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A PRELIMINARY STUDY ON HOUSEHOLD READINESS TO ENGAGE IN WASTE SEGREGATION BEHAVIOR

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Abstract

In Malaysia, two critical issues are identified in waste management: (i) lacking of readiness towards recycling and (ii) segregating. If not properly managed, it leads to massive waste generation at the landfill. Uncontrollable massive waste generation in landfill has various negative impact towards the community. For this reason, this project aims to investigate the household readiness towards waste segregation in one of the cities in Malaysia, Kuantan. The project employs 364 houses for sampling, but only 283 give the response and are willing to participate in this project. This project has two main findings: i) waste generation for each residential area, and statistics on readiness of household towards waste segregation. In conclusion, this project anticipates that only very few numbers of households that are participating in waste segregation. This situation reflects the current scenario in Malaysia. This number only came from one of the cities in Malaysia. With this limited study within limited area of research, this project notes that lacking of readiness would not help the government, or related agencies to make it success of waste segregation project. In fact, this project is crucial for the purpose of sustainable development goals.

Keywords: Recycle, landfill, waste segregation, readiness, Malaysia.

1. Introduction

Malaysia, with an area of 330,803 km and has a population of approximately 32,344,164 as of March 27, 2019 (Malaysia Population, 2019). Malaysia has three distinct ethnic groups Malays, Chinese, and Indians. It describes that Malaysia's number population is on rise and has diversity in culture. This scenario indicates that Malaysia has variety of food consumption and lead to variety waste generation.

Recent report notes 55% of solid waste disposed at landfills comprise food (Bernama, 2018). In number, Malaysian generated average of 38,000 tons of solid waste daily and out of these 38000 tons, only 24% were recycled meanwhile 76% went to landfill (Lim, 2018) and estimated to continue increase by the year 2020. These statistics reveal that the behaviour of recycling and segregating are connected. It tells that if the households do recycling; it indicates that the household is doing waste segregation. However, if these two behaviours (recycling and segregating) do not exist, hence, leads to massive waste generation in landfill.

1.1. Research Background

Based on the report, recycling rate is only 17.5% in 2017 (The Star Online, 2017), that is far behind from other developed countries (they are reaching more than 40% (The Sun Daily, 2015). Even the value is quite small (17.5%), it shows that community start to react positively towards government initiatives. (The Star Online, 2017). Vice versa, at most 70% to 80% of recyclable items found in the landfill (Moh & Manaf, 2014). A research conducted in northern Malaysia showed that more than half of household (the respondents) are not interested to participate in recycling activities, the most given reason they did not participate was how 'inconvenient it was' (distant, no facilities provided, not important to do recycling) (Omran et al., 2009). Surprisingly, numbers of household revealed that recycling is kind of wasting behavior (Omran et al., 2009). Above findings, showing only small supports received from Malaysia community on recycling and segregating the waste.

This project anticipates that Malaysian do not want to participate due to several reasons:

i) their attitude, or

ii) culture, or

iii) not much exposure received on recycling, or

iv) not much reading on the aspect of recycling

v) Not much information on recycling and segregating is shared via internet or physical method.

The above scenario does not help to solve the Malaysia environment issues, as above mentioned it generates massive waste in the landfill. From the statistic view, Malaysia community disposed about 60% waste in a landfill and currently, more than half of the available landfills has reached to maximum capacity (Ghazali et al., 2014; Johari et al., 2012). There are two types of landfill in Malaysia, sanitary and non-sanitary. Sanitary landfill very helpful and useful, but we have very few of its (see Table 01 below).

Table 01. Landfills in Malaysia in as at 2016

Location (State)	Number of sanitary landfills	Number of non-sanitary
Perlis	-	1
Kedah	1	6
Pulau Pinang	1	1
Perak	1	15
Selangor	4	4
Wilayah Persekutuan	-	-
Negeri Sembilan	1	4
Melaka	1	-
Johor	3	9
Pahang	8	8
Terengganu	-	9
Kelantan	-	11
Sabah	1	21
Sarawak	3	43
Wilayah Labuan	-	1
Malaysia	**24**	**133**

Source: Kompendium Pengurusan Sisa Pepejal Malaysia, Edisi 1 (2017)

In non-sanitary or open dumping landfill, not all waste is pre-treated (Hassan et al., 2006; Visvanathan et al., 2005). Apparently, these two landfills: 1) non-sanitary and 2) open dumping landfill are public known in our country (Idris et al., 2004; Latifah et al., 2009). However, these landfills may contribute to CO_2 gas emission and leachate (Hassan et al., 2006). For instant, in 2006, the issues of contaminated drinking water in Klang Valley forced many government agencies to get involved in waste management system. As a result, government builds more sanitary landfills and strictly forbidding opening new dumps (Fauziah & Agamuthu, 2012).

