

# Urban Community Willingness to Pay for Improved Solid Waste Management in Malaysian Municipality: A Choice Modeling Approach

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Received: May 25, 2014 Accepted: July 25, 2014 Online Published: August 22, 2014

doi:10.5539/ass.v10n18p122

URL: <http://dx.doi.org/10.5539/ass.v10n18p122>

## Abstract

The management of solid waste in urban areas is a critical issue for some developing countries especially in Asia which requires immediate attention. This study attempts to make an analysis and assessment of public attitudes and behaviour towards the improvement of urban solid waste management offered by a municipality in Malaysia by looking at the people's willingness to pay (WTP) for the improved services. Seremban Municipality, one of the most important municipalities in Malaysia, has been chosen for this study because of its rapid development and phenomenal economics growth. The study covers seven residential areas under the administration of the municipality. A survey questionnaire and observation techniques have been carried out to the 140 households. Contingent Valuation Method (CVM) is used for the quantitative data analysis. The study results indicated that the households are willing to pay for the improved services and a regression model was created to show the factors contributing to the willingness to pay.

**Keywords:** solid waste management, contingent valuation, willingness-to-pay, choice modeling, urban management, environmental issue, Malaysia

## 1. Introduction

Due to the rapid economic growth in urban areas, the production of solid wastes in Malaysia in particular has increased rapidly in terms of waste amount as well as composition, which ultimately creates a critical issue for waste management authority. In fact, it has become a worldwide problem (Lau, 2004). As a result, the quality of urban areas in most developing nations is deteriorating. It has also been argued that among the Asian countries, China, South Korea and Malaysia require immediate attention in solid waste management (Saat, 2013; Badgie, Samah, Manaf, & Muda, 2012; Lau, 2004).

Municipal waste problem is frequently discussed and it becomes the main issue in an urban management. In fact, the issue of waste management will be more complex and challenging in the future due to the tremendous growth in urban population and their consumption patterns. It is argued that the greater the economic prosperity and the higher percentage of urbanization, the greater the amount of solid waste produced, and managing waste will become more complex (Hassan, 2000). This is due to the fact that waste will continuously exist because of natural activities in human life cycle. Indeed, waste generations have a close relation with production and consumption patterns of the human activities. As long as the process of production and consumption activities is still in place, the generation of waste will continue to occur. Therefore, an effective and efficient solid waste management is essential in order to avoid environmental and health hazards which may lead to undesirable consequences for community people and the ecosystem in general.

Individual always produces waste throughout their life regardless of its quantity. In a country, such as the United States, as reported by the Environmental Protection Agency (2013), the amount of waste generated by urban communities has increased almost three times within the last four decades from 88.1 millions of tons in 1960 to 250.4 millions of tons in 2011. According to Vitor, Ishak & Jasaw (2013), income level of the people of any

nation determines the generation and composition of the solid waste. In the Malaysian context, the country generated almost 3.3 million metric tons of waste in total in the year of 2011. This figure represents an increase of 6.3% as compared to three million metric tons generated in 2010 (Embas, 2012). Reports in the 9th Malaysian Plan (RMK9) also concluded that the average waste generation has increased from 0.67 kg/person/day in 2001 to 0.8 kg/person/day in 2005 (Economic Planning Unit, 2006). In the meantime, the industries manufacture thousands of new products each year which will ultimately make urban waste a complex problem to handle and dispose. In fact, waste generation is significantly related to population, urbanization and affluence of the people in the community. It has been argued that most developed and developing nations with increasing population, prosperity and urbanization, managing solid waste becomes increasingly challenging for municipalities to collect, recycle, treat and dispose of huge amounts of solid waste (EEA, 2005). As far as Malaysia is concerned, this waste management problem has been aggravated further due to scarcity of waste landfills as well as poor recycling rate (Agamuthu & Fauziah, 2011). However, Badgie (2010) indicated the urgent need through the application of 3Rs (reduce, reuse and recycle) to modernize the solid waste management system in order to improve the waste management services particularly in developing nations.

The main issue here is whether everyone in the government, private sector, and also the community (household) play their role effectively in managing the urban solid waste. A study by Lubis (1994) pointed out that the management must ensure the involvement of all parties and must be fully supported by most households and community. The community support can be seen from their awareness and effort in the process of keeping the environment clean. This is also in line with the study by Jahi (1993) which concludes that environmental management may not be successful without cooperation from public (community) and private sectors. The understanding of community preference is also an important element in the management system of environmental issue. Due to this, it is very important to understand the views of the community people as well their attitudes towards the waste generation and management of solid waste in Malaysia. However, the data and the analysis of solid waste for major cities in Malaysia are not well documented (Economic Planning Unit, 2006), and still highly underdeveloped. More specifically, there is a call for urgent adoption of adequate and efficient waste management techniques especially for urban areas in Malaysia (Badgie et al., 2012).

