

The Role of the Scavengers in Orders to Reduce Plastic Waste In Alak Landfill Sites Of Kupang City

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Abstract: An experiment on the role of scavenger in order to reduce domestic waste has been conducted in TPA Alak of Kupang City for three months (March – June 2011). The aims of this research were to know: (1) how many plastic reduced by scavenger; and (2) how much money earned by them. The method used in this research was census to all scavengers in TPA Alak. the population of this study were all scavengers in alak dumps. Sample determination was done by purposive sampling technique. A total of 46 scavengers were used as samples. The data obtained were analyzed descriptively. The results of this research showed the following: (1) total production of plastic collected by each scavenger was about 30,235.2 kg with averaged production of 657,286,9 kg/people/year; and (2) total income earned by each of them was about 50,904,000 IDR with averaged income of 1,106,608,696 IDR/people/year.

Key words: Scavengers, Plastic waste, TPA

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I. Introduction

The use of plastic waste is increasing day by day. Packaging of various industrial products, such as food and beverages are generally made of plastic. In addition, household appliances, and hospitals are also made of plastic. The material of the plastic is difficult to decipher by microorganisms, therefore the plastic items that are not used anymore into waste that will pollute the environment and cause various types of diseases for animals and humans. Besides causing disease, the presence of waste in the environment will damage the aesthetic value.

Existing plastic waste is generally just thrown away, burned or recycled. These processes have not solved plastic waste problems. Plastic waste dumped into the environment will accumulate because it can not be decomposed. Ermawati[1] suggests that waste plastic that is burned at low temperatures will produce carcinogenic compounds, such as poly chlorodibenzodioxins and poly chlorodibenzofurans. Plastic waste recycling is a way that can reduce plastic waste, but the quality of recycled products is relatively low so a more precise recycling method is needed. The negative impacts of plastic waste on the environment include polluting soil and water, killing decomposing organisms in the soil, toxins from plastics can enter the food chain chain with increasing concentrations at every tropical level[2].

Waste has become one of the environmental problems that cannot be handled properly until now, both in many cities, especially developing countries and Indonesia itself, meanwhile the management of waste is not balance with the production of waste itself, it cause stack of waste in many places. Budiharjo[3] said that waste management was a classical problem in many cities.

The ministry of environment reported that the presentation of waste composition in Indonesia were : food waste (50%) rubber, leather, wood (16.45%) paper (13.67%) plastic (8.68%)glass (1.54%), metal (1.66%)[4]. In general, the composition of waste in Indonesia consists of organic waste about 70-80% inorganic waste about 20-30%[5].

The statistic about the role of the scavenger in reducing plastic waste in Kupang city is not yet available. Some previous research has been done such as the waste processing into compost[6], the potency of metal waste pollution and community participation in its management[7], and evaluation of the final waste processing system[8]. But there is no spesific research on plastic waste. The facts show that the information sector such as scavenger groups has been doing bussiness by sorting and selling the plastic waste for recycled.

Based on the description above than it seems necessary to do a research about the role of the scavenger in orders to reduce plastic waste in Alak landfill sites of Kupang. The aims of the research were to find out how many plastic waste reduced by the scavenger; and (2) how much income earned by the scavenger.

II. Material And Method

This research has been done in Alak landfill sites of Kupang for two months since 9th March to 9th May 2011. The method used in this research is census, there was two types of data collected, primary and secondary data. The whole scavenger in Alak landfill became the population in this research. Purposive sampling used in this research determined by those 46 people who have been recorded as a group of scavenger in Alak landfill sites of Kupang.

Descriptive analysis were used as a tool to find out the amount of plastic waste reduced by the scavenger. In this case, researcher just want to find out things that have relation with the amount of plastic waste collected by the scavenger, how they collect it with the role of the scavenger. To find out the income earned by the scavenger in reducing plastic waste (IDR) in Alak landfill sites the formula below was used:

$$PD = TR - TC$$

where:

PD = income. TR= Total Income and TC = Total Cost.

