

# Municipal Waste Management Dissemination to Rural Society: A Preliminary Action Research

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**Abstract** - The increasing waste due to increasing population and consumption in rural area led municipal waste management in rural area essential. However, most of rural area did not have well developed municipal waste management for some reasons. This community service intended to provide a contribution to society to manage municipal waste in rural area. Action research is implemented in this community service. Focus Group Discussion (FGD) was applied to identify what are the main problems and decided what actions will be conducted during community service. From the first FGD, we concluded that the activities should be prepared were providing information related to negative impact of disposing municipal waste illegally, understanding on the type of municipal waste and how to separate them as well as training to manage municipal waste in simple way through Takakura method. Those activities, then, conducted through a workshop on municipal waste management in household level.

**Keywords:** Community service, municipal waste management, Takakura method.

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## I. INTRODUCTION

Commonly, waste management studies have been frequently conducted in urban area. It affects urban people tend to have well behaviour related to waste management. About 51% households said that their municipal waste were collected by bin man, whilst only 3.59% rural households did the same [1]. This shows that waste management is not merely urban problem but there is also a big challenge in rural area.

Most of rural area are underdeveloped. Waste management infrastructures in such area, consequently, are not as well developed as urban area. Lack of financial budget in rural area is one of the causes. Moreover, government policy towards waste management will affect the development of related infrastructures. In contrast with rural area, in general, development of waste management system to overcome waste problem in urban area are well supported by local government. Besides, perception that every rural household have already had their own waste disposal in the backyard is also the cause of lack of waste management system in rural area [2].

Apart from that, lack of knowledge of society have close relation to lack of people's behaviour related to waste [3]. Knowledge can be affected by education level and access of information about environment related regulation. Those are the antecedents of people's behaviour related to waste management in Indonesia [4].

A survey on people's behaviour related to waste conducted by *Badan Pusat Statistik* (BPS) shows that about 88.5% rural people burned their municipal waste, while 51% urban household did the same [1]. Meanwhile, about 25% and 11% rural and urban households, respectively, buried municipal waste in the land [1]. Both methods have disadvantageous effects if not properly done; burning municipal waste produces GHGs (greenhouse gasses) while burying municipal waste in the land may produce methane (CH<sub>4</sub>), also a kind of GHG, that contributes to global warming. Moreover, disposing municipal waste to rivers also a common practice which lead to flooding event during rainy seasons. Whereas, if well managed, municipal waste can contribute to generate household's income, for example by producing compost from the organic fraction of the waste.

People awareness and willingness to manage their municipal waste is needed in order to develop waste management system in one area. Waste bank (Bank Sampah) and Takakura composting methods are two alternative solutions for municipal waste management for household level in the situation where local governments have not yet provided Temporary Disposal Site. In 2012, there were about 886 *Bank Sampah* that had 84 thousand customers and were able to manage Rp 3.18 billion a month [5].

This paper aims to provide analysis of community service project related to waste management that have been conducted in Gedaren Village, Klaten, Central Java. The main aim of the

project is to offer waste management system that meet society needs.

## II. PROBLEM'S DIAGNOSIS

Location of the study was in *Rukun Warga* (RW) 4 in Derepan, a hamlet which is located in Gedaren Village, Jatinom, Klaten, Central Java Province. Gedaren is located 30 minute or 18 km far from the centre of capital city of Klaten Regency and 37 minute or 26 km far from Kartasura, Sukoharjo.

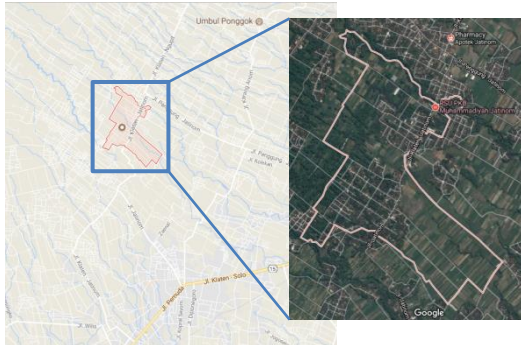


Figure 1. Location of study: Dukuh Derepan, Gedaren, Jatinom, Klaten, Central Java

RW 4 contains seven *Rukun Tetangga* (RTs). This area is inhabited by 647 people which constitute 205 households. Most of inhabitants in RW 4 are farmers and traders with the lowest education level of secondary school. This level of education influences them to easily accept new information and technology. They also have willingness to overcome the problem of municipal waste.

At the time of study, this area did not have municipal waste Temporary Disposal Site (TDS). Most of households that did not have backyard disposed municipal waste to the river. They thought that municipal waste that was thrown to the river would follow water flow. However, it did not. Hence, the river banks were full of rubbish and dirty as shown by Figure 1. They also burned the waste in their back or front yard and created air pollution. This problem need to be solved.

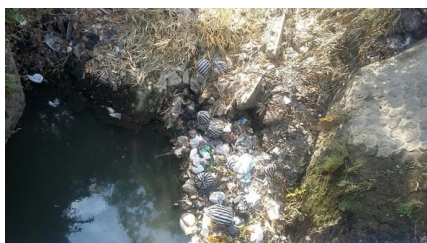


Figure 2: Municipal waste in the river in Derepan.

However, the root of waste management problem must be identified first. In this community service activity, the approach to identify the problems was an action research. Hence, problem diagnosis was determined by focus group discussion (FGD) with

local community. Society members, community organisations, local leaders and researchers are involved in the discussion to identify the problems.



Figure 3: Inhabitant burns municipal waste in front of his house.