However, an integrated waste management must be implemented. It must take into account household attitudes as the major urban waste generator and their feedback towards this issue. The ultimate goal is that the waste generation from the household side can be minimized to the minimum level, if not be completely eliminated. It is also noted that in Malaysia more than 65% of the total population live in urban areas-the main waste generator in Malaysian context (Mohamad & Keng, 2013). Even though a significant number of studies have been conducted in the past on solid waste management (Mohamad & Keng, 2013; Behzad et al., 2011; Badgie et al., 2012; Chua et al., 2011; Lau, 2004); there is hardly any study found that investigates the community people's willingness to pay to improve the solid waste management for the community where they live particularly in the context of Malaysia.

This study attempts to look at people's perception in order to fully recognize the community's (household) willingness to pay for improved waste management services for the community where they live. A holistic and integrated effort is important to minimize solid waste and the unconditional cooperation from individuals (community people), industries, municipals, state and federal governments is required as they play the ultimate roles to handle the waste management problems. The willingness to pay also reflects the people's awareness about the detrimental effects of improper waste management and health hazards for local communities. In this study the Contingent Valuation Method (CVM) is used in order to evaluate the community people's willingness to pay (WTP) for better solid waste management in Malaysia.

## 2. Background of the Study

The higher rate of population growth, the increasing economic activities, and the living standards (life-style) of the community have caused the increase in products demand which forced the industries to manufacture more products to meet these needs. Fulfillment of these needs apparently has caused the increase in residual materials which translates into the increase amount of waste produced by them. It is also found that the amount of waste produced per person per day is also depends on the economic status of the community concerned (GAIA report, 2003). Malaysia as a developing country is also facing the increase amount of waste generation and the problems of disposal of this waste. As per GAIA report 2003, the waste amounts per person per day vary from 0.45 to 1.44 kg, and the average is about 1 kg per capita per day. It is estimated that almost 7 million of tons of waste generated in 2000 in Malaysia with an annual increase of 3% (Badgie et al., 2012). Another alarming statistics is that municipal solid waste in Malaysia has increased more than 90% over the past decade (Agamuthu et al., 2009). The increase may create a huge problem in the future if no proper actions is taken, and it requires greater

focus on solid waste management in the context of Malaysia (Badgie et al., 2012).

The concentration distribution of community in the city and other areas has resulted in serious financial, management, and technical problems in waste management. In addition, continuation of development and innovation of technology and the improvement in the manufacturing process, packaging, and product marketing have also resulted in the increase of waste in various forms. The increase in goods packaging, rapid growth in productivity has also contributed to the large amount of waste in urban areas. Changes also occur in the working sector, agricultural sector as well as industrial and service sector. As a result of changes in this community, the industry is forced to increase the production to fulfill the increasing life standards which in turn will also lead to generation of waste materials (Liddle, 2000; Peterson et al., 1999).

Inefficient and inappropriate ways of disposing waste have created unpleasant scene, creating a serious danger to public health, including air and water resources pollution, increasing spreader of disease vectors, and a downside impact of land value which will eventually affect people's living standards and development. On the other hand, failure and inability to understand on how to save and recycle various types of waste, has economically caused unnecessary waste and thus will ultimately affect the natural resources and environmental devastation. Therefore, Sham Sani (1993) emphasizes on the need to consider the economic and ecological factors in establishing and making any decision to reduce the environmental quality degradation. In principle, waste collection and disposal is the primary responsibility of local governments, and other related parties. But, in fact, this waste problem has become a national issue which requires the central government involvement in the waste management.

The management of solid waste has now been a worldwide phenomenon. In the context of Asian countries, China, Malaysia and South Korea require immediate attention to address this problem. According to World Bank (2013), urban areas currently generate roughly 1.3 billion tons of solid waste per year and this figure will grow to 2.2 billion tons per year by 2025-an increase of 70 percent with current urbanization trends. In Malaysia, according to Arpah Abdul Razak (2013), in 2012, there were a total of 33,000 tons per day of waste has been generated by Malaysians. It is important to note that ASEAN countries are among those producing higher amounts of waste. Table 1 explains the urban municipal solid waste (MSW) generation in selected ASEAN countries and its neighborhood in 2012 and 2025 (projection).

Table 1. Municipal solid waste generation in selected Asian countries

Country	Current MSW Generation (kg/capita/day)	Projection MSW Generation in 2025 (kg/capita/day)
Brunei Darussalam	0.87	1.3
Indonesia	0.52	0.85
Lao PDR	0.7	1.1
Malaysia	1.52	1.9
Myanmar	0.44	0.85
Philippines	0.5	0.9
Singapore	1.49	1.8
Thailand	1.76	1.95
Vietnam	1.46	1.8
Hong Kong, China	1.99	2
Japan	1.71	1.7
South Korea	1.24	1.4
Bangladesh	0.43	0.75
India	0.34	0.7
Iran	0.16	0.6
Maldives	2.48	2.2
Nepal	0.12	0.7
Pakistan	0.84	1.05
Sri Lanka	5.1	4
Lower Income	0.6	0.86
Lower Middle Income	0.78	1.26
Upper Middle Income	1.16	1.59
High Income	2.13	2.06

Source: Modified from World Bank (2012).

