

A Study on The Behaviour of The Residents at Felda Soeharto regarding Solid Waste Separation

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Abstract: The increasing amount of solid waste generation is becoming a global concern that is causing many problems to the environment and its living things. Among the problems due to the increasing of solid waste to human health include the low birth weight and cancers. The problem of solid waste also endangers the ecosystems of animals and plants and pose them to the threat of extinction. One of the measures that can be taken to reduce the amount of solid waste generation is by practicing the 3R concept. Therefore, a study was conducted to investigate on the behaviour of the residents staying at Felda Soeharto towards waste separation. The data collection is carried out in 2 stages: i) Part 1: Questionnaire survey; and ii) Part 2: Experimental awareness campaign. For Part 1, a self-administered questionnaire was distributed to the residents at Felda Soeharto to evaluate their perception in practicing the 3R concept in their daily life activities. The results will be analysed using SPSS software. In Part 2 of the data collection, an experimental campaign on waste cooking oil (WCO) was conducted for a duration of 2 months. The purpose of the campaign is to investigate the respondent's willingness to take part in the campaign. At the end of the campaign, the WCO accumulated were recorded and sent to the recycling facilities for disposal. From the results obtained, it can be concluded that majority of the respondents are willing to practice 3R concept. However, the lacked recycling facilities in the study areas discarded their practice.

Keywords: Household Waste, Waste Separation, Waste Cooking Oil, Municipal Solid Waste

1. Introduction

Over the years, solid waste issues have gained significant attention from all around the world. The transformation of new economies and technologies have led to an increase in the number of solid wastes as urbanization and population increased. In Malaysia, solid waste generation has increased drastically from 12.3 million tons in 2013 to 13.9 million tons in 2018 and is expected to rise up to 15.6 million tons by year 2020 [1].

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The increasing of solid waste brings serious social threats on the environment and its living things including air, water, and soil pollution. In terms of human, it represents a real threat to human health such as low birth weight, congenital anomalies, and cancers [2]. All the solid waste generated will produced more dangerous gases when disposed through landfill such as carbon (CO)₂, biogas (CH)₄, water, and heat [3]. The process caused certain odors other than spreading of diseases to various vectors such as birds, insects, and rodents. In terms of animals, improper disposal of solid waste such as ocean dumping, oil spills, littering gives an impact to the animals and eventually suffocates marine life such as coral and fish [4]. This contributes to a loss of oxygen to mammals and other fishes and causing them to die in their natural habitat.

The government of Malaysia has enforced mandatory of Solid Waste Separation at Source in 2015. The Regulation requires Malaysians to segregate their waste according to its category before disposal. Unfortunately, the program was proven to be unsuccessful when the involvement remains low among Malaysians after three years of the implementation of the programs [5]. The urban population are more aware on waste separation concept compared to rural population. One of the factors that contribute to lower exposure of waste separation in rural areas is geographical condition. The existence of mountains, valleys, highlands, karst regions and wetlands make it more difficult to incorporate effective waste management facilities in rural areas. Therefore, it is important to investigate the behaviour of the residents at Felda Soeharto towards waste separation.

2. Literature Review

Municipal Solid Waste (MSW) or commonly known as trash is a type of waste consisting of everyday items that are discarded by the public. Among the items that can be classified as MSW include product packaging, grass drippings, furniture, clothing, bottles, food scraps, newspaper, and batteries. The largest contributors of MSW comes from residential areas or also known on the household waste [6,7]. Household waste can be defined as any waste generated from domestic source, represents over two-thirds of the municipal solid waste stream and internationally a large part ends up at landfills [8]. Household waste are classified based on their physical compositions which are biodegradable and non-biodegradable waste. Physical Composition of Household Solid Waste is represented in Table 1.

Table 1: Physical Composition of Household Solid Waste [9]

Physical Composition	Basic Classification	Examples
Biodegradable	Food Waste	Vegetables, meats
	Garden Waste	Dried leaves, twigs, cut grass
	Plastics	Plastic bottles and packaging
	Textile and Rubber	Clothes, leather products
Non-biodegradable	Paper and Box	Newspaper, various type of paper and box products
	Glass	Various type of glass products used in home, laboratory etc.
	Metal	Ferrous products, zinc, chromium, and various type of metal products.

Household waste can be categorized as biodegradable and non-biodegradable waste (refer to Table 1). Biodegradable waste refers to waste that can be decomposed completely through biological processes. Non-biodegradable waste refers to waste which cannot be decomposed through biological

processes [10]. There are two types of non-biodegradable waste, i.e., recyclable and non-recyclable wastes. Recyclable waste is waste with economic value as it can be recovered and reused while non-recyclable waste is waste which does not have economic value.

