Overview Of The Specific Weight And Composition Of Waste In Offices (Case Study In Govenor Of West Sulawesi Province Office Areas)

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ABSTRACT

Offices is one of the place that has a high potential for waste production because there are regular users who have routine activities every working day. The composition of waste needs to be known in order to determine the most efficient and appropriate way of processing waste so that it could be applied. It is necessary to know the specific weight of waste to manage the waste transportation system, about the equipment used to transport waste to the Waste Final Shelter. Described the specific weight and composition of waste in the offices. This research is a descriptive research. The sample is the amount of waste in the Governor of West Sulawesi Office. The sampling technique is total sampling. The research instrument is form in SNI 19-3964-1194. The data analysis performed is descriptive analysis. The specific weight measured based on waste carried out for eight consecutive days at the same location. The results fluctuated every day. The composition of waste are food waste, plastic, paper, and other types and and the largest type of waste was food waste at 4.90 kg/day or 48.84%/day. The building D has the highest specific weight of waste average compared to the other buildings (6.15 kg/m³) and has the highest total type of waste (16.94 kg/day). The specific weight of the waste ranged from 2.69 kg/m³ – 6.15 kg/m³ and the higher composition of aste is food waste.

Keywords: *Waste, Specific weight, Composition, Office*

ABSTRAK

Perkantoran merupakan salah satu tempat yang memiliki potensi produksi sampah yang tinggi karena adanya pengguna tetap yang memiliki aktivitas rutin setiap hari kerja. Komposisi sampah perlu diketahui untuk dapat menentukan cara pengolahan sampah yang tepat dan paling efisien sehingga dapat diterapkan proses pengolahannya. Berat jenis sampah perlu diketahui untuk mengelola sistem pengangkutan sampah, terkait peralatan yang digunakan untuk mengangkut sampah sampai ke Tempat Pembuangan Akhir (TPA). Penelitian ini merupakan penelitian deskriptif. Sampel adalah jumlah sampah di Kantor Gubernur Sulawesi Barat. Teknik pengambilan sampel yaitu total sampling. Instrumen penellitian adalah formulir dalam SNI 19-3964-1194.. Analisis data yang dilakukan adalah analisis deskkriptif. Berat jenis sampah diukur berdasarkan pengumpulan sampah selama 8 hari berturut – turut pada lokasi yang sama. Haslnya fuktuatif setiap hari. Komposisi sampah terdiri dari sisa makanan, plastik, kertas, dan lainnya dan jenis sampah terbanyak adalah sisa makanan sebesar 4.90 kg/hari atau 48,84%/hari. Gedung D memiliki rata – rata berat jenis sampah tertinggi dibandingkan gedung lain (6.15 kg/m3) dan memiliki total jenis sampah terbanyak (16.94 kg/hari). Berat jenis sampah berkisar 2.69 kg/m3 – 6.15 kg/m3 dan jenis sampah terbanyak adalah sisa makanan sebesar 4.90 kg/hari atau 48.84 %/hari.

Kata Kunci : Sampah, Berat Jenis, Komposisi, Perkantoran

INTRODUCTION

Garbage is all kind of waste produced from human and animal activities in the form of solid, liquid, or gas that is disposed because it is no longer needed or unwanted (1). Waste composition is the description of each component and its distribution contained in a solid waste that are usually expressed in the form of weight percentage (% weight). The waste composition is grouped into organic waste (food waste, paper, plastic, cloth (textile), rubber, yard waste, wood, etc.) and inorganic waste (glass, cans, metal, and others (2).

Office is one of the places that has a potential for high waste production because there are regular users who have routine activities every working day. All of the provincial level offices in West Sulawesi are located in one place called the West Sulawesi Provincial Office Area. The waste generation in the area is in the range of 0.06 kg/person/day-0.24 kg/person/day (3).

The composition of waste need to be known in order to determine the most efficient

and appropriate way of processing waste so that it could be applied (4). Waste management that are based on the data of waste composition and waste recycling condition in a place will be more successful compared to adapting waste management programs from other places, so it is very important to know the actual field conditions regarding the characteristics and waste composition (5). It is necessary to know the specific weight of waste to manage the waste transportation system, about the equipment used to transport waste to the Final Disposal Site (6).

