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Study of Waste Generation and Determination of Waste Management Infrastructure Needs in Seleparang-Lombok District

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ABSTRACT: *This study aims to determine waste generation and infrastructure needs in waste management in Seleparang sub-district, Mataram city. The infrastructure referred to in this study is the need for waste transportation equipment and the rhythm needed to manage waste from waste sources to temporary and final landfills. Study methods include; first conducted a waste generation survey based on SNI-19-3964-1994, second conducted a calculation and evaluation of fleet capacity, based on the results of the waste generation survey. From the results of the study, it was found that the waste generation in Seleparang District was 28,498 kg / day or 291 m3 / day. The infrastructure needs of dump truck transportation equipment with a capacity of 8 m3 as many as 15 units and containers with a capacity of 6 m3 as many as 49 units.*

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I. INTRODUCTION

Waste generation data is an important variable/component in designing a waste management system to be able to determine the infrastructure needed [4]. In the concept of a production system, waste generation is an input that will be processed in infrastructure such as; transportation equipment, containers / TPS, landfill, and others to produce waste handling output [10]. When viewed from input-process-output, infrastructure is a tool to process waste generation in an area.

When waste management infrastructure planning is not prepared based on data on waste generation to be served, it will cause various problems. For example, incomplete collection systems, lack of garbage conveyance, insufficient temporary shelter capacity (TPS), and landfills (TPA). becomes a typical problem covering technical, social and cultural aspects [9]. In addition to infrastructure, public knowledge and concern for sorting waste is very low due to the pattern of habits and behavior of people who are accustomed to throwing waste without paying attention to the composition of the waste. The condition of mixed waste makes it very difficult for the government and the cleaning office to carry out the recycling process. Many materials should be recyclable but in the end they are only stockpiled at TPS or TPA.

According to Setiadi, [6] waste generation in urban settlements comes from households, stalls, public buildings, and home industries. Data generation, composition, and characteristics of waste are very supportive in compiling a waste management system in an area [3,2]. The preparation of a good and correct waste management system can improve the beauty, cleanliness, health, comfort, and environmental sustainability of an area. Even if waste management with the 3R concept can be implemented properly, it will provide added value economically. For example, plastic waste that can be recycled and organic waste that can be composted can be sold to increase income[7, 8, 11, 13, 12].

The paradigm of waste management in Indonesia has changed since the enactment of Law number 18 of 2008 concerning "Waste Management" and supported by Government Regulation number 81 of 2012 concerning "Management of Family Waste and Similar Waste of Family Waste" from the paradigm of collection-transport-disposal to management that relies on waste reduction and waste handling [7, 8]. To support this paradigm, the government invites all levels of Indonesian people, both the government, business actors and the wider community to carry out activities to limit waste generation, waste reuse and recycle or better known as Reduce, Reuse and Recyle (3R) in an effective, efficient, and programmatic way.

To maintain the quality and sustainability of the environment so that the welfare and quality of life of future generations are more guaranteed and competitive, the Mataram City Government has made breakthroughs through various programs, one of which is the "Environment with Zero Waste" (LISAN) program together with related agencies such as; The Public Works Office (PU), the Environment Agency (BLH), and the Hygiene Office try to invite the community to play an active role in managing waste problems. LISAN is a community-

based waste management program towards strengthening community capacity (community capasity building) in the field of waste management through socialization, training and support facilities. From social engineering (social engineering) is carried out through waste barter, waste sodaqoh, craft waste raw materials. So that this social engineering can sensitize the community, provide economic value, reduce the volume of waste at the TPS, and cut off household waste lines.

From various programs and efforts made by the Mataram city government so as to achieve efficient and effective waste management. However, the implementation has not been achieved as expected. This condition can be seen from the monitoring and reality in the field that there are still many polling stations that are unable to accommodate temporary waste from the surrounding environment before being disposed of into the landfill as shown in figure 1.

Figure 1. Portrait of the study site (Source: Doc, 2022)

Departing from this situation, finally a presumption / thought arises whether the infrastructure built has considered the generation of waste from the source of waste to be served or whether the transportation schedule from TPS to TPA is not carried out as planned. For this reason, it is necessary to study the generation of existing waste so that urban waste planning and management becomes more precise and better. This condition is clearly seen from the amount of garbage that spills into the streets.

II. STUDIES OF METHOD

Scope of Study

This study was conducted in Seleparang sub-district, Mataram city to obtain related data; (1) generation of household waste, (2) the number and capacity of polling stations.

Tools used in the study

The tools used to obtain data in this study are plastic bags to hold garbage, scales to weigh garbage, boxes measuring 20 x 20 x 50 cm and meters to measure the volume of waste, and stationery.