The above discussion extracted three issues: 1) recycling rate is increasing but at a slow pace, 2) limited number availability of landfill, 3) Pre-treated of waste due no segregation from source. A proper waste segregation behaviour helps tackle those three issues, however, Malaysia is still lacking in terms of exposure on information related to waste segregation processes including "what, how, why questions.

On top, government also has played its role such as launching the campaign of waste segregation among the households and introduced the act on Solid Waste and Public Cleansing Management Act 2007 (Act 672) and it becomes mandatory in September 2015. The government provides only for residents in urban area but not in rural; the rural residents still dispose the waste illegally by open air burning and open dumping (Moh & Manaf, 2014).

Nevertheless, waste separation practice by public in Malaysia is still low and still in tradition waste handling: scavengers do the most the waste segregation in landfill site. The entire problem of the waste separation comes from the public where Malaysia still far behind in terms of cognitive awareness towards hygiene, to have empathy, responsibility towards change behavior that involves waste self- management (Moh & Manaf, 2014). Thus, it is important to investigate the readiness behaviour of Malaysian towards waste segregation.

2. Problem Statement

As noted in previous discussion, the average for waste generation rate is from 0.8kg/cap/day – 1.12kg/cap/day and the recycling rate increasing from 5% to 17.5%. The worry point is the i) waste dumped in landfill is increasing yearly and ii) Malaysia has 155 landfills, but only 12 of them are sanitary landfills. Due to using an over capacity landfill, the methane (CH_4) and Green House Gases (GHG) emissions are increasing.

This scenario describes that Malaysia faces crucial environmental problem and needs a better solution and implementation in immediate time. The local authorities and decision makers at state level had discussed with the various stakeholder to figure out the right policies and strategies for implementation programs. Malaysia waste authorities had carried out massive effort to reduce the waste generation and as a result recycling rate increases to 17.5%. However, this figures - not enough to solve the critical problems of landfill in Malaysia.

Consumer, society, community play a major role in helping reducing waste generation in Malaysia however, they may not work hard on it and this practice of waste segregation is still considered poor among Malaysian. For example, more than 30% potentially recyclable materials were directly disposed in the landfills. Recently, a field study conducted in one of the landfill located in Pahang, Malaysia. The study found out that the landfill comprised of combination waste: domestic waste and recyclable See below.

Figure 01. Composition waste found in landfill site ranges from food waste, plastic, aluminium, glass and paper

As shown in Figure 01, composition waste found in landfill site ranges from food waste, plastic, aluminium, glass and paper. Even though, separated bins were provided, the consumer or community still failed to segregate the waste accordingly. For example, see figure 02 below.

Figure 02. Bin for plastic waste

The design for dustbin in Figure 02 is for plastic waste, however, obviously we can see diaper (red arrow) in that bin. This is one of the examples that waste was not segregate accordingly. This bin is located in one of the shopping malls in Pahang.

As the outcome, the correct waste segregation helps to minimize waste generation, but the consumer needs to be in 'ready' state. Hence, this project aims to investigate the readiness of household towards waste segregation, providing existing government regulations, facilities and knowledge on waste management.

3.   Research Questions

RQ: What is household reaction towards issue of massive waste generation in landfill?

RQ a: What is the measurement of waste generation among households?

RQ b: How ready of household towards segregating their waste?

4.   Purpose of the Study

This project aims to investigate the readiness of household towards waste segregation and develop two objectives:

1. To weight household waste generation

2. To observe whether the household is engaged with waste segregation behaviour or not (to see either the household separate or not the waste (between wet n dry).