The purpose of this research is to describe the specific weight and composition of waste in the offices.

MATERIAL AND METHOD

The type of this research is a descriptive research. The population is the amount of waste in the West Sulawesi Province Office Area. Within the complex area there are many offices at the provincial level. The sample is the amount of waste in the Governor of West Sulawesi Office. The Governer's office consists of 3 buildings in right-wing that consist of 2 floors each (Building A-C), the main building with 4 floors (Building D), and 3 buildings in left-wing consist of 2 floors each (Building E-G). The method used for non-random sampling technique is total sampling by collecting all the waste products from the West Sulawesi Governer's Office in a day.

The data collection technique used is the frequency sampling or by collecting samples of waste composition that are carried out for eight consecutive days at the same location. The research instrument form based on the procedure in SNI 19-3964-1194 about "Methods of Taking and Measuring Samples of Municipal Solid Waste Generation and Composition". The sample collection started at 08.00 am, then the composition and weight waste will be measured directly at the location.

The data analysis used is descriptive analysis to see the frequency of the characteristics of the variables after calculating the specific weight and composition of the waste based on the formula that are stated in the SNI 19-3964-1194. The data is then presented in the form of tables and narratives.

This research has received Ethical Approval Recommendation from the Commission of Health Research Ethics of the Makassar Health Polytechnic with the number 266/KEPK-PTKMKS/VI/2017 on June 5th, 2017.

RESULTS AND DISCUSSION

The specific weight of waste is defined as weight of the material divided by unit of volume (7). The specific weight of waste was measured based on the SNI 19-3964-1194 regarding the method of collection and measurement of the samples of generation and composition of urban waste. The result is as follows.

Table 1 Specific Weight of Waste (kg/m³)

Buildings	Day -								Average
	1	2	3	4	5	6	7	8	
A	1.79	3.67	3.40	1.68	2.67	2.92	2.66	2.76	2.69
B	5.83	17.86	2.60	1.69	5.31	3.47	3.23	2.50	5.31
C	6.59	4.37	10.83	2.55	4.38	2.99	0.79	2.56	4.38
D	14.49	5.43	4.52	7.36	6.16	6.26	2.23	2.82	6.15
E	3.91	3.81	2.06	7.38	3.99	4.75	3.08	3.00	3,99
F	2.39	3.21	2.57	2.78	5.56	13.91	4.36	9.70	5.56
G	1.19	4.15	4.28	3.38	3.11	7.71	2.37	2.65	3.60

On the first day, the highest specific weight of solid waste was in Building D (14.49 kg/m^3). The highest specific weight of solid waste on the second day was in the Building B (17.86 kg/m^3). The C building has the highest specific weight of solid waste (10.83 kg/m^3) on the third day. On the fourth day, the highest specific weight of waste was in Building E (7.38 kg/m^3). The highest specific weight of solid waste on the fifth day was in Building D (6.16 kg/m^3). The F building had the highest specific weight of solid waste (13.91 kg/m^3) on the sixth day. On the seventh day, the highest specific weight of waste was in Building F (4.36 kg/m^3). And the highest specific weight of waste on the eighth day was in Building F (9.70 kg/m^3). The building D has the highest specific weight of waste average compared to the other buildings (6.15 kg/m^3). This is in accordance with the D building area, which is wider than other buildings, which are 6,713 m^2 and has a higher number of employees as many as 644 peoples. Building D also has a meeting building on the 4th floor which is often used for activities in the West Sulawesi Governor's Office.

The specific weight as one of the physical characteristics of waste are influenced by several things including income, population growth, season, and storage time. Data from the research results showed that the highest specific weight of waste varies every day. When the research was conducted in August, it was the rainy season which affected the specific weight of the waste. A study conducted by Ruslinda Yenni in Bukittinggi City shows the specific weight difference between the rainy and dry seasons, the average specific weight of waste in the rainy season is 0.31 kg/l while in the dry season 0.24 kg/l (8).

