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The Study of Domestic Waste Collection at Samarahan, Sarawak, Malaysia

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Abstract

At present, public or community perception of local authority performance on waste collection is poor because of the environmental impact and visibility of waste. Therefore, a systematic way of collecting waste must be an important agenda for any local authority. This paper aims to identify the principles of waste management being used and to make recommendations for improving waste management in Samarahan Area. Quantitative method is the approach to archieve the objectives. Quantitative method which is survey question was designed to the public community area Samarahan. This study is interested in knowing the "what", "why" and "how" issues related to these related subjects. Surveys operate on the basis of statistical sampling, where it surveyed through questionnaires. Then SPSS is used to analyze the data obtained from the questionnaire survey. Type of analysis used are frequency, descriptive as well as cross tabulation. Furthermore a part from that, this study can help the Local Authority and community to improve the waste management and reduce the issues of domestic waste in Samarahan, Sarawak, Malaysia.

Keywords: domestic waste, waste management, systematic scheduling

1. Introduction

1.1 Background of Study

In 2002, the National Strategic Plan for Solid Waste Management (NSP) was formulated and embraced in 2005 by the Government of Malaysia. It provides the basis for solid waste management policies in Peninsular Malaysia. Moreover, the continuous growth in population and the increase of variety of characteristics of solid wastes generated create a managerial problem the federal dan local authorities in Malaysia. In 2001, Ministry of Housing and Local Government (MHLG) re-launched another 3Rs programmers to increase the recycling awareness among local community. As a result, the recycling rate reached 5% for the whole country. Apart from that, various surveys conducted indicated that the majority of Malaysians are aware of the importance of 3Rs, however the environmental initiative alone was ineffective in the country. Public indicated that only policy and political drives may effectively promote their participation in 3Rs activities or other activities towards waste management (Seow & Abas, 2014; Mohamed, Seow, & Goh, 2014). Green movement would be a first step towards the development of Malaysia in a healthier environment.

1.2 Literature Reviews

1.2.1 Waste

Waste applies to "a resource discarded by its processor or user (dweller, commerce, industry and government) because apparently it is no further use to the processor" (DEFRA, 2004). Solid waste is a common term to describe a garbage, refuse and trash (DEAT, 1999). McDougall et al. (2001) cited that there are several possible classifications of waste. The classification are by original use as in packaging, material (paper or glass), physical goods as in recycle or combustible, its origin as in domestic or industrial (Sathiskumar, 2009; Seow & Abas, 2014).

1.2.2 Waste Management

The management of waste at all phases is based on the generation of waste, on-site storage, collection,

transportation, treatment and processing of waste (Pitchtel, 2005). Moreover, inappropriate solid waste management may contaminate the air, water and land resources (Hashim, Abdul, Mohamed, & Haneesa, 2011; Mohamed, Yee, & Abd Rahim, 2015). In addition, the scope of solid waste management embraces administrative, legal, planning, financial and engineering functions to engage with the solutions to solid wastes problems (Tchobanoglous et al., 1993). The municipal waste differs greatly according to the local community itself and the management of local authority will deal with them accordingly. It also changes significantly with time due to the needs of the local community. In countries which have a developed recycling culture, the waste collection consists mainly of wastes that are categorized and waste such as plastic packaging are separated accordingly.

1.2.3 Waste Assortment & Disposal

Solid waste in urban areas is collected by fixed station and/or by house to house collection systems. Waste collection vehicles collect waste from one house to another a specific time and day (Shekdar, 2009). The operative component collection is embraces with other essentials in solid waste management. Tchobanoglous et al. (1993) has mentioned when direct hauling is no longer economically feasible, the transfer and transport operations is essential. While the subsequent transport of the wastes, it involves over long distances to the processing or disposal site. Leaching of pollutants from an abandoned dump fouled a water treatment plant and cut off the local water supply. Hence, an important issue need to be dealt here for the comfort of the local community. An alternative solution is to store waste in landfills and to incinerate wastes. However, it will bring out its own set of environmental problems. There are currently several waste incinerators being built in Malaysia. Not surprisingly, many of these are being built on islands or faraway place.

1.2.4 Stationary Container Systems

The system utilized for the collection of all types of wastes in accordance with the type and quantity of handled wastes and the number of generation points. The vehicles are outfitted with internal compaction mechanism (Peavy et al., 1985).