And the mathematical logic is as follow:

$$Pd = Py \cdot Y - \sum_i^N P \cdot Xi$$

Pd = the income of waste reduced

Py = Cost Price (IDR/Kg)

Y = Total Cost Price (Kg)

Pxi ... n = input price i ... n (IDR)

Xi ... n = Input i ...n

III. Result And Discussion

A. Result

1. Total amount of plastic waste reduced by the scavenger in Alak landfill sites.

The result showed that total 926m³ of waste was produced daily by the 291.794 citizen of Kupang, 75,63% organic waste (700m³) and 24,37% inorganic waste (226m³). There was about 408m³ or 44% of the total waste carried to Alak landfill sites, 38m³ or 4,10% has been recycled to compost and other useful material, while 518m³ or 55,94% of waste scrap that has not been carried to the Alak landfill sites has been throw away to the dead riverside, seaside, open dump, and also in the backyard and burried by the citizen.

The amount of plastic waste received at the Alak disposal site and the income received by the scavengers from the sale of plastic waste as shown in table 1.

Tabel 1. Income earned and receipt of plastic waste in Alak landfill sites

	Waste type					
	Plastic waste receipt (Kg)			Plastic waste income earned (IDR)		
	Daily	monthly	Yearly	Daily	monthly	Yearly
Total	96,91	2.519,6	30.235,2	484.550	12.598.000	151.176.000
Average	2,11	54,77	657,28	10.550	273.876,9	3.286.434,78

Source : Primary Data 2011.

The results showed that about 30.235.2 kg of plastic waste was generated in a year, and 657.29 kg/respondent on average, with total income IDR 151.176.000 in a year, 3.286.434.78 on average.

2. The scavenger's income earned by reduce the plastic waste in Alak landfillsites.

Income become one of the economic indicator that impact someone in produced waste. The scavenger's income showed in tabel 2.

Tabel 2. The scavenger's yearly income on average.

	Scavenger income / year (IDR)	Scavenger income / month (IDR)
Total Income	50.904.000	4.242.000
Average income	1.106.608,696	92.217,39

Source : Primary Data, 2011.

By the data on tabel 2 showed that the scavenger total income of plastic waste about IDR 50.904.000 and IDR 1.106.608,696 on average. The income of the scavenger in Alak landfill sites was low level classified. It cause by some factors such as : the scavenger did not manage properly the manpower inn their family, the lower selling price in between Alak landfill sites (IDR 5.000) and other landfill in Kupang (IDR 7.000).

B. Discussion

1. Total amount of plastic waste reduced by the scavenger in Alak landfill sites.

Plastic waste that carried daily to Alak landfill sites was about 1,06 ton, while the recycleable waste was 0,6 ton (4,36 %). The waste that can be recovered only about 9,82% from the total waste entered to Alak landfill sites. It was indicated that 90.18% waste carried to Alak landfill sites can not be process well and only dumped, so it cause the landfill sites full rapidly and has short term period.

90.18% of waste in Alak landfill can not be degraded naturally. This will create a burden for the environment. From the total waste that can not be degraded, 30.235,2 kg per year is plastic waste buried in Alak landfill. If this condition is not solved immediately, then it is certain that within the next 10 years, Alak landfills are filled with less than 302.352 kg of plastic waste.

The presence of plastic waste is a source of sustenance in the scavengers. While on the other hand, most people assume that waste is something that is not useful. Tobing[9] argues that the perception of waste as something useless, reinforced by the statement "throw garbage in place" which implies that garbage should indeed be discarded; not recommended for use. Public perception is understandable because not all people have adequate knowledge about waste. Negative perceptions about waste are based on the fact that waste can have negative impacts on the environment and people. Santoso[10] and Tobing[9] argue that waste generates negative impacts on air pollution, soil, water, aesthetic disturbances and traffic congestion and causes various types of diseases in humans, such as diarrhea, cholera, typhoid, dengue and skin diseases. Fidiawati and Sudarmadji[11] suggest that there are vectors in residential neighborhoods of respondents, such as flies and mosquitoes.