It can be argued from the figure in the above table that lower income countries such as Nepal, Myanmar, Vietnam have lower generation of solid waste averaging 0.6 kg per person per day, while for the countries (Indonesia, Philippines, Thailand, and Malaysia) have lower middle income average generation of waste is 0.78 kg per person per day (World Bank, 2012; Badgie et al., 2012). Meanwhile countries with higher income level such as Korea, Singapore, Hong Kong, and Japan have higher generation of waste average per person per day i.e. 2.13 kg/person/day. The table also explained that Malaysia categorizes as lower middle income countries generates the second highest amounts of waste i.e. 1.52 kg/person/day in 2012 behind Thailand. However the figure for Malaysia is estimated to be almost the same as to Thailand in 2025 to 1.9 and 1.95 kg/person/day respectively, which is higher than that of some higher income countries like Japan, South Korea, and Singapore.

From the facts and figures mentioned above, it is clear that the current waste management system needs to be reviewed and improved towards an integrated management system that take into account all issues of environmental sustainability, conservation of natural resources, health, and comforts of human life. Therefore, among the important elements that we need to pay attention to are role and attitude of the households, waste generation at the community level, problems of waste management, and the improved plan that need to be run.

This study was conducted in the area of Seremban Municipality (MPS), which is located in Negeri Sembilan Malaysia. MPS has borders with Seremban district in the west, Jelevu and Kuala Pilah in the east, Rembau and Port Dickson in the south. MPS covers seven residential areas called mukim covers up 15,151.37 hectares. This includes new areas resulted from the territorial enlargement of the Seremban Municipality (MPS, 2014).

The position of the study area will become increasingly important in the future due to two major internal and external factors. Internal factors focus more on the increase of economic activities, infrastructure development, and social and local residence development. While the external factors derived from the impact of massive development that exists outside the municipality, particularly momentum of development in Lembah Kelang, rapid growth in the areas of the Kuala Lumpur International Airport (KLIA), continuing development of federal government complex Putrajaya, the development of Multimedia Super Corridor (MSC) in addition to industrial development around the area of Seremban and Bandar Baru Nilai.

The land use condition in the area of Seremban Municipality (MPS) generally indicates empty lot, agricultural activities, river, road, railway, and housing (refer to Table 2). The major development concentration of this area is in the north side of North-South Highway, particularly in Mukim Bandar and Mukim Ampangan, while most areas in Mukim Rasah, and in the north of Jalan Jelevu remains as agricultural areas.

The population in the Seremban Municipality (MPS) according to the census in year of 2010 showed that the population of MPS is 555,935 people, mainly residing in the Mukim Bandar and Mukim Ampangan. The number of people is estimated to increase up to 847,134 people in the year of 2020 with average growth rate 5.22 percent between the years of 1991-2020 (MPS, 2014). This increase occurred as a result of rapid development of housing sector and of other development sectors. This proves that the population growth in this area is caused by internal factor (natural) and external factor (migration).

Table 2. Land use in study area (2007)

Land Use	Area	
	Hectare	Percent
Housing	6,499.52	40.24
Business	2,007.93	12.43
Industry	1,217.13	7.54
Institutions and facilities	1,259.01	7.80
Empty Lands and Recreation	1,393.41	8.63
Transportation and Communication	3,042.60	18.84
Infrastructures and Utility	731.78	4.53
Total	16,151.37	100.00

Source: MPS (2014)

Like any other state capital cities MPS, experienced serious problems in waste management. Waste increases every year and the attitude of the community that are less concerned with the environment issues had increased

the complexity of management. The waste generation according to the MPS is about 113,800 metric tons a year. This amount is projected to increase each year and in 2020 it is estimated that waste production will reach about 152,900 metric tons a year. If we examine the disposal aspects, the current disposal site according to the reports by Jabatan Perkhidmatan Bandar Seremban in 1999 as cited by MPS (2014) is unable to accommodate the amount of waste at this time and for the future. Therefore, the MPS will present a proposal for new local waste disposal area of 9.1 acre to accommodate the amount of waste until the year 2020 (see Table 3).

Table 3. Amount of waste and area of landfill needed

Year	Amount of Waste Generated Each Year (Kg)	Landfill Area Needed (Acre)
2010	113,796,780	6.74
2020	152,884,630	9.10

Source: MPS (2014)

The practice of dumping wastes anywhere by the community, especially into the rivers and in the residential areas has created difficulties to the management to clean the areas. The response from the small and medium size industries about this issue is not good and many failed to comply with the environment acts. The reason is perhaps due to the lack of knowledge pertaining to waste management. To address this issue, the MPS will promote the environmental or green campaign (MPS, 2014).

### 3. Method

#### 3.1 Methods for Assessing Waste Management

Environmental management including waste management is a costly affair. The costs may include the cost of collection, transportation, disposal and also additional costs such as subsidies, recycling and so forth (Palmer et al., 1997). In this respect, it is important to note that the federal government of Malaysia already spent RM 20.9 million for building new 9 sanitary landfills and upgrading 27 existing landfills in 34 areas within peninsular Malaysia (Lau, 2004).