1.2.5 Collection Routes (Optimal Route)

The routing of collection vehicles within its assigned collection zone should be designed. The layout routes guidelines are to promote efficient network layout. Thus, minimize the numbers of turns and dead space encountered as well. Vesilind et al. (2002) cited the rules as:

There were four procedure needs to be done to optimize the path in the solid waste collection system:

i. Preparation of the study area location map

ii. Data analysis and schedule based on information obtained

iii. Make the initial framework for solid waste collection routes

iv. Make initial feedback on the framework of the path and run the routes.

Daily route determination is very important to optimize the collection of waste capacity and minimize the time and distance travelled.

It should be considered from the following aspects:

(i) The description of a collection;

(ii) Landfill; Landfill depends on factors landfill life, travel time and unloading time and maintenance costs.

(iii) Collection zone; Collection zone is a division of an area to a smaller area. Each division of the path is made almost equal to ensure that all trucks have or carry the same burden.

(iv) Daily task of each truck; each truck has been set to do the work proceeds on certain days of the week. This way, the work of waste collection in each area that has been determined can be implemented properly. For example, the working area is divided into two routes, on Monday, Wednesday and Friday to make the collection on the same path, while on Tuesday, Thursday and Saturday collection is made of different proximity.

(v) Housing area road system; Track system in residential areas have been introduced to minimize the time and space collection.

2. Method

According to Kothari (2004), study means search for knowledge and related information on a particular topic. Study is fundamentally about understanding and explaining about “knowing” and a study methodology is a formal, systematic application of a scientific method to a study of problem and an orderly approach taken towards the collection of data. There are four basic methods in study: case study, historical review, experiment

and survey. There is no definite rule as to which one to select when doing study. It all depends on the nature and scope of the thesis, the sources of the data, the study questions and hypotheses or proposal, and constraints and scope of the research (Jankowicz, 1993; Yin, 1994; Robson, 1994; Bell, 1993; Landau & Everitt, 2004). As has been mentioned in earlier, this study seeks to propose a systematic way in designing a scheduling a domestic waste collection.

This study is concerned with the issues of "how", "why" and "what" that relate to this study. This study comprises three main stages. First stage involves a literature review. Information are assembled from academics journal, journal proceedings, related articles and government reports. Second stage then commence by means of questionnaire distribution to selected and appropriate respondent. Survey data can be collected either through face-to face interview, telephone interview, online means or postal questionnaire. Lastly in stage 3, it involves the use of quantitative method. Yin (2009) highlighted five study classes, which are experiment, survey, action study, ethnographic study and case study. This study is include the combination of different study methodologies. Therefore, a detailed literature review, including online search and a review of academic journals and industrial documentation was commenced. There is no definite rule as to which one to select when doing study. It all depends on the nature and scope of the thesis, the sources of the data, the study questions and hypotheses or proposal, and constraints and scope of the study (Yin, 1994; Bell, 1993).

This study was however not focused on finding that sort of data but focuses on acquiring data and evidence on the perception of society towards the waste disposal management and the impact it has on the Local Government. In relation to this, Gummesson (1991) cites that while quantitative study is concerned with issues such as how much, how often and how many, qualitative study on the other hand is concerned with identifying certain phenomena based on an in-depth exhaustive investigations and analysis. As for the quantitative method involve mostly with the random survey of the field data. A quantitative method approach such as doing a survey is good for probing the general patterns and common properties as a whole but would not be effective in generating the explanation behind what, why and how things are done. Blackman (1993) stresses that quantitative study is excellent for providing knowledge on percentages and figures for decision-making and more "reportage" in nature but is weak in explaining or evaluating the figures.

2.1 Sample

In order to address the perception of society to the waste disposal management, the things that have to know are the study objective and study problems/questions. For example, the framework below are based on the pledge made at in 1992 at the Earth Summit in Rio. Informing people, including those in government, industry, non-governmental organisations is one of the commitments in that document. Moreover, the environment management is for the general public to be aware about the issues involved in considering whether our development is a threat to the environment.

Hence, the respondents are:

(i) Selected at Samarahan Local Authority area based on the housing area which the Samarahan Local Authority manage the waste disposal.

(ii) Selected to answer the questionnaire and it is not compulsory to send all because it uses simple sampling strategy. Hence, it would be sufficient to represent the data as the respondents were randomly selected.

