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Analysis of Community's Willingness to Accept (WTA) on Waste Management of Waste Bank Programme in Yogyakarta City

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ABSTRACT

The improvement of facilities and infrastructures, increasing population and changing consumption patterns will increase the volume, type and characteristics of waste. The increased volume and type of waste requires attention for waste management with hope that it will create clean and healthy environment. One of the current government efforts to address the garbage problem is to disseminate the program of waste sorting and recycling through waste bank program. Waste bank is one solution to perform effective and sustainable waste management at community level which can provide economic benefits to them. This research is a quantitative descriptive study that was aimed to identify the amount of compensation fund that are willing to be accepted by the community from the existence of Waste bank. The respondents were 40 customers of waste bank Lintas Winongo in Kalurahan Bumijo, Jetis District, and Waste bank Surolaras in Kalurahan Notoprajan, Ngampilan District of Yogyakarta City. The data used in this study are of primary and secondary ones. The primary data obtained from direct interviews with respondents, meanwhilethe secondary ones were obtained from relevant governmental institutions and literature studies. The tools used for data collection were: stationeries, calculators, computers, questionnaire, and digital cameras. The Analysis of Willingness to Accept (WTA) employed Contingent Valuation Method approach by using Microsoft Excel 2007.The results show that the community's willingness to accept to the compensation is varied depends on the waste type that is deposited. The average amount of compensation fund that are willing to be accepted by the community is as follows: for plastic waste, IDR. 1,127.5/kg; for paper waste, IDR.1,605/kg; glass waste, IDR 475/kg; and metal waste, IDR. 2,145/kg. These results will support the related authorities a consideration of providing compensation to community in waste management effort with waste bank system.

Key words : waste, waste bank, willingness to accept/WTA.

1. INTRODUCTION

Waste problem is complex and has multi dimensional characteristic as it relates to some aspects such as social, economic, and several others. The increasing amount of waste each day over the years becomes a phenomenal problem and needs serious treatment, especially if it is related to the vision of Indonesia Waste Free in 2020. But the reality is: the people of Indonesia is not yet fully agree and has one frequency in realizing that vision. The increasing purchasing power to various kinds of staples and technology results and the increasing business or activities that support economic development in a region give major contribution to the quantity and quality of waste that is generated. Improved facilities and infrastructure, increasing population and changing consumption patterns will increase the volume, type and characteristics of the waste.

Waste management system is a complex, dynamic system, characterized by large number of stakeholders (therefore a society also), variety of types of waste generated (Costi et al., 2004, Bivainis & Podgaiskyte 2010). Inappropriate waste management is the most important factor in the formation of illegal landfills, breed of the parasites, and cause of unsanitary living conditions or contaminated drinking water, therefore disease breakthrough (Podgaiskyte, 2011). Properly organized and implemented waste management is important to make positive significant impact in general extent on natural environment, public health, and resource use. Nevertheless, changing lifestyles and consumption rates affectthe development of waste management technologies and methods.

Based on the data of the Ministry of Environment and Forests, in 2016 waste generation for nation wide is estimated reached 200,000 tons/day, or equivalent to 73 million tons/year. The biggest challenge of waste management is the handling of waste plastics that is not environmentally friendly. Based on the results of studies conducted in several cities in 2012, the pattern of waste management in Indonesia is as follows: transported and dumped in landfill (69%), buried (10%), composted and recycled (7%), burned (5%), and the

rest (7 %) is not managed. Currently, more than 90 % of regencies/ cities in Indonesia are still using open dumping system or even burn the waste.

Scientists Morrissey and Browne (2010) stated the sustainable municipal waste management system must be economically affordable, environmentally friendly and socially acceptable. The concept of sustainable development is based on three dimensional aspects of economy, social aspect and ecology. The scientists discussed the needs for the other aspects. In this context, Costi et al. (2010), Balkema et al., (2002), and Finnveden et al. (2007b) provided discussions on additional aspects of technology, institutional, functional and normative. Technological aspect execution provides the information about the system efficiency, while the economic, environmental and social aspects provide information in relation to its effectiveness. If is not conducted properly, then it will have negative impact on health, environmental and socio economic. The system analyses the environment of human activity and its impact on the environment through the technical, economic systems, social and ecological interactions.