Over the years, there have been many studies conducted by researchers from all around the world regarding MSW. A few issues discussed related to MSW include knowledge on waste separation, insufficient of waste collection and recycling facilities, and accessibility to recycling bins. The selected studies related to the MSW are summarized in Table 2.

Table 2: Summary of selected studies regarding MSW

Criteria	Description	Sources
Knowledge on waste separation	Younger generations are less inclined to recycle compared to the elderly citizens. This might be because the older individuals may be at a phase in their lives that is closer to retirement, or may already retired, hence, they have more time to recycle as compared to the younger individuals.	[11]
	20 respondents participated at Banting, Selangor had moderate level of awareness on waste separation. They have knowledge on waste separation practice but they did not put this into practice in their daily life.	[12]
Insufficient of waste collection and recycling facilities	82 of the respondents agreed that they are more willing to practice recycling if the municipal provides better facilities for waste separation at the curbside.	[11]
	Lack of recycling facilities or inappropriate location of recycling facilities are among the challenges that discourage the householders to practice waste separation and recycling.	[13]
Accessibility to recycling bins	564 respondents from university community agreed that accessibility to recycling bins are the most important attribute in fostering waste separation behaviour.	[14]
	Placement of recycling bins that is within the reach of the public that can be accessed only by walking distance from their staying area will increase the recycling rate among the community.	[15]
	Placement of adequate number of recycling bins and within reach is important to encourage people to recycle and separate their waste efficiently.	[16]

3. Methodology

In this study, the data collection is carried out in two stages: i) Part 1: Questionnaire survey; and ii) Part 2: Experimental awareness campaign. For Part 1, a self-administered questionnaire was distributed to the residents of Felda Soeharto to evaluate their perception in practicing the 3R concept in their daily life activities. The results will be analysed using Statistical Package for Social Science (SPSS) version 22.0. The SPSS software was used for organizing, describing, and analyzing data from the questionnaires to produce information on the descriptive statistics, cross tabulation, and correlation test.

In Part 2 of data collection, an experimental campaign on WCO was conducted for a duration of 2 months. The purpose of the campaign is to investigate on the respondent's willingness to take part in the programme. Posters on how to separate the WCO in a proper manner were prepared for the residents. A temporary collection area was also provided for the residents to deposit their WCO. Apart from that, a reward programme was also designed to encourage the residents of Felda Soeharto to take

part in the campaign. At the end of the campaign period, the WCO accumulated were recorded by using Microsoft Excel Spreadsheet and sent to the recycling facilities for disposal.

4. Results and Discussion

Part 1: Questionnaire survey

Demographic profile and background of household waste

A total of 120 of respondents at Felda Soeharto took part in the survey. The demographic profile of the respondents in terms of age, gender and educational background is summarized in Table 3.

Table 3: Summary of respondent’s demographic profile (n=120)

Variable	Descriptions	Frequency	Percentage (%)
Gender	Male	56	46.7
	Female	64	53.3
Age	25 years and below	18	15.0
	26 - 35 years	20	16.7
	36 - 45 years	30	25.0
	46 - 55 years	27	22.5
	56 years and above	25	20.8
	Level of Education	No Education	11
	Primary School	20	16.7
	Secondary School	48	40.0
	College/Institution	19	15.8
	University	22	18.3

From Table 3, it can be summarized that from 120 respondents participated in this survey, 56 respondents (46.70 %) were male, and 64 respondents (53.30 %) were female. In terms of age, majority of the respondents were between the ages of 36-45 years old (30 respondents, 25.00 %). This is followed by 46-55 years old (27 respondents, 22.50 %); above 56 years old (25 respondents, 20.80 %); 26-35 years old (20 respondents, 16.70 %) and below 25 years old (18 respondents, 15.00 %). In terms of level of education, 40.00 % of the respondents received their education until secondary school (48 respondents). This is followed by 18.30 % who had university education (22 respondents); primary school at 16.70 % (20 respondents); college/institution at 15.80 % (19 respondents) and no education at 9.20 % (11 respondents).

In general, there are various types of waste produced by the respondents. The findings are shown in Figure 1.

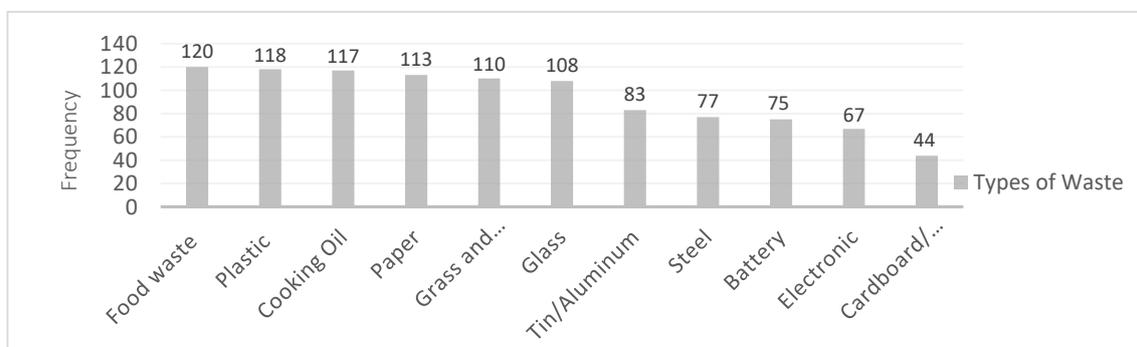


Figure 1: Household waste generated by the respondents

Based on the Figure 1, 100.00 % of the respondents generated food waste. The results obtained is line with findings conducted by [17] that claimed Malaysians tend to produce more food waste rather