The specific weight of waste is needed in waste management, one of which as a storage reference for the waste container that are used. In this research, the average specific weight of waste is 2.69 kg/m^3 - 6.15 kg/m^3 are still sufficient to be stored in a 120 L container and a total of 10 pieces of trash bins where in each Buildings A, B, C, E, F, and G has one trash bin and for building D has four trash bins that are enough to contain wastes. As for the waste transportation, it is carried out once in the afternoon, unless if there are certain activities, transportation will then usually carry out the waste more than once a day. However, at the waste container of the governor's office has not been separated between organic and inorganic waste. This will make it difficult for the next waste processing process.

The waste composition is a description and the distribution of each component that are contained in the waste. This data is important to evaluate the equipment that are required, the systems, waste management, and the waste management plan of a city. The most frequent grouping of waste is based on its composition, for example expressed as % by weight or % by volume of paper, wood, leather, plastic, metal, glass, cloth, food, and other wastes (9). The waste composition was measured based on the SNI 19-3964-1194 regarding the method of collection and measurement of the samples of generation and composition of urban waste. The result is as follows.

Table 2 Building Waste Composition

Buildings	Type of Waste									
	Food Waste		Plastic		Paper		Others		Total	
	kg/day	%/day	kg/day	%/day	kg/day	%/day	kg/day	%/day	kg/day	%/day
A	4.06	53.70	1.97	26.00	1.47	19.44	0.06	0.86	7.56	100
B	5.45	52.20	2.50	23.94	2.43	23.27	0.06	0.59	10.44	100
C	4.06	51.98	1.81	23.17	1.81	23.17	0.13	1.68	7.81	100
D	10.31	60.86	3.68	21.72	2.45	14.46	0.50	2.96	16.94	100
E	2.88	34.08	2.94	34.79	1.63	19.29	1.00	11.84	8.45	100
F	3.13	37.58	2.31	27.73	2.81	33.73	0.08	0.96	8.33	100
G	4.44	51.45	2.00	23.17	2.06	23.87	0.13	1.51	8.63	100
Average	4.90	48.84	2.46	25.79	2.09	22.46	0.28	2.91	9.73	100

Based on table 2, it is known that the types of waste found were food waste, plastic, paper, and other types. The other types of waste include iron, wood, glass, and printer cartridges. Among these types of waste, food waste is the most common type of waste in each building (4.90 kg/day 48.84 %/day). Among all the other buildings, building D has the highest total types of waste, which is 16.94 kg/day.

This research is in line with a research that are conducted in Tampan Pekanbaru District which also shows that the food waste composition with the percentage of 24.6% is the highest percentage for non-domestic waste (10). Other than that, this is also in line with a research conducted by Wardihan at Werdhapura Village Center Denpasar which showed the highest waste composition was food waste with the percentage of 26% (11).

Based on the type of waste, the waste in the governor's office is divided into organic waste as much as 48.84 % and inorganic waste as much as 51.16%. The office waste composition is usually dominated by inorganic waste such as paper, but at the governor's office paper is directly collected by scavengers because it has economic value which is why the amount of paper waste at the time of the study was not much. The waste composition can be used as a consideration to determine the feasibility of waste processing, especially recycling and composting as well as the possibility of using landfill gas as an alternative energy (12).

In general, it can be concluded that the consumption trend has not led people to concern for environmental quality, especially seen from the use of plastic and paper as packaging materials which reflect the lack of participation from each individual to prevent the emergence of waste types that are difficult to decompose. One of the reasons to this course of packaging consumption is due to the large number of activities at the governor's office and there is no canteen that are available around the governor's office area.

Based on the results of the waste composition in the governor's office it could be seen that there is a potential for waste recycling. Food waste can be used as compost or could be given to farmers as cattle fodder. For plastic waste which consists of plastic bottles and food wrappers, plastic drinking bottles waste are assumed to be 100% recyclable and can be sold in used goods stalls.

CONCLUSION

The specific weight of the waste ranges from 2.69 kg/m^3 – 6.15 kg/m^3 and the largest type of waste is the food waste at 4.90 kg/day or 48.84%/day. The D building has the highest specific weight average of waste compared to the other buildings (6.15 kg/m^3) and has the highest total type of waste, which is 16.94 kg/day.

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