Result of FGD shows that the need to improve social awareness to manage municipal waste and understanding on the negative impact of municipal waste in RW 4, Gedaren Village, was viewed as essential. Changing behaviour of society related to municipal waste such as disposed municipal waste in illegal places (e.g. river, unintended land) and burning municipal waste should be limited. Information about health and environmental impact of municipal waste should be transferred to society. This may increase society understanding and improve health and environmental awareness [3]. Study in Muaro Jambi shows that knowledge of people on environmental impact of municipal waste influences their behaviour related to municipal waste [6]. Hence, information related to municipal waste management in household level should be informed to society as the first action to deal with waste management in RW 4, Gedaren village, Klaten, Central Java. Then, we agreed to deliver a lecture and workshop about household's municipal waste management as the first action to solve the problem of waste management in domestic level.

## III. PRELIMINARY ACTION RESEARCH: GIVING INFORMATION AND WORKSHOP TO MEMBER SOCIETY

After preliminary study through Focus Group Discussion with community leaders, member of society and researcher, the initial action was giving information about domestic waste to member of society and provide workshop to manage organic waste through Takakura method. Information related to environmental regulations is the initial knowledge to increase social awareness. Introduction to type of municipal wastes, how to deal with each type of waste, how to manage organic waste and how to manage inorganic waste are discussion topics delivered to society. Information related to separating inorganic and organic waste is also emphasised.

An introduction to waste bank was delivered to participant to deal with inorganic municipal waste. Even though Gedaren village didn't have waste bank, separation inorganic from organic waste is essential activities. Sell inorganic wastes to waste collector is an alternative before developing Bank Sampah.

Meanwhile, organic waste or green waste which contains of food and garden waste can be buried to produce compost. But it may produce methane that influences global warming. Takakura composting, hence, selected as an alternative method to manage organic municipal waste and it was delivered as a workshop.

Takakura waste composting method was introduced to participants because this method is seen as the easier way to manage organic waste in a household level. Recently, most of rural households didn't have enough yard to bury their waste as a result of increasing population. But, the need of managing organic municipal waste is inevitable. Takakura composting can be implemented in small house with small backyard. Compost resulted can be directly used for agriculture or sell it as the source of family's income.

In this first activity of community service, information about Bank Sampah and Takakura are two activities introduced during workshop. But, Takakura composting is selected to be demonstrated during the workshop. Participants involved during workshop, hence, they could implement Takakura assisted by the researchers.

#### IV. THE EFFECTIVENESS OF THE WORKSHOP AND ACTION FOLLOW UP ACTION

After delivering the workshop, effectiveness of those delivering methods for giving information about municipal waste management is evaluated. Wilcoxon Statistical test for identify the changes and effect size to identify the impact of workshop.

Wilcoxon test is applied because the data is Likert scale which is categorised as ordinal data. Clearly, the data does not follow normal distribution. Five scale of Likert used to evaluation, where point 1 to 5 means "really don't know" to "really know". In this scale, point 3 is a neutral.

Meanwhile, effect size is measured through dependent group effect size ( $\Delta$ ) that is calculated through  $(\mu_{pre} - \mu_{post})/\sigma_d$ . When the absolute effect size value ( $\Delta$ ) is equal to 0.2, it is categorised as small changes. Meanwhile, when absolute effect size values ( $\Delta$ ) are equal to 0.5 or 0.8 are categorised as medium large changes.

Test of workshop effectiveness using 35 people among 54 people who filled the evaluation questionnaire. Five questions that represent five main theme delivered in the workshop are asking in the questions. Those themes are about understanding of participant to organic and inorganic waste, to manage inorganic waste, to manage organic, waste can generate money and Takakura composting.

*P-value* Wilcoxon tests presented in Table 1 shows that there are significant changes of the understanding of participant to five themes. Moreover, effect size values of four themes – organic and inorganic waste, managing inorganic waste, managing organic waste and home composting - more than 0.8. That means the impacts of delivering information about those themes are very large. The largest impact is the information on managing inorganic municipal waste.

Meanwhile, only one question on the understanding that waste can generate money has value 0.75. This means the impact of information that municipal waste can generate money has medium to small impact to improve knowledge society.

After the workshop, one pages of guideline of Takakura composting are given to all participants. This help them to practice Takakura composting at their home.

TABEL 1.  
 WILCOXON TEST AND EFFECT SIZE

Variables	Mean ( $\mu$ )		Standard deviation ( $\sigma$ )		Mean of difference	Standard Deviation	Z (Wilcoxon-est)	p-alue	Effect size ( $\Delta$ )
	Pre	Post	Pre	Post					
Understanding on organic and inorganic waste	2.86	4.03	1.03	0.45	-1.171	1.014	-4.245	0.000*	-1.15
Understanding to manage waste that contains of plastic, paper, can and bottle waste (inorganic)	2.57	3.86	0.95	0.65	-1.286	0.957	-4.562	0.000*	-1.35
Understanding to manage waste that contains of food, garden and lawn clippings	2.66	3.89	0.95	0.47	-1.229	0.973	-4.600	0.000*	-1.26
Understanding that waste can generate money	2.74	3.46	0.98	0.95	-0.714	0.957	-3.500	0.000*	-0.75
Understanding to domestic waste composting method	2.57	3.83	0.92	0.71	-1.257	1.010	-4.522	0.000*	-1.25

## V. CONCLUSION AND DISCUSSION

Delivering information through training and workshop in this community service has significant impact to improve knowledge of participants to manage municipal waste. Willingness of participant to implement municipal waste management improved as they already know how to manage municipal waste.

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