In accordance to Mandate Act No. 18 of 2008 on Waste Management, the paradigm of waste management should be shifted from get-haul waste into reduction in the sources and recycling of the waste. The approach of end of pipe is replaced with: the principles of 3Rs (reduce, reuse, recycle), the responsibility of the manufacturer or extended producer responsiblity (EPR), recycled material (material recovery), recycled energy (energy recovery), use of waste (waste utilization), and the final processing of waste in the landfill environmentally. One of the current government efforts to address waste problem is disseminating the program of plastic waste sorting and recycling through waste bank Program.

Waste bank is one strategy to implement 3Rs (Reuse, Reduce, Recycle) in waste management at the source on community level. The implementation of waste bank in principle is a social engineering to urge people to sort their waste. Implementation of waste bank can also provide real output for community in the form of employment opportunities of the operational management and investment in the form of savings (Ministry of Environment, 2011). Waste bank activities is potential to improve the waste sorting at the sources and its presence can also bring economic benefits for the community.Based on data from the Environment Agency of Yogyakarta, until December 2015 there were a total of 405 waste banks with total customers as much as 16,563 households. The amount of waste that can be sorted in the waste bank reaches 5 ton/day. Every month,the inorganic waste are sold to collectors and the money are handed over to the owner of those waste.

With waste bank, there are some benefits to be gained at once, such as; first, it is one of the alternative solutions to manage household waste; second, it can play role as the media of effective environmental education for public about the importance of waste sorting and saving; third, it can increase local awareness of the importance of domestic waste managemen; fourth, it can create neighborhoods become healthy, clean and green; fifth, it reduce the volume of waste dumped in landfill, so they can save freight costs, extend the life of the landfill use and reduce air pollution around the landfill; and sixth, it can be a source of extra income for some people. Waste bank is potential to improve the sorting of waste at the sources and its existence can also provide economic benefits to the community.

People's dissatisfaction to the value of existing payment for environmental services is feared would encourage people to return to the pattern of economic activity that ignores environmental sustainability. Related with waste banks program that have been announced by the government of Yogyakarta, it is necessary to implement an economic instruments for approaching the value of people's willingness to accept the payment due to waste management efforts in the community. One of the approach is the Analysis Willingness to Accept (WTA) that is a measure of the concept of economic valuation of environmental goods. This measure provides information about the amount of compensation that is willing to be accepted by society on environmental degradation in the vicinity which is equivalent to the cost of the improvement of environmental quality. Assessment of the environmental goods in WTA questions what is the minimum amount of money a person is willing to be accepted by the (household) monthly or annually as compensation for environmental damage receipt. The purpose of this study was to determine the amountof compensation fund that is willing to be accepted by the community related with the existence of waste bank.

2. MATERIALS AND METHODS

This research was conducted at waste banks in Yogyakarta City area. The locations were determined intentionally (purposively) based on the consideration that the waste banks sample have highest number of customers compared to other areas in the city. The research involved 40 customers of two waste banks as the respondents, i.e. Lintas Winongo and Surolaras. The research was held in October 2016. The types of data collected in this study were primary and secondary ones. The primary data were obtained from direct interviews with respondents. To obtain the necessary data, the technique of data collection used was through interviews, questionnaires, documentation and observation.