3. Results

This chapter presents the results based on the empirical investigations. First, this study provide a brief descriptive analysis of the data on the sample of 40 respondents which serve to reflect the characteristic of the population. In this study, the SPSS (*Statistical Package for Social Science*) is used. The sample is described by giving the basic statistics of the respondents. Second, evaluation of the answer using simple data tabulation, cross tabulation and chi square test in cross tabulation.

Table 1. Satisfactory of services

	Frequency	Valid Percentage
Not Satisfy	29	72.5
Satisfy	5	12.5

Table 2. Contract of service is according to the schedule

	Frequency	Valid Percentage
Disagree	27	67.5
Agree	4	10.0

Table 3. No remaining waste after collection

	Frequency	Valid Percentage
Disagree	24	60.0
Agree	1	2.5

Table 4. Garbage bin is at it original position after collection

	Frequency	Valid Percentage
Disagree	19	47.0
Agree	6	15.0

Table 5. Garbage bin is in a good condition after collection

	Frequency	Valid Percentage
Disagree	15	37.5
Agree	12	30.0

Table 6. Rubbish/waste is scattered around after collection

	Frequency	Valid Percentage
Disagree	10	25.0
Agree	8	77.5

Table 7. Waste' liquid dropping after collection

	Frequency	Valid Percentage
Disagree	14	35.0
Agree	5	52.5

Table 8. Waste/rubbish is crammed in front of our house or business premises

	Frequency	Valid Percentage
Disagree	18	45.0
Agree	10	70.0

Table 9. Size of the contena is not appropriate/ waste overflow

	Frequency	Valid Percentage
Disagree	8	20.0
Agree	26	75.0

Table 10. Illegal dumping

	Frequency	Valid Percentage
Disagree	27	67.5
Agree	4	10.0

Table 11. Blocked drain

	Frequency	Valid Percentage
Disagree	5	12.5
Agree	20	50.0

Table 12. Problem of foul smell/stinking

	Frequency	Valid Percentage
No	8	20
Yes	7.5	67.5

Table 13. Problems with rodent and wild animals

	Frequency	Valid Percentage
No	15	37.5
Yes	7	17.5

Table 14. Sour eye view/aesthetic value problem

	Frequency	Valid Percentage
Disagree	5	12.5
Agree	21	62.5

Table 15. Facilities being vandalised

	Frequency	Valid Percentage
Many	8	20.0
Little	11	27.5

Table 16. Incurred high management cost

	Frequency	Valid Percentage
No	19	47.5
Yes	42.5	42.5

Table 17. Location of the contena is not suitable

	Frequency	Valid Percentage
No	27	67.5
Yes	13	32.5

Table 18. Failure to collect waste according to the schedule

	Frequency	Valid Percentage
No	7	17.5
Yes	33	82.5

Based on Table 1, the descriptive statistics showed that the overall mean is about 2 to 3. It can be deduce that the factors from Table 1 to 18 that majority of the respondent disagree with the statement given and thus it reflect that most of them are not satisfied with the frequency of the services given and the contract are not based on schedule. In addition, remaining waste is still a problem after collection. However, the respondent responded that there is no major issue on crammed rubbish or illegal dumping within the vicinity.

On the other hand, for factors such as waste residue, foul smell, rodent and wild animals, and others as stated in Table 1 showed that the overall mean is about 3 above to 4 plus. Thus, majority of the respondent agree that there is a lot of problem associated with waste management and others as stated in Table 1. It is under indication that the municipal got to improve on their waste management especially in term of service frequency and adhering to the schedule. This is accordance to statement from Mohamed, Ta Wee and Kai Chen (2014). Table 1 to 18 is basically the elaboration of the descriptive statistics of Table 1. The data also implied the same issues as being discussed earlier.

A cross tabulation is performed based on Table 19 and 20 to determine the connection between age, frequency of service is satisfactory and failure to collect based on schedule while the later one is age, contract of service and failure to collect according to schedule. It is obvious from these two tables that by age majority of the respondents that dissatisfied of the frequency of service also agreed that service provider failed to collect waste according to the schedule and not basically service is not based on the contract.