The amount of fees charged depends on the assessment of management or service provided. Assessment analysis is based on the individual preferences of the products or services. The value of a product or service for a person is depending on the extent to which he was able to afford to pay to obtain a product or service. Basic idea in this assessment is the community people's willingness to pay (WTP) for better waste management services. The amount of willingness to pay or sacrifice to get the products or services usually depend on wealth of a person, or in other words the wealthier he is, the greater his willingness to pay for the improved services (B. C. Field & M. K. Field, 2006).

Furthermore Field and Field (2006) states there are three ways that may be used in assessing WTP of a person. The first way is to see someone's attitude in solving the environmental problems individually. The amount of costs required to solve the environmental problems explain the WTP of that person. The second way is to provide a choice to the individual in avoiding environmental problems in places of origin to other places. The amount of willingness to pay of that person to avoid the environmental problems from original place to other places explains the WTP of the person. Field and Field (2006) called the first and the second way as the indirect method or indirect technique of describing someone's WTP. The third way is to run a survey and ask directly to the household how much their willingness to pay if the environmental problems in their surroundings can be overcome. This is called the direct assessment method (direct technique). This third way gets much attention from many economists nowadays because of its flexibility.

In this study, the assessment techniques used is a direct assessment technique. This method is called the contingent valuation (CV), i.e. a method to directly ask the community about their willingness and their preferences (B. C. Field & M. K. Field, 2006).

There are four steps to be done in this study for assessing the role of the household towards an improved waste management through the contingent valuation method (CV):

- 1) Identify and gain insights about the characteristics of the environmental quality problems and waste management events that will be assessed in the study area;
- 2) Identify the respondents were to be, including the selection procedure to get the respondents;
- 3) Designing and running a survey through questionnaires to the respondents or the household;

4) Make analysis from the response obtained to a model to determine the role of the household towards the improved waste management.

The contents of the questionnaire cover various aspects about the role and attitudes of consumers. Among the contents of the questionnaire is concerning the household attitudes towards environmental problems in general and the problems of waste in particular, educational background, occupation, household income and waste generation and waste management at household level.

### 3.2 Concept of Contingent Valuation Method

This method is executed by asking directly the public about their preferences and willingness towards the benefits of the management of the environment and their willingness to pay those benefits received.

A new plan or management often involves additional cost. In practice, this cost is usually charged to the household. The amount for improved service depends on the benefits they will receive.

Suppose the current situation in waste management is  $Q_0$ , the frequency of waste collection is three times a week but irregular with no separation of waste at source, the type of disposal is tipping control, using open truck transportation, and an indirect or hint payment. Suppose the household average income is  $M_0$ , the service will be improved to the new management plan ( $Q_1$ ) with the frequency of waste collection is three times a week but regular, there are waste separation at source for recycling, the type of disposal (TPA) is sanitary landfill, using closed freight truck or compactor, and the payment is monthly direct charge, surely the satisfaction (utility) will increased from  $U_0$  to  $U_1$  (Figure 1). If we maintain the state of satisfaction (utility) curve the same  $U_0$ , then the consequences, the household will lose some income to  $M_1$  to get the improved service. The difference in household income from  $M_0$  to  $M_1$  is referred to as the willingness to pay (WTP).

### 3.3 Data Analysis and Model

Econometric method has been used for data analysis in this study. Econometric methods can be defined as a branch of economics that combine economic theory, mathematics, and statistics for the purpose of assessing the relationship of quantitative economics (Abdullah, 1992; Anuar, 1991; Rani & Yen, 1987). In fact, the prime concern for application of econometric method in various research initiatives is to understand how the assumptions are made to justify and implement the underlying economic model and the interpretation of results of the study (Meghir & Rivkin, 2010).

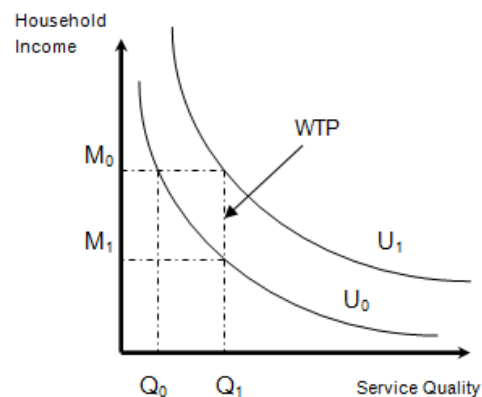


Figure 1. The concept of contingent valuation method

Source: Modified from B. C. Field & M. K. Field (2006)

A computer assisted program i.e. Statistics Package for Social Science (SPSS) is used to obtain the statistical figures needed for analysis such as to estimate the coefficients of some variables in the model.