than other types of waste and the amount of food waste produced rises between 15.00-20.00 % during festive seasons [18]. In addition, the results also revealed that 97.50 % of waste cooking oil (WCO) were produced in Felda Soeharto. This is supported by a survey conducted by [19,20]. In their research, they concluded that approximately 40,000 tonnes/year of WCO were produced in Asian countries such as China, Malaysia, Indonesia, Thailand, Hong Kong, and India, making it as one of the contributors of domestic waste.

In terms of the methods used by the respondents to dispose their waste, the findings indicated that ‘collected by a hired contractor’ was the most common methods practiced by the respondents. Seeing that there is no garbage collection service provided by the Felda management, the residents had to pay a contractor to collect their waste to be disposed at an open space that used to be a factory at Felda Soeharto. Other methods of disposal include threw in the open space or road-side, dug a hole around the house and burn it, dug a hole around the house and plant it, and threw into the river/drain/trench. The findings are summarized in Figure 2 below.

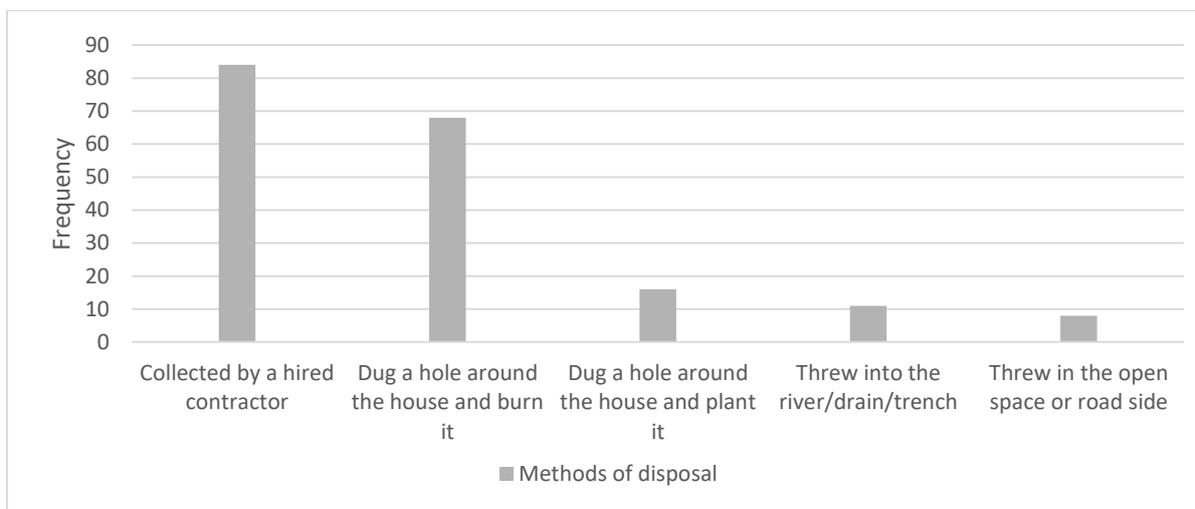


Figure 2: Disposal methods practiced by respondents

From the survey, it was revealed that majority of the respondents did not practice waste separation at source (refer to Figure 3). Only a minority of the respondents (35 respondents, 29.00 %) separated their waste.

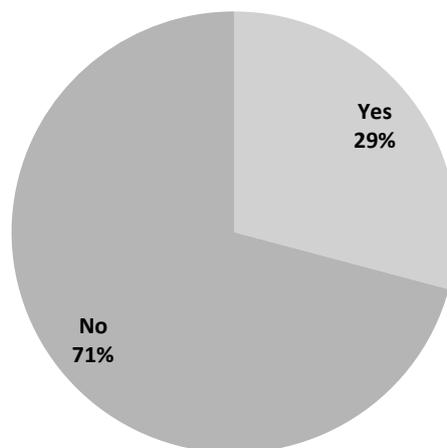


Figure 3: Willingness to separate waste

A correlation test was carried out to see the relationship between gender, age and level of education and respondent’s willingness to separate the waste. The results are illustrated in Table 4.

