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ASSESSING COMMITMENT, ATTITUDE AND BEHAVIORAL CHANGES OF COMMUNITY TOWARDS WASTE SEGREGATION PROGRAM AND ITS COST BENEFIT ANALYSIS IN SERDANG JAYA

HAJAR MARIAH BINTI HASHIM

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BY

HAJAR MARIAH BINTI HASHIM

Thesis submitted in fulfillment of requirement of the requirement for the degree of Bachelor Science (Environmental and Occupational Health) from the
Faculty of Medicine and Health Sciences
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ABSTRACT

ASSESSING COMMITMENT, ATTITUDE AND BEHAVIORAL CHANGES OF COMMUNITY TOWARDS WASTE SEGREGATION ACTIVITY AND ITS COST BENEFIT ANALYSIS IN SERDANG JAYA

HAJAR MARIAH BINTI HASHIM

Introduction: The rate of waste segregation in Malaysia is still low (JPSPN, 2012). **Objective:** A cross-sectional study was conducted at Taman Sri Andalas, Serdang Jaya to determine (i) the commitment, attitude and behavioral change of community and (ii) the reduction of waste from the waste segregation activity. **Instrument & Methodology:** A total of 69 respondents were selected randomly by street to participate in the waste segregation program conducted in this study. Households were provided with recycled bin and food waste bin facilities and collection services in the program. The behavioral changes were assessed along the program based on the Theory of Planned Behavior (Ajzen, 1991). **Results:** Significant behavior changes were determined in perceived behavior control, situational factors, outcome, consequences, perceived lack of facility and moral norm behavior in this study. The volume of waste segregated for recycled has increased significantly, from 9.39% (phase 2) to 10.58% (phase 3) in this program and 13.26% of the community waste is a food waste that possible to be composted. The volume of waste that end up to landfill has decreased from 100% in the first phase (without segregation) to 90.61% and 76.16% in phase 2 and phase 3 (with segregation) respectively. **Conclusion:** The waste segregation program resulted in several behavioral changes of households and reduction of waste to landfill. It is recommended to extent the program to a bigger scale of community to assess the actual behavioral change and the volume of waste segregated by the households.

Key words: Behavioral changes, waste segregation program, Theory of Planned Behavior (Ajzen, 1991).

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ABSTRAK

MENILAI KOMITMEN,SIKAP DAN PERUBAHAN TINGKAH LAKU KOMUNITI TERHADAP PROGRAM PENGASINGAN SAMPAH DAN ANALISIS KOS KEUNTUNGANNYA DI SERDANG JAYA

HAJAR MARIAH BINTI HASHIM

Pengenalan: Kadar pengasingan sisa di rumah di Malaysia adalah masih ditahap rendah (JPSPN, 2012). **Objektif :** Satu kajian keratan rentas telah dijalankan di kawasan Perumahan Taman Sri Andalas, Serdang Jaya untuk mengenalpasti (i) komitmen, sikap dan perubahan tingkah laku komuniti dan (ii) pengurangan sampah daripada program pengasingan sampah. **Kaedah & Peralatan:** Sejumlah 69 orang responden telah dipilih secara rawak mengikut lorong bagi menyertai program pengasingan sampah yang dijalankan dalam kajian ini. Setiap isi rumah akan dibekalkan dengan tong sampah kitar semula, tong sampah sisa makanan dan juga servis kutipan sampah kitar semula. Perubahan tingkah laku dinilai sepanjang program dijalankan berdasarkan 'Theory of Planned Behavior (Ajzen, 1991)'.**Keputusan kajian:** Perubahan tingkah laku ketara yang telah dikenalpasti dalam kajian ini adalah tingkah laku tanggapan kawalan, tingkah laku keadaan, tingkah laku hasil, tingkah laku akibat, tanggapan kurang kemudahan dan norma moral. Jumlah sisa yang diasingkan untuk dikitar semula telah meningkat dengan ketara, dari 9.39% (pada fasa ke-2) kepada 10.58% (pada fasa-3) program dan 13.26% daripada sisa yang dihasilkan adalah sisa makanan yang boleh dikompos. Jumlah sisa yang dibuang ke tapak pelupusan masing-masing telah menurun daripada 100% pada fasa pertama (tanpa pengasingan) kepada 90.61% dan 76.16% pada fasa 2 dan fasa 3 (dengan pengasingan). **Penutup:** Program pengasingan sampah menyebabkan beberapa perubahan tingkah laku terhadap isi rumah dan pengurangan sisa ke tapak pelupusan. Disyorkan supaya program dijalankan dalam skala yang lebih besar dalam masyarakat untuk menilai perubahan tingkah laku dan jumlah pengasingan sisa sebenar isi rumah.

