0.00	1.50	1.00	1.00	1.50	1.03	0.26
4	5	2.00	2.50	2.00	1.80	1.00	0.00	1.50	1.00	1.48	0.30
5	6	2.50	1.50	1.50	1.00	2.80	1.20	1.10	1.50	1.64	0.27
6	5	0.50	1.00	0.00	0.80	0.50	0.00	1.50	0.70	0.63	0.13
7	6	1.00	1.70	2.00	2.50	2.00	1.50	0.90	2.00	1.70	0.28
8	3	2.10	2.00	1.00	3.50	1.00	1.40	0.50	1.20	1.59	0.53
9	2	1.50	1.30	0.00	1.40	0.00	0.00	0.00	1.40	0.70	0.35
10	3	1.00	1.50	0.50	0.80	1.00	0.00	1.20	2.30	1.04	0.35
11	6	1.00	2.00	2.50	4.50	2.00	2.50	3.00	2.00	2.44	0.41
12	4	1.50	0.50	1.00	0.50	0.40	2.00	2.00	0.50	1.05	0.26
13	5	0.20	2.50	1.00	1.50	1.00	0.00	2.50	1.80	1.31	0.26
14	4	0.60	1.50	2.00	0.70	1.00	0.50	1.30	1.50	1.14	0.28
15	4	2.40	1.00	1.30	2.00	1.50	1.30	1.00	1.30	1.48	0.37
16	5	2.10	2.50	2.50	3.00	2.00	3.50	2.00	2.50	2.51	0.50
17	2	1.30	1.00	0.80	1.00	0.00	0.00	0.00	0.80	0.61	0.31
18	3	0.00	2.00	1.50	0.00	1.00	1.00	1.80	1.50	1.10	0.37
19	2	0.00	0.60	0.00	0.00	2.00	0.00	0.60	2.00	0.65	0.33
											0.33