Household waste generation study

The waste generation study was carried out based on SNI 19-3964-1994 concerning "Method of Taking and Measuring Waste Generation Examples". The stages are as follows [1]:

a.The number of man exsamples is calculated by the equation:

$$S = CD \sqrt{Ps} \quad (1)$$

S is the number of samples (man), Cd is the coefficient of change, Ps is the population (man).

b. The number of sampling waste generation samples taken is calculated by the equation:

$$K=S/N \quad (2)$$

K, number of family samples (kk); S, the number of soul samples; N, number of people per family (kk).

c. The number of examples of waste generation from housing with economic levels is as follows:

Permanen = S1 x K
Semi permanen = S2 x K
Non permanen = S3 x K
(S1, S2, S3 are 10%, 40%, 50% respectively).

d. Determination of waste generation

The determination of the total waste generation can be determined by the following equation:

Total waste generation (QT) = Household waste (Qd) (3)

Infrastructure capacity assessment

The infrastructure study is adjusted to the Minister of Public Works of the Republic of Indonesia No. 03/PRT/M/2013: calculating the waste management infrastructure needs plan as follows [4]:

a. Collection/transport equipment requirements:

total equipment=(vol.timbulan sampah)/(kapasitas alat x fp x rt) (4)

b. TPS/continer equipment:

TPS total=(vol.timbulan sampah)/(vol.kontainer) (5)

III. RESULTS AND DISCUSSION

Garbage generation calculation

Administratively, Seleparang District has 9 villages, 61 neighborhoods, a population of 73,222 people with an area of 10.77 km2 as shown in table 1.

Table 1. Administration and community system of Seleparang District

Kelurahan	Luas Wilayah (km^2)	Jumlah Lingkungan	Jumlah Penduduk (jiwa)	Kepadatan
Rembiga	3,15	6	10.104	3.208
Karang Baru	2,37	9	9.925	4.188
Monjok	1,35	7	11.590	8.585
Monjok Timur	0,37	6	4.469	12.078
Monjok Barat	0,50	7	6.267	12.414
Dasan Agung	0,79	13	11.386	14.412
Dasan Agung Baru	1,16	4	7.591	6.543
Gomong	0,39	3	6.347	16.274
Mataram Barat	0,69	6	5.543	8.033
Kec. Selaparang	10,77	61	73.222	6.798

Based on the results of measurements and tabulations of household and non-household waste generation survey data in Seleparang sub-district, Mataram city, which is used as the basis for determining waste generation, the total waste generation (QT) is equal to 28,498 kg / day or 291 m3 / day. Waste generation consists of organic waste 21,920 kg / day, plastic waste 4,633 kg / day, and other non-organic waste 1,945 kg / day as shown in table 2.

Table 2. Total waste generation in Selaparang District

No	Komponen	Per Hari		Per Bulan	
		Berat (Kg)	Persentase (%)	Berat (Kg)	Persentase (%)
1	Organik	21.920	76,92	657.597	76,92
2	Plastik	4.633	16,26	138.995	16,26
3	Anorganik	1.945	6,82	58.344	6,82
Total		28.498	100	854.935	100

TPS capacity calculation

From research, observations, measurements in the field, it is known that in Seleparang sub-district there is a one-unit depot transfer garbage shelter with a capacity of 32 m3, 6 containers with a capacity of 3 m3. The means of transporting waste from the Temporary Landfill (TPS) to the Final Landfill (TPA) uses a dump truck with a capacity of 6 m3 with a rhythm 2 times a day. So that with the volume of waste generation in Seleparang sub-district as much as 291 m3 / day, it can be determined the needs of transportation / collection equipment and TPS needs using equations 10 and 11 as follows:

1. The need for dump truck transportation equipment with a capacity of 8 m3 and ritasi 2 times a day is 15 units of dump trucks.
2. The need for containers with a capacity of 6 m3 is 49 container units.

The calculation of the need for transportation equipment needed to manage waste in Seleparang sub-district is as many as 15 units of dump trucks with a capacity of 8 m3. Based on field data, the fleet allocated to handle waste management in Seleparang sub-district is 4 units of dump trucks with rhythms 2 times a day. Of this amount, it is not enough to completely transport the waste in Seliparang sub-district. From the results of this study, it shows that waste management planning in the city of Mataram, especially in Seleparang sub-district, has not been well planned and takes into account the generation of waste produced.

To respond to this condition there are several alternatives that can still be done, including; First, to overcome the shortage of transportation fleets, it can be done by adding transportation rhythms (RT) or by adding fleets. Second, maximize the 3R concept on waste sources. So that the waste that will be accommodated at the TPS is only other non-organic waste while organic waste is composted and plastic waste is sold for recycling.

IV. CONCLUSION

The conclusion of the results of this study is that waste generation in Seleparang sub-district is 291 m3 / day. The infrastructure needs of the dump truck fleet with a capacity of 8 m3 are 15 units and containers with a capacity of 6 m3 are 49 units. It is recommended to rearrange waste management infrastructure needs related to transportation equipment needs, daily ritation, and TPS volume based on waste generation.

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