Table 19a. Frequency of service is satisfactory * failure to collect waste according to the schedule * age of respondent

Age of respondent			Failure to collect waste according to the schedule				Total
			Disagree	Neutral	Agree	Totally agree	Disagree
21 - 30	Frequency of service is satisfactory	Disagree		0	0	6	6
		Neutral		0	3	0	3
		Agree		1	0	0	1
	Total			1	3	6	10
31 - 40	Frequency of service is satisfactory	Totally disagree	0			5	5
		Disagree	2			0	2
	Total		2			5	7

Table 19b. Frequency of service is satisfactory * failure to collect waste according to the schedule * age of respondent

Age of respondent			Failure to collect waste according to the schedule				Total
			Disagree	Neutral	Agree	Totally agree	Disagree
41 – 50	Frequency of service is satisfactory	Totally disagree			3	3	6
		Disagree			3	5	8
		Agree			1	0	1
	Total				7	8	15
More than 51	Frequency of service is satisfactory	Disagree		0	0	2	2
		Neutral		1	2	0	3
		Agree		3	0	0	3
	Total			4	2	2	8

Table 20a. Contract of service is according to the schedule * failure to collect waste according to the schedule * age of respondent

Age of respondent			Failure to collect waste according to the schedule				Total
			Disagree	Neutral	Agree	Totally agree	Disagree
21 – 30	Contract of service is according to the schedule	Disagree		0	3	6	9
		Neutral		1	0	0	1
	Total			1	3	6	10
31 – 40	Contract of service is according to the schedule	Totally disagree	2			5	7
	Total		2			5	7

Table 20b. Contract of service is according to the schedule * failure to collect waste according to the schedule * age of respondent

Age of respondent			Failure to collect waste according to the schedule				Total
			Disagree	Neutral	Agree	Totally agree	Disagree
41 – 50	Contract of service is according to the schedule	Disagree			0	7	7
		Neutral			7	0	7
		Agree			0	1	1
	Total				7	8	15
More than 51	Contract of service is according to the schedule	Disagree		0	2	2	4
		Neutral		1	0	0	1
		Agree		3	0	0	3
	Total			4	2	2	8

Table 21. Age of respondent * frequency of service is satisfactory

		Frequency of service is satisfactory				Total
		Totally disagree	Disagree	Neutral	Agree	Totally disagree
Age of respondent	<40	5	8	3	1	17
	>40	6	10	3	4	23
Total		11	18	6	5	40

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.410(a)	9	.003
Likelihood Ratio	30.589	9	.000
N of Valid Cases	40		

a. 15 cells (93.8%) have expected count less than 5. The minimum expected count is .88.

Table 22. Age of respondent * failure to collect waste according to the schedule

		Failure to collect waste according to the schedule				Total
		Disagree	Neutral	Agree	Totally agree	Disagree
Age of respondent	<40	2	1	3	11	17
	>41	0	4	9	10	23
Total		2	5	12	21	40

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.523(a)	9	.002
Likelihood Ratio	25.038	9	.003
N of Valid Cases	40		

a. 14 cells (87.5%) have expected count less than 5. The minimum expected count is .35.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.814	.002
	Cramer's V	.470	.002
N of Valid Cases		40	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

As for Table 21 and 22, another cross tabulation was performed with additional task of looking at chi square and symmetric measures. Chi square is use due to the fact that the data obtain by the study is non parametric in nature. Based on the result above, it can be deduce that both factors are important and seriously regard as main contributor to clean environments.

4. Discussion

Waste collection service is one of the services offered by the local authority. This study showed that containers are placed in some neighborhoods and it is appropriately placed. However, the number of containers are not enough with respect to waste generated. Moreover, a portion of the neighborhoods are pleased to throw their garbage into an open area without using the bin or container as the disposal of waste. Apart from that, other households have their own way of household waste disposal and this shows that they are not appreciating the local authority services. They used the non standardized bins and local authority also located some dust bins only on the main roads. Based on the regularity of the collection of waste from the containers, almost all the respondents which is 98%, responded that containers did not get emptied regularly. Hence, waste management problem is complex because it involves a multitude of environmental, technical, economic and social factors. Similarly, it is perceived that lack of financial resources, organisational awareness, inappropriate technology uses, transportation systems conflict and social problem have made the waste management at local authority unsatisfactory. Moreover, the indifference towards environmental cleanliness and sanitation have made waste management more challenging for this study area. Solid waste source might have changed through time due to the changes in the demographic of local community. Hence, more study is needed to produce more valid data for current and future waste management planning.

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