Non-numerical data that is qualitative about the background and attitude is converted to dummy data. Dummy data in this study are as follows:

- 1) Type of house: 1 for bungalow and semi-detached houses and 0 (null) for other types of house;
- 2) Gender: 1 for the men and 0 (null) for women;
- 3) Race: 1 for the Malay and 0 (null) for non-Malays;
- 4) Education: 1 for certificate/diploma and above and 0 for lower than certificate/diploma;

5) Household recycling practices: 1 for household that often or rarely practicing recycle and 0 for never practice recycling;

6) Tendency to protection of the environment or the source: 1 for household that only tend to the protection of the environment and 0 for tend to the source, or both tend to choose the protection of the environment and select the source together.

WTP by Navrud and Ready (2007) is defined as a function of the nature of the product or environment services and individuals.

$$WTP_{ij} = f(G_j, H_i) \quad (1)$$

Where:

$WTP_{ij}$  = Willingness to pay of household i towards environmental management in place j;

$G_j$  = Characteristics of the environment services in place j;

$H_i$  = Characteristics of household i;

From equation (1), the models that will be used in this study are shown in the form of a linear regression model as follows:

$$Y_i = \beta_1 + \beta_2 * X_{2i} + \beta_3 * X_{3i} + \dots + U_i \quad (2)$$

Where:

$Y_i$  = Dependent variable;

$\beta_{1,2,3,\dots}$  = regression coefficients that describe the changes in the dependent variable that caused by independent variables

$X_{2,3,\dots}$  = Independent variables

$U_i$  = Regression error or a random variable.

From equation (1) and (2) above can be estimated the regression model for household WTP ( $Y_i$ ) in this study as follows:

$$Y_i = \beta_1 + \beta_2 * X_{2i} + \beta_3 * X_{3i} + \beta_4 * X_{4i} + \beta_5 * X_{5i} + \beta_6 * X_{6i} + \beta_7 * X_{7i} + \beta_8 * X_{8i} + \beta_9 * X_{9i} \quad (3)$$

Where:

$\beta_{1,2,3,\dots}$  = regression coefficients;

$X_{2i}$  = type of house;

$X_{3i}$  = age;

$X_{4i}$  = gender;

$X_{5i}$  = race;

$X_{6i}$  = education level;

$X_{7i}$  = recycling practices;

$X_{8i}$  = trend to environmental protection;

$X_{9i}$  = household income each month.

The obtained model from the regression results acceptable after F and t test showing a significant and consistent. In addition, autocorrelation factors and co-linearity test are also conducted in the regression analysis to test the model produced.

#### 4. Results

In statistics, to create a model that can describe the situation or indeed represent something of the desired area, e.g. the attitude of a local community, the sampling procedure must be done properly. Samples taken in this study referred to as the respondents represent the entire population in the area of the study.

The respondents are from different background. The selected 140 respondents in this study, the average age of respondents was 37 year old with the oldest respondent was 63 year old while the youngest was 20 year old (Table 4).

In regard to gender factor, male and female participation were almost the same in terms of number for this study i.e. male respondent consisted of 73 while the female were 67 in number. In terms of race factor, most of the

respondents i.e. 72.9 percent are Malay, while the remaining 27.1 percent of the respondents are from different races, i.e. non-Malay (Table 5).

Table 4. Respondents based on age

No.	Age	Number of Respondent	Percent
1	<21	2	1.4
2	21-30	24	17.1
3	31-40	51	36.5
4	41-50	48	34.2
5	51-60	14	9.9
6	>60	1	0.7
	Total	140	100.0

Table 5. Respondent based on race

No.	Race	Number of Respondent	Percent
1	Malay	102	72.9
2	China	24	17.1
3	India	14	10.0
	Total	140	100.0

Table 6. Respondent based on employment

No.	Type of Employment	Number of Respondent	Percent
1	Government official	12	8.6
2	Private employee	28	20.0
3	Part-time worker	18	12.9
4	Businessmen	24	17.1
5	Retiree	9	6.4
6	Housewife	36	25.7
7	Student	13	9.3
	Total	140	100.0

In terms of employment status, 25.7 percent of the respondent i.e. 36 people were housewives, followed by 28 respondents who work in the private sectors, 24 works as businessmen and the rest consists of government officials, part-time workers, retirees, and students (see Table 6). Those who work as government employees or private employee i.e. 40 people are mostly management, administrative and professional levels (see Table 7).

In terms of education, most respondents have a bachelor degree followed by those who completed high school education (see Table 8). The average household income is RM3660 with a whole range of income of respondents is in the range of RM1000-RM6000 a month (see Table 9).

Table 7. Respondent based on working area

No.	Working Area	Number of Respondent	Percent
1	Managerial and administrative	14	10.0
2	Professional	16	11.4
3	Technical and services	7	5.0
4	Clerk	3	2.1
	Total	40	28.6



Table 8. Respondent based on level of education

No.	Level of Education	Number of Respondent	Percent
1	Completed secondary school	4	2.9
2	Completed high school	44	31.4
3	Certificate or Diploma	34	24.3
4	Bachelor degree	58	41.4
	Total	140	100.0

Table 9. Respondent based on monthly income (in RM)

No.	Monthly Income	Number of Respondent	Percent
1	1000-2000	9	6.4
2	2001-3000	22	15.7
3	3001-4000	61	43.6
4	4001-5000	40	28.6
5	5001-6000	8	5.7
	Total	140	100.0

#### 4.1 Household Attitudes towards Environmental Problems

Prior to further discussion about the attitudes of the household towards the issue of waste generation and management, their attitude towards environmental problems will be highlighted first. It is important to note because it will affect the household attitude towards the issue of waste generation and the proper management of the waste as well as their willingness to pay.