Table 4: A correlation test between gender, age, and level of education and willingness to separate the waste

Description		Gender	Level of education	Willingness to separate the waste
Gender	Person Correlation	1	-0.074	-0.086
	Sig. (2-tailed)		0.425	0.352
	N	120	120	120
Level of education	Person Correlation	-0.074	1	-0.184*
	Sig. (2-tailed)	0.425		0.044
	N	120	120	120
Willingness to separate the waste	Person Correlation	-0.086	-0.184*	1
	Sig. (2-tailed)	0.352	0.044	
	N	120	120	120

*. Correlation is significant at the 0.05 level (2-tailed)

From Table 4, it can be concluded that there is no significant relationship between gender, age, and level of education and willingness to separate the waste. This is supported by [21] that claimed gender, age, and education are statistically important in determining an individual’s willingness to separate waste but are not statistically significant for the waste separation behaviors in individuals. In other words, it can be said that education only is not sufficient enough to stimulate waste separation behaviors in an individual. However, according to [22], age and gender are significant predictors of household waste separating behaviors in individuals.

Perception of respondents that practice waste separation and 3R in their daily activities

Table 5: Reasons given by the respondents for practicing waste separation and 3R

Descriptions	Disagree	Agree
Love the environment	0	25
3R practice can reduce environmental problems	2	22
Feel satisfied for being able to help to minimize problems related to solid waste	2	21
Waste separation can save money	5	20
Waste separation is an easy process to implement	2	19
Able to generate income from selling the recyclables	3	16
To avoid penalties	16	14
Being forced by family and friends to practice 3R	24	7
Saw other people practice 3R	26	6

Table 5 revealed that majority of the respondents (25 respondents) claimed that their love towards the environment was the main reason for them to practice 3R in their daily life. This is followed by ‘3R practice can reduce environmental problems’ (22 respondents) and ‘feel satisfied for being able to help to minimize problems related to solid waste’ (21 respondents). Apart from that, some of the respondents separated their waste because they feel that waste separation can save money in addition to being able to generate income from selling the recyclables (20 respondents and 16 respondents respectively).

Perception of respondents for their refusal to practice waste separation and 3R in their daily activities

Table 6: Reasons given by the respondents for not practicing waste separation and 3R

Description	Disagree	Agree
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Waste separation requires extensive use of bins and plastics	10	71
I do not have the time to do it	13	66
Waste separation is a time-consuming process	19	56
Waste separation is a complex process	24	48
I do not know how to separate the waste according to its category	48	20
It is difficult to remember the categories of waste that needs to be separated	48	18
I do not see the importance of the household waste separation	51	14
I do not think it is my responsibility	53	11

From Table 6, it can be concluded that ‘Waste separation requires extensive use of bins and plastic’ (77 respondents) was the main reason given by the respondents for refusing to separate their waste. This is followed by ‘I do not have the time to do it’ (66 respondents) and ‘waste separation is a time-consuming process’ (56 respondents). A study conducted by [11] on the effects of socio-economic influences on households recycling behaviour revealed that most respondents who work do not have time and energy to separate the waste. This is also agreed by [23]. Their research on the barrier towards household waste recycling at South Africa concluded that no space, no time and dirty are the reasons for people do not recycle.

From the results obtained, it can be concluded that the respondents were aware on the importance of waste separation and 3R practice. Nonetheless, their willingness to practice 3R in their daily life is still at the unsatisfactory level.

Part 2: Experimental awareness campaign

A simple experiment is carried out to identify the respondent’s willingness to participate and practice the 3R’s concept in their daily activities. A campaign on WCO was conducted whereby the respondents were asked to accumulate their WCO in a proper manner before sending them to recycling facilities. The amount of WCO accumulated was weighed and recorded every week for 2 months before selling them to a vendor that collect WCO. The results are presented in Table 7.

Table 7: Total of WCO accumulated during study period

Weeks	Total amount of WCO (Kg)
W1	1
W2	1
W3	2
W4	3
W5	3
W6	4
W7	5
W8	8
Total	27

From Table 7, it can be concluded that the total of WCO accumulated weekly was increasing. From observation, it can be said that during Week 1, majority of the residents were still unaware of the presence of the campaign. Starting from Week 2, people started to become aware of the campaign and took part in them. Even though at the end of the campaign only 27 kg of WCO were accumulated, nevertheless, the positive increasing trend of WCO collected every week indicated that the residents were willing to separate their waste if recycling facilities are provided. This is also agreed by [11]. Their research revealed that majority of the respondents agreed that they are more willing to practice recycling if the municipal provides better facilities for waste separation.

5. Conclusion

This paper investigates on the behaviour of the residents staying at Felda Soeharto towards waste separation. The results showed that the participation of the respondents in practicing waste separation at source were still considered low. However, the residents are willing to practice waste separation if recycling facilities are provided.

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