The method to estimate the WTA of a community is by calculating the average of WTA value as well as calculating the WTA total (Hanley and Spash, 1993). CVM method uses direct approach which is essentially asking the community how much is the maximum of their willingness to pay (WTP) the additional benefits derived from the use, and or how much is their willingness to accept (WTA) the compensation of a decrease in the quality of environmental goods (Hanley and Spash, 1993)

a. Mean value of WTA

$$EWTA = \frac{\sum_{i=0}^{n} WTAx_i}{n}$$

EWTA = presumption value of WTA average
x_i = number of individual data
n = number of respondent
i = respondents to-i who are willing to accept the compensation fund (i=1,2,…,k)

b. Total value of WTA

Summation data is a process where the middle value deals is converted to the population. After estimate the median value of WTA, the value of community's WTA can be estimated through formula (Hanley and Spash, 1993):

$$TWTA = \sum_{i=0}^{n} WTA_i n_i$$

3. DISCUSSION

3.1. Characteristics of Respondents

In this study, the respondents surveyed are bank customers of Surolaras waste bank in Kalurahan Notoprajan of Ngampilan District and customers of Lintas Winongo Waste Bank in Kalurahan Bumijo of Jetis District, both in Yogyakarta City. The study was conducted toward 40 respondents who are consisted of 6 (15 %) males and 34 (85 %) females. Based on their age group, the majority of customers who become the respondents is aged between 40-60 years i.e. 65% (26 people), and the other age groups are: 30-40 years 12.5% (5 people), aged over 60 years 22.5% (9 people). For education level, it can be said that the high percentage of waste bank's customers who become the respondents were graduated from senior high school, i.e. 52.5 % (21 people); mean while for other levels: elementary school, 12.5% (5 people); junior high school 15 % (6 people); and university 20% (8 poeple). Based on respondents' occupation types, it is known that the majority of waste bank customers is housewife, i.e. 57.5% (23 people). Respondents who worked as entrepreneur/self employed were 27.5 % (11 people), employee/civil servant/military personnel/policeman/pensionerwere 12.5% (5 people) and farmer/ workers were 2.5% (1 people). Those characteristics of respondents can be seen in Table 1.

Table 1. Characterictic of Respondents

Variable	Frequency	Percentage
Gender		
Male	6	15 %
Female	34	85 %
Age-group (years)		
40-60	26	65 %
30-40	5	12,5 %
> 60	9	22,5 %
Education		
University	8	20 %

Senior High School	21	52,5 %
JuniorHigh School	6	15 %
Elementary School	5	12,5 %
Occupation		
Housewife	23	57,5 %
Entreprenur/Self Employed	11	27,5 %
Employee/Civil servant/ Military personnel /Policeman/Pensioner	5	12,5 %
Farmer/Worker	1	2,5 %
Income		
<IDR.1.000.000,	20	50 %
IDR.1.000.000 - IDR.2.000.000	14	35 %
IDR.2.000.000 - IDR.3.000.000	5	12,5 %
>IDR.3000.000,-.	1	2,5 %

Source : Primary data (2016)

3.2. The average value and the variation of WTA

WTA calculations can be done directly (direct method) by conducting a survey, and indirectly (indirect method) by calculating the value of the environmental degradation that occurs. In this study WTA calculation is conducted directly by means of survey and interview with waste bank customers in Kalurahan Bumijo and Notoprajan of Yogyakarta City. Before performing the analysis Willingness to Accept (WTA) it needs to identify the respondent's willingness to accept the payment value according to the scenario offered. There were 40 respondents whose opinions were asked about the willingness or unwillingness to accept the payment value according to the scenario offered. From the results, 100 % (40 respondents) stated willing to accept the payment value. The average value and the variation of the WTA that were counted were plastic waste, paper waste, glass waste and metal waste.

3.2.1 Mean value and variation of WTA of Plastic Waste

The average value and the variation of the WTA of Plastic Waste can be seen in Table 2.

Table 2 Respondents' WTA on Plastic Waste

No	WTA Value (IDR/kg)	Frequency	WTA Value Average (IDR/kg)	WTA Value Total
1.	1700	1	42,5	42,5
2.	2000	8	400	3200
3.	1000	9	225	2025
4.	500	13	162,5	2112,5
5.	600	1	15	15
6.	700	1	17,5	17,5
7.	1800	2	90	180
8.	3000	3	225	675
9.	2700	1	67,5	67,5
10.	2500	1	62,5	62,5
Amount		40	1127,5	8,397.5

Source : Primary data processed (2016)

From table 2, the results revealed that the magnitude of mean value of WTA of plastic waste is IDR. 1,127.5. The average amount of plastic waste generated by Lintas Winongo and Surolaras waste banks was 320.25 kg/month. The mean of total value of WTA for plastic waste is IDR.2,689,299.38/month.