Table 10 shows that household attitudes towards government financing of the environmental development is ranked below other issues such as education, issues of poverty and unemployment, public health services, and housing issues, while household attitude towards the issue of waste is ranked at six below several other environmental issues. This indicates that among the priority list of community people, the issue of waste generation and management were not listed in their top five (5) priorities. All these attitudes are influenced by the background of the respondents of various backgrounds.

Table 10. Respondent attitudes towards environmental issues

Rank	Government Fund Priority	Environmental Problems
1	Education	Food safety and security
2	poverty and unemployment	Water pollution
3	public health services	Air pollution
4	Housing	Flood
5	Environment	Flora and fauna reservation
6	Criminal Prevention	Waste management
7	Defense	Landslide
8	---	Traffic congestion
9	---	Deforestation
10	---	Noise pollution
11	---	Wetland conservation

#### 4.2 Household Attitudes towards Waste Generation and Management Issue

Basically, all the respondent are concerned about the environmental degradation problem especially the issue of waste production and management, where many people are concerned when the garbage problem is not solved promptly, effectively and more importantly sustainable.

In this study, respondents' attitudes towards the issue of waste management are divided into two categories. 80

respondents (57.1 percent) stated that they were very concerned about the issue of waste and management, while 42.9 percent or 60 people states that they are quite concerned about the issue. Differences in attitudes are due to differences in the background of respondents. Majority of the collection and placement of waste out of the house are carried out by other members of household and only 37.1 percent or 52 respondents who do it by themselves. This perhaps relate to the status or position of the respondents in the household. However, all or 100 percent of the respondents stated that waste reduction efforts are important in the waste management.

As for the recycling efforts in the waste management, the respondents gave a slightly different manner proportionate to the reduction of waste. Only 123 people or 87.9 percent of respondents stating that recycling is good for the environment, while the remaining 17 people or 12.1 percent states that they are not sure with recycling programs. This may be due to lack of respondents' knowledge and know-how of recycling program.

Fifty one (51) respondents (36.4 percent) have rarely practiced recycling in their home. The recycling method they practiced is through the reuse of certain waste or making compost of food waste. Meanwhile, 89 people (63.6 percent) of respondents never practice recycling in their homes for reasons such as not interesting (7.1 percent), not enough time (14.3 percent), there is no nearest recycling program (46.4 percent), there is no economic incentive ( 7.1 percent), and do not know how to recycle (25.0 percent).

In addition to practicing recycling program, there are also 10 percent of respondents that practice waste separation in the initial level although rarely. The respondent's reason for waste separation practice is listed as good for the environment (0.7 percent), ease practice compost (9.3 percent), and facilitate recycling practices (2.1 percent). Meanwhile, 126 people (90 percent) of respondents did not practice the separation of waste at the initial level because they are not interested (8.6 percent), not enough time (18.6 percent), there is no economic incentive (37.1 percent), does not know how (10 percent) , the facilities are not available (80 percent), and it is too expensive (10.7 percent).

In terms of household attitude towards considering only purchase of products if the product is made from recycled materials or materials that can be recycled or not, 119 people or 85 percent of respondents stated not to consider it. Only 21 people or 15 percent of the respondents consider it slightly.

Towards the satisfaction of the waste collection service by the concerned agencies, only 55.7 percent somewhat satisfied with the service, and 42.9 percent claim not satisfied, while the rest (1.4 percent) said do not know. The satisfaction of the waste disposal services by the relevant authority or agency, only 12.1 percent of the respondent was quite happy to waste disposal service, and 11.4 percent claim not satisfied, while most of them (76.4 percent) states do not know.

When the respondents are offered to choose which one of them are more likely to: to the environmental conservation or tend to use sources or likely to select both at once, 42.1 percent of respondents tended to choose the environmental conservation and 57.9 percent more likely to select both at once.

#### *4.3 Household Attitudes towards an Improved Service*

Basically, attitude explains the household willingness to pay (WTP) towards an improved environmental management, especially the issue of waste generation and management. In this study, the form of benefits offered is an improved management compared to the current inefficient management by taking into consideration aspects of health, comfort, and environment-friendly management. The household is initially exposed to current waste management practiced, and the forms for improved management before finally offered to the households as an improved service.

There are two options offered to the households. The first option is the current management option with all the problems that exists. The households are explained about the characteristics and current management problems such as the frequency of waste collection, method of disposal is not environmental friendly, forms of transportation, and mode of payment of bills.