The results showed that scavengers have a very important role in reducing environmental problems caused by plastic waste. There were about 6-15 scavenger's family live settle down in tent at Alak landfill sites, and 46 people operate each day. They worked everyday to collecting and sorting waste as plastics, papers, boxes, tin, metal, glass and bottle then they sellit out.

The level of waste acquire by the scavenger in Alak landfill sites was lees than the waste generated in other local landfill in Kupang. It causes by the scattered scavenger around Kupang was collected first the plastic waste that has good quality in big scale and has higher selling price IDR 7.000/Kg, so the scavenger in Alak landfill sites only got the scrap plastic waste with worse quality and has lower selling price IDR 5.000/Kg.

2. The scavenger's income earned by reduce the plastic waste in Alak landfillsites.

Based on the data in table 2 it can be argued that plastic waste is a source of income for scavengers. Scavengers rely on plastic waste at the Alak landfill to earn a fortune. The result of the research shows that scavenger income per year is Rp. 50.904.000 with average per scavenger of Rp. 1.106.608,696 or Rp. 92.217,39. When compared with the salary of a laborer Rp. 40,000 per day or a driver's salary Rp. 50.000 per day then scavenger income from plastic waste is small. However, it should be understood that population growth continues to increase over time, so that plastic waste will increase as well. In addition, the need for plastic waste as a raw material for the production of goods with economic value is also increasing so that plastic garbage sales value will also increase.

Besides having a negative impact on the environment, plastic waste can be used to produce various products. Kadir[12], plastic waste can be used as a source of liquid fuel. Surono and Ismato (2016)[13] suggested that plastic waste types PP, PET and PE can be processed into fuel oil. Oil from PP type plastics has a high heating value, higher than the calorific value of diesel, gasoline, LPG or kerosene. Sofiana[14] explains that plastic waste can be utilized as an alternative coating material (upholstery) on interior products. Ermawati[1] asserted that lubricant oil produced from plastic waste has high quality. The results show that plastic waste provides benefits for waste pickers and reflects on the fact that waste can be processed into various products, it is necessary to do waste management wisely by involving the whole community including scavengers. Plastic waste management is carried out through the collection phase until fabrication. Pratiwi, *et. al.* [15], plastic waste management is done with total ergonomic approach to increase community participation. Further explained that plastic waste processing is done through collection, sorting, compaction, prefabrication and fabrication.

The results also show that the scavenger education level generally does not finish at elementary school. Because the level of education is low, the scavenger's knowledge about plastic waste management is also limited. Therefore, it is important to do counseling in order to increase the scavenger knowledge about waste management as well as how to process plastic waste to produce products that have economic value. Thus, scavengers not only collect and sell plastic waste, but they are expected to produce economically valuable

products to increase their income. The concept of reduce, reuse, recycle, and replace also need to be introduced to scavengers to increase knowledge about plastic waste. In addition, knowledge about safety and healthy also needs to be given to scavengers so that they can use self-protective equipment, such as masks and gloves at the time of scavenging.

IV. Conclusion

There are two conclusion based on the discussion before:

- a. Total plastic waste reduced by the scavenger in Alak landfill sites was : 96.91 kg daily and 2,11 kg on average; 2.519,6 kg monthly and 54,77 kg on average; 30.235,2 kg yearly and 657,28 kg on average by person. Plastic waste that collected by the scavenger were plastic cup, plastic bottle, plastic goody bag, and other household plastic material.
- b. The scavenger's total income by reduce the plastic waste was : Rp.484.550,- and Rp.10.550,- on average daily by person ; Rp.12.598.000,- and Rp. 273.876,90,- on average monthly by person; Rp.50.904.000,- and Rp. 1.106.608,696 yearly b y person.

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