The value of willingness to accept the compensation of plastic waste management is quite varied, for plastic waste, the lowest is IDR. 500/kg with frequency of the respondents is as many as 13 respondents (32.5 %);meanwhile the highest is IDR. 3,000/kg with 7.5 % respondents or 3 people. The highest frequency of WTA value is IDR. 500, -The percentage distribution about WTA value of plastic waste can be seen in Figure 1.
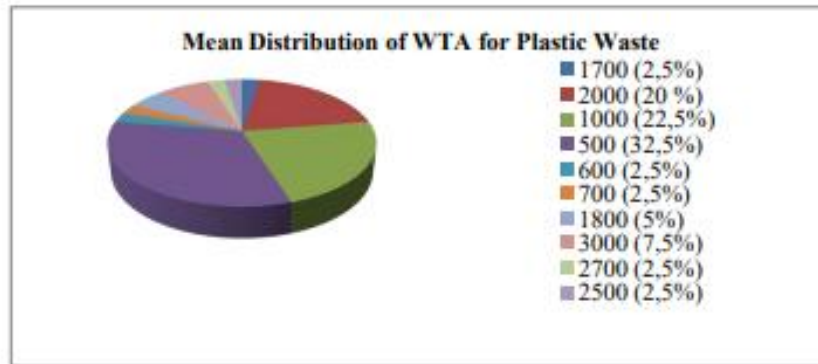
Figure 1: Mean Distribution of WTA of plastic waste

3.2.2 Mean value and variation of WTA of Paper Waste

The average value and the variation of the WTA of Paper Waste can be seen in Table 3.

Table 3 Respondents' WTA on Paper Waste

No	WTA Value (IDR/kg)	Frequency	WTA Value Average (IDR/kg)	WTA Value Total
1.	1700	3	127,5	382,5
2.	2000	7	350	2450
3.	5000	1	125	125
4.	3000	1	75	75
5.	4000	2	200	400
6.	1500	10	375	3750
7.	1300	1	32,5	32,5
8.	1800	1	45	45
9.	1000	5	125	625
10.	700	6	105	630
11.	500	2	25	50
12.	800	1	20	20
Amount		40	1,605	8,585

Source : Primary data processed (2016)

Based on the data that has been obtained from respondents and from the calculation, the magnitude of the mean value of WTA of waste paperisIDR. 1,605,-. The average amount of paper waste that is generated by Lintas Winongo and SurolarasWaste bankswas736,615 kg/month. The mean of total value of WTA for paper waste isIDR.6,323,839.78/month.

The value of willingness to accept the compensation of paper waste management starts from the lowest IDR. 500/kg stated by 2 respondents (5%), to the highest that is IDR. 5,000/kg stated by 1 respondents (2.5%). The highest frequency of WTA value is IDR. 1,500,- with as many as 10 respondents (25%) who declared it . The percentage distribution about WTA value of paper waste can be seen in Figure 2.

Mean Distribution of WTA for Paper Waste

- 1700 (7,5%)
- 2000 (17,5%)
- 5000 (2,5%)
- 3000 (2,5%)
- 4000 (5%)
- 1500 (25%)
- 1300 (2,5%)
- 1800 (2,5%)
- 1000 (12,5%)
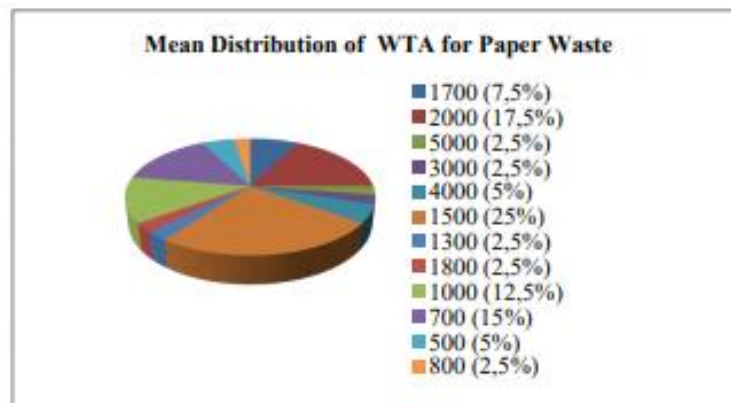- 700 (15%)
- 500 (5%)
- 800 (2,5%)