The current frequency of waste collection is three times a week, but the collection time is not certain or irregular. Sometimes waste is not collected for many days that attract insects and animals such as flies, dogs and cats. This condition also causes bad odor and uncomfortable.

The current type of disposal or landfill has many problems to the environment and human life. The landfill in whole or in part is open and uncovered with the soil. The wastes on the disposal area are also not treated and lack of control, so the hazard leach to the environment that can cause the emergence of health problems such as water and air pollution and cause environmental problems such as threatening of aquatic life and loss of recreational opportunities.

In terms of transporting the waste, there are still some routes that use open truck. This may cause uncomfortable view, bad odor, and some parts of the waste may fall upon the road from the trucks that have excess cargo. In terms of the charge, the households do not pay the service provider directly but through the annual tax (land and building tax) that they pay. The actual amount of the charge for the waste service alone is not known by many households.

Second option is the improved service and management. The problems that exist on the first option (the current waste service) will be eliminated on this second option. The households are exposed to the benefits that they will receive if they choose the second option. In this second option, the frequency of waste collection remains three times a week, but on the day and the time that has been set for each household.

Form of transportation on the second option is by using compactor trucks or closed trucks so that the problems such as the smell and so forth will be reduced. While the condition of disposal site is also improved, the sanitary landfill is also improved. This sanitary landfill requires that the floor or base of the landfill should be constructed in such a way to prevent the occurrence of leakage into the ground and this landfill also requires the closing of waste with a layer of land every day, so that insect and animal cannot breed or disrupt the disposal site. The disposal site will be placed far from residential areas.

Both these options have the implications of each, the monthly charges. With the first option, each household is required to pay the service through the tax to the government without knowing exactly the amount of money deducted for the service. Meanwhile, with the second option, the payments are made directly by the household each month to the service providers separated from the tax. This payment is not a substitute for direct payment on the first choice.

Results of this study show 45 people or 32.1 percent of respondents choose the first option because they disagree with the monthly direct payment (31.4 percent) and not sure of the improved service offered (0.7 percent). Meanwhile, respondents who choose the second option are 95 people or 67.9 percent. Therefore, analysis of the household's WTP will be focused to the 95 respondents who chose the second option.

From regression analysis, we obtain the WTP model for the improved waste management in Seremban Municipality as follows:

$$WTP = 12.069 - 1.143X_2 + 0.056X_3 + 0.865X_4 + 1.768X_5 + 0.771X_6 - 1.077X_7 - 0.417X_8 + 0.0022X_9 \quad (4)$$

(1.922) (0.873) (0.036)\*\* (0.704) (0.714)\*\*\* (0.770) (0.701) (0.670) (0.00)\*\*\*

Where:

$X_2$  = dummy variable for the type of home;

$X_3$  = age of respondents;

$X_4$  = dummy variable for male gender;

$X_5$  = dummy variables for Malay race;

$X_6$  = dummy variable for education level;

$X_7$  = dummy variable for the practice of recycle;

$X_8$  = dummy variable for the tend to the environmental or source protection;

$X_9$  = Income of respondents each month.

$R^2 = 0.359$ ;

Durbin-Watson = 1.896;

Figures in brackets indicate standard error of the respected variables.

Surprisingly, the model indicates that only age, race and income have significant relation to the willingness to pay for the improved services. This finding is consistent with other study by Vitor et al. (2013) where they also found that age and income contributed significantly to WTP. From this model we can calculate the average WTP for this study which is RM23. This is consistent with the average WTP obtained from the questionnaire that is also RM23, while the median value for the WTP is RM25.

## 5. Discussion

Urban waste management issue is widely discussed at various different levels whether at national or international level. This issue is closely related with the attitude of the households and the community involvement directly or indirectly in the management.

In this study, some attitudes and involvement of the households in waste management have been identified. The attitudes of the households examined in this study are the attitudes towards environmental issues in general, attitudes towards the issue of waste generation and management at household level, and household attitudes towards urban waste management improvement, in this case emphasized on households' WTP towards improved service offered.

### *5.1 Attitudes towards Environmental Issues*

When we asked the respondents whether the government funding is important to improve the quality of environment problems in the country, their attitudes towards environment related issues is put at the fifth place below the issues of education, poverty or unemployment, public health, and housing.

For society in general, attitudes such as this is not surprising. This is because aspects such as education, poverty or unemployment, public health, and housing are aspects that are directly related and affect their day-to-day life. It is not like the environmental issue, where the interest or benefit of it, is not clearly visible to the public in most cases. It should be noted that the most critical challenge in waste management is positive public attitude and self-participation in the process of successful waste management. The success of 3R policy is mainly depending on effective public involvement. The appropriate knowledge of separation of waste can reduce collection time and cost (Hassan & Rahman, 2000). In fact, public awareness and attitudes towards recycling are the most influencing factors for recycling program in the context of most developing nations (Troschinetz & Mihelcic, 2009).