5.   Research Method
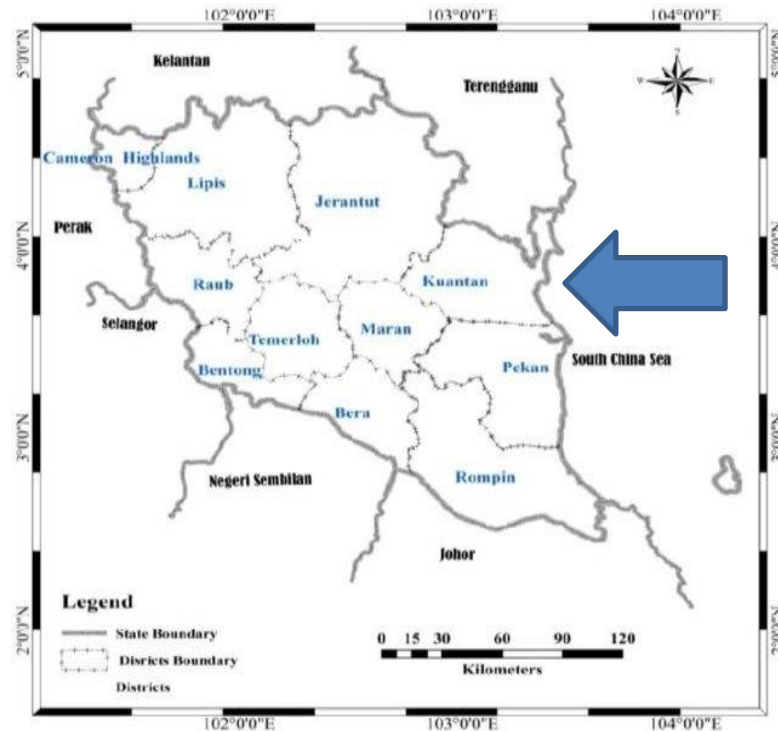
5.1. Description of Study Area

Figure 03. The District in State of Pahang

Kuantan has been selected for the preliminary study because of its high population density due to the urban development and industrial areas. Kuantan population is approximately 607,778. This particular study focuses on households in Bandar Indera Mahkota, Kuantan, Pahang with population approximately 11,712

5.2. Data Collection

In the data collection process, there were four residential area are identified: 1) Indera Mahkota 1, 2) Indera Mahkota 2, 3) Indera Mahkota 8, and 4) Indera Mahkota 15. These four residential areas were selected due to its greater number of population. A total of 364 houses were selected from this 4 residential area. This project employs scattered random sampling (see Table 02).

Table 02. House sampling calculation

Area	Population (houses)	Percentage	Percentage
Indera Mahkot 2	3022	46%	167
Indera Mahkota 15	1416	21%	77
Indera Mahkota 1	1035	16%	58
Indera Mahkota 8	1121	17%	62
Total			**364**

This project applies same data collection method to all four residential areas. All teams received analogue weight scales and specific forms for data record purposes. The weighing process is in morning session (from 7.30 am to 12 pm). This period is preferred due to 1) the availability time for most residents and 2) it is best to collect in the morning session due to have a pleasant weather. The data were collected from 283 house (out of 364 houses). This respond due to some houses locate their waste bin inside the house and no one in the house, data cannot be collected from that particular houses.

6. Findings

The result for this preliminary study divided into two categories:

1) Waste generation for each residential area

2) Statistics on readiness of household towards waste segregation

6.1. First Category

Table 03. Waste generation for each residential area

Area	Houses	Wet waste	Dry waste	Total	Waste Generation Rate
IM 2	63	62.84	77.775	140.615	2.23
IM15	115	273.818	36.002	309.82	2.69
IM1	52	133.667	53.378	186.045	3.58
IM 8	53	229.26	24.69	253.95	4.79
Total	**283**	**699.585**	**190.845**	**890.43**	

From table 03 above, total of waste for two days is 890.43 kg. The assumption can be made:

1) Waste generation rate is from 2.23 kg/ day – 4.79kg/ day

2) Approximately only 21% of household were recycle their waste

3) Even only wet waste collection schedule was considered, household that purely ready with segregation still segregating their waste.

6.2. Second Category

Table 04. Statistics on readiness of household towards waste segregation

Area	No of Houses	Segregate the Waste	
		Yes	No
Indera Mahkota 2	63	20	43
Indera Mahkota 15	115	27	88
Indera Mahkota 1	52	13	39
Indera Mahkota 8	53	12	41
Total	**283**	**72**	**211**

Table 04 above indicates that 25% segregated their waste. The number quite small if compared to the number of houses.

7. Conclusion

In conclusion, this project anticipates that very few numbers of households that are participating in waste segregation. It does reflect the current scenario in Malaysia. This number only came from one of cities in Malaysia. With this limited study within limited area of research, this project notes that lacking of readiness would not help the government, or related agencies to make it success of waste segregation project. In fact, this project is crucial to make sure country's sustainable development goals.

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