Figure 2 : Mean Distribution of WTA of paper waste

3.2.3 Mean value and variation of WTA of Glass Waste

The average value and the variation of the WTA of glass waste can be seen in Table 4.

Table 4 Respondents' WTA on Glass Waste

No	WTA Value (IDR/kg)	Frequency	WTA Value Average (IDR/kg)	WTA Value Total
1.	100	5	12,5	62,5
2.	1200	1	30	30
3.	500	14	175	2450
4.	1000	1	25	25
5.	200	10	50	500
6.	250	6	37,5	225
7.	2000	2	100	200
8.	1800	1	45	45
Amount		40	475	3,537,5

Source : Primary data processed (2016)

From Table 4, we note that the magnitude of mean value of WTA of glass waste is IDR. 475,-. The average amount of glass waste generated by Lintas Winongo and Surolaras waste banks is 108,555 kg/month. The mean of total value of WTA for glass waste is IDR.384,013.312/month. WTA value with the highest frequency is IDR.500,- i.e.14 respondents (35 %) .

The value of willingness to accept the compensation for waste management of glass starts from IDR. 100/kg by the number of respondents as many as five people (12.5%), to the highest IDR. 2,000/kg by the number of 2 respondents (5%). WTA value with the highest frequency is IDR. 500,- with a total of 14 respondents (35%). The percentage distribution about WTA value of glass waste can be seen in Figure 3.

Mean Distribution of WTA for Glass Waste

- 100 (12,5%)
- 1200 (2,5%)
- 500 (35%)
- 1000 (2,5%)
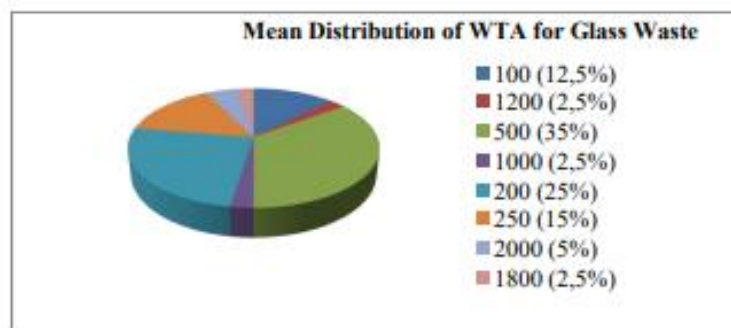- 200 (25%)
- 250 (15%)
- 2000 (5%)
- 1800 (2,5%)

Figure 3 : Mean Distribution of WTA of Glass waste

3.2.4 Mean value and variation of WTA of Metal Waste

The magnitude of mean value of WTA of metal waste is IDR. 2,145,-. The average amount of metal waste generated by Lintas Winongo and Surolaras waste banks is 85 kg/month. The mean of total value of WTA formetal waste is IDR.910,775,- /month. The average WTA amount of metal waste can be seen in table 5

Table 5 Respondents' WTA on Metal Waste

No	WTA Value (IDR/kg)	Frequency	WTA Value Average (IDR/kg)	WTA Value Total
1.	1700	3	127,5	382,5
2.	1800	4	180	720
3.	5000	2	250	500
4.	3000	5	375	1875
5.	2500	6	375	2250
6.	4000	2	200	400
7.	2000	3	150	450
8.	1600	10	400	4000
9.	600	1	15	15
10.	200	1	5	5
11.	1000	2	50	100
12.	700	1	17,5	17,5
Amount			2,145	10,715

Source : Primary data processed (2016)

The value of willingness to accept the compensation for waste management of metal waste starts from IDR. 200/kg stated by the 1 respondents (2.5%), to the highest that is IDR. 5,000/kg with 2 respondents (5%). WTA value with the highest frequency is IDR. 1,600, - with as many as 10 people who stated it (25%). The percentage distribution of the value of WTA for metal waste can be seen in Figure 4.