### *5.2 Attitudes towards Waste Generation and Management Issues*

In this study, 57.1 percent of respondents expressed great concern about this issue, while 42.9 percent expressed a bit more concerned about it. Differences in attitudes also appear due to differences in the background of respondents. Respondents who understand the importance and consequences of the waste problem will be more concerned with this issue. In this case, we can also see from the attitude of the respondents put the garbage disposal problem at the sixth ranking compared to other environmental problems and 70.7 percent said it is very important.

Waste minimizing or reduction efforts are more important in overcoming the problems of waste management recycling. This attitude is a common attitude and be a basis in any waste management. Regarding the respondents (12.1 percent) who say that they are not sure with recycling program is due to their lack of understanding to the benefits of doing so and lack of knowledge on how to recycle. Only a few respondents (6.4 percent) who had heard the recycling program in their area. This also makes their attention of the recycling program is lower than that of the waste reduction program.

The household attitude of considering purchasing only products if the product is made from recycled materials or materials that can be recycled or not, 85 percent of respondents stated not consider it. To the satisfaction of the waste collection service and disposal by the relevant authority or agency, nearly half of respondents stated not satisfied. This indicates that there is hope or desire of respondents to the improvement of the current waste management by the relevant authority or agency.

### *5.3 Attitudes towards an Improved Waste Management Issues*

The discussion here is about the willingness to pay (WTP) for the improved waste management. As aforementioned, the WTP will exist if the community can see the benefits of the improved management offered.

From the regression analysis model obtained we can say that age, race, and income of respondents have a significant influence. The age of respondents is significant at the level of 95 percent, while the race and the income of respondents are significant at the level of 99 percent.

Strength of the regression model is at the level of 35.9 percent based on the value of R square. This value is meant changes in willingness to pay by the household on this model can only be described as 35.9 percent by the variables included in the model.

This representativeness value or  $R^2$  is considered high for study using data obtained from the cross section data. This is because a random selection of respondents is very difficult to ascertain whether the respondent has been selected to represent the variables or not.

## **6. Conclusion**

From this study, several conclusions can be drawn. The attitude of the community towards environmental issue is still below or under other preference like education, poverty or unemployment, public health, and housing facilities.

The result of the study explained that 57.1 percent of the household respondents truly care about proper waste management issue, while 42.9 percent respondents expressed a bit more concerned about it. However, respondents viewed waste management as less important issue as compared to food safety, air and water pollution, flooding and the issue of plant and animal extinction. Realistically, it is important to pay more efforts in waste reduction than that of recycling efforts in order to overcome the acute problem of waste management, which ultimately leads to a clean, green and healthy nation. In this regard, households' awareness of using products only made from the recycled materials or materials that can be recycled can play an important role in waste reduction process. Unfortunately, the study found that about 85 percent of respondents usually do not consider this issue.

The other important finding of the study is that almost 50 percent of households respondents are not satisfied with the waste collection as well as disposal issues carried out by the relevant agency. This indicates that there is a space for better waste collection and disposal management system in order to have clean, green, and environmentally healthy Malaysia for all to cherish. Households' WTP towards the improved waste management in this study is subject to the type of house, age, gender, race, education, and the practice of recycle, the tendency towards the environmental protection or resource utilization, and the monthly income. The average household WTP for the improved waste management in Seremban Municipality is RM23, while the median value is RM25.

### 6.1 Basic Implications

Municipal waste management must always be improved to achieve sustainable development and environmental friendly management. However, that improvement will result in the increase in cost to be borne by the community. Thus, we need a technique and policy to determine a suitable cost provisions for everyone in the society. Here, the determination of WTP of the community through contingent valuation method is appropriate to be considered.

WTP model produced and developed in this study can be used to determine the degree of affordable charges if an improved waste management will be executed. It is suggested that the charge that will be assigned to the community should be under their WTP as indicates in this study so that the community will get the value of the improved services that can affect household satisfaction towards the management. This will provide a great implication on the implementation of this improvement. WTP model produced and developed in this study can also be used to determine the degree of subsidy should be given to the poor household proportionate to the high monthly income households.

### 6.2 Recommendations

It is undoubtedly important to note that efficient waste management is an important matter for the community people that should be given top most priority in the future in order to have healthy environment for all. Therefore, the following suggestions can be considered in order to have efficient waste management for neat and clean environment. There are:

- 1) Community involvement in management must be realized to achieve the goal of having efficient and effective waste management. The current study discovered that many households have insufficient knowledge about the detrimental effects of improper waste management system. Thus, the suitable awareness program should be considered to educate community people about waste generation as well as how to manage household waste.
- 2) Management programs such as how to separate waste, ways to minimize or reduction, how to recycle and reuse should be introduced widely to the community people. In this regard, the 3R policy in Malaysia should be strengthened, recycling should be made compulsory, and create awareness among the community people to pay for better services.
- 3) Facilities to support waste management programs as mentioned above must be placed in a known and easily reached by the community people.
- 4) Research initiatives and various studies on waste management should be continued to have deeper understanding about this phenomenon with different samples cover various parts of Malaysia as well as with other variables not included in this study to strengthen the model in explaining household's willingness to pay.

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