Mean Distribution of WTA for Metal Waste
- 1700 (7,5%)
- 1800 (10%)
- 5000 (5%)
- 3000 (12,5%)
- 2500 (15%)
- 4000 (5%)
- 2000 (7,5%)
- 1600 (25%)
- 600 (2,5%)
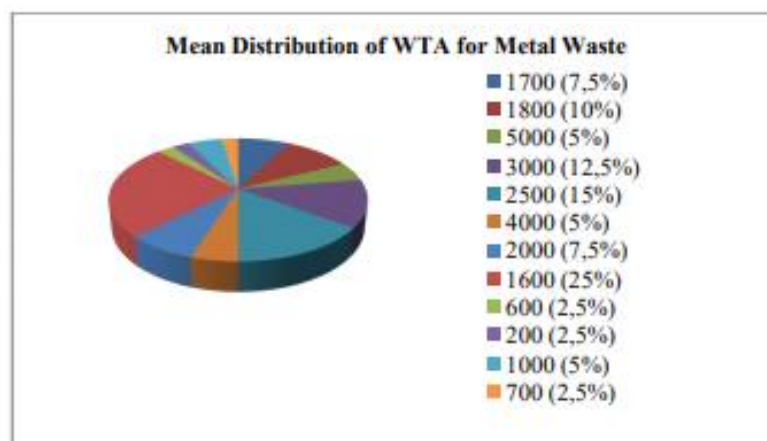- 200 (2,5%)
- 1000 (5%)
- 700 (2,5%)

Figure 4 : Mean Distribution of WTA of metal waste

The amount of the payment for environmental services of waste management that is willing to be accepted by the customers of Lintas Winongo and Surolaras Waste Bank varies depending on the type of waste that is deposited. When compared with the prevailing prices in the waste bank,i.e. plastic waste at IDR 800, -

/kg, paper waste at IDR. 1,300, -/kg, glass waste at IDR 200, -/kg, and metal waste at IDR.1,800, -/kg, the value of the willingness to accept (WTA) the compensation fund by community is slightly higher. This is reasonable because the price of the needs that must be fulfilled by community is also increase. Most of the respondents have income less than IDR 1,000,000/month (50%), thus this is lower than the minimum wage of the City (MSEs) in Yogyakarta in 2016 which is amounted to IDR. 1.452.400/month.

The significant positive effect of income, level of education and age on WTA corresponds with the previous related findings by Goldar and Misra. For female respondents who were found to have positive relationship with WTA, they show more concern to the management of domestic waste compared with their male counterparts. Such conditions cause people cannot meet theirneeds for living properly,sothey tend to look for other additional income. This findings fit well with the results of a research conducted by Ramadhan that the higher the income of the respondents, the smaller their WTA value. This is because high income respondents feelthey are quite well-off to spend the expense for overcoming the negative impact of presence waste, so that the expected value of the compensation fund is not high. Conversely, people with lower incomes tend to expect greater compensation value.

CONCLUSION

Municipal waste management is a complex issue with impact on economic, environment and social living. .Municipal waste management system must be economically affordable, environmentally friendly and socially acceptable. Based on the results and discussion of this research, it can be concluded that the amount of respondents' WTA toward waste management of waste bank program is varied depends on the type of waste that is deposited. The mean value of compensation fund that are willing to be accepted by the community (WTA) for plastic waste is IDR. 1127.5/kg, for paper waste is IDR.1605/ kg, for glass wasteis IDR 475/kg, and for metal wasteis IDR. 2,145/kg. These results will help the related authorities a material for the consideration of providing compensation to community in the effort of waste management with waste bank system.

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