Kata kunci: Perubahan Tingkah laku, program pengasingan sampah, Theory of Planned Behavior (Ajzen, 1991).

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LIST OF ACRONYMS AND ABBREVIATIONS

CBA	Cost Benefits Analysis
DANIDA	Danish International Development Agency
JPSPN	Jabatan Pengurusan Sisa Pepejal Negara
MOHLG	Ministry of Housing and Local Government
PPSPPA	Perbadanan Pengurusan Sisa Pepejal dan Pembersihan Awam
MSW	Municipal Solid Waste
USEPA	US Environmental Protection Agency
SWM	Solid Waste Management
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action

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CHAPTER 1

INTRODUCTION

1.1 Background of study

Waste management is currently one of the key areas of public policy. The increasing in population growth results in increasing total waste generated (Adon, 2008). Table 1.1 shows the statistics of municipal solid waste (MSW) in peninsular Malaysia from 1970 to 2010. This table shows that waste generation in Kuala Lumpur has increased for example from 98.9 tonnes per day in 1970 to 3,489 tonnes per day in 2010. The changes to modern lifestyle and living standard of households are the factors that contribute to the increasing of waste generation.

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Table 1.1: Generation of MSW in peninsular Malaysia (1970-2010)

Urban centre	Solid waste generated (tonnes / day)						
	1970	1980	1990	2002	2006	2009	2010
Kuala Lumpur	98.9	310.5	586.8	2754	3100	3387	3489
Johor Bahru (Johor)	41.1	99.6	174.8	215	242	264	272
Ipoh (Perak)	22.5	82.7	162.2	208	234	256	264
Georgetown (Penang)	53.4	83.0	137.2	221	249	272	280
Klang (Selangor)	18.0	65.0	122.8	478	538	588	606
K.Terengganu (Terengganu)	8.7	61.8	121.0	137	154	168	173
K.Bharu (Kelantan)	9.1	56.5	102.9	129.5	146	160	165
Kuantan (Pahang)	7.1	45.2	85.3	174	196	214	220
Seremban (N.sembilan)	13.4	45.1	85.2	165	186	203	209
Melaka	14.4	29.1	46.8	562	632	691	712

Source: Fauziah & Agamuthu (2012)

The recycling rate in Malaysia is still low where only 5% from total 5 million ton of waste being recycled (PPSPPA, 2012). Malaysia generates up to 17,000 ton of waste per day and by 2020 waste is estimated to be 30,000 ton per day (Chen, 2012).Waste segregation is in demand to promote recycling in this country. By 2020, Malaysian government has set a target to increase the recycling rate by 22%. Currently, our neighborhood country, Singapore has succeeded to reach 40% of recycling rate. Furthermore, with the segregation of organic waste and food waste from recycled materials, it is expected to reduce volume of waste disposed to landfill (PPSPPA, 2012). Figure 1.1 shows the composition of solid waste in Malaysia. Most of the waste is categorized as waste that can be recycled and compost.

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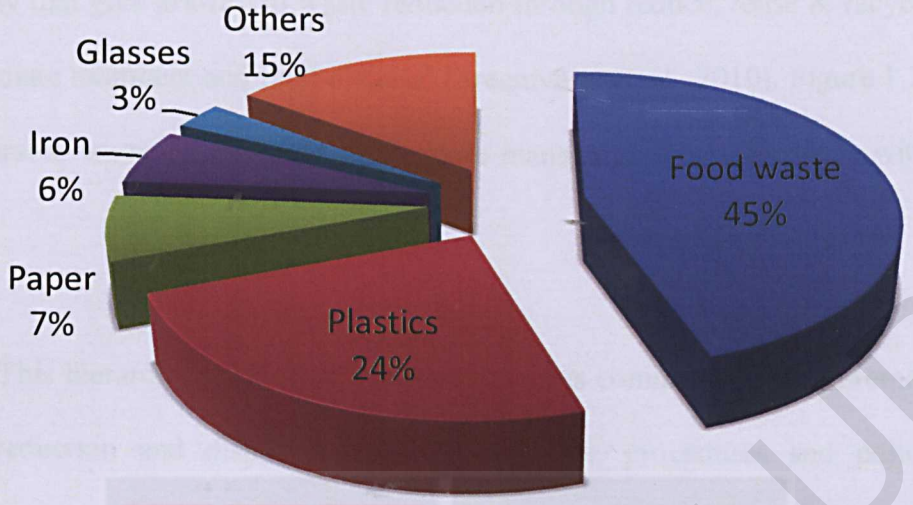

Figure 1.1: Composition of solid waste in Malaysia 2005.

Source: PPSPPA (2012)

Minimizing waste out to landfill is important to safeguard the environment from negative effects and from contributing to global warming (Syed, 2010). Local authorities spend up to 60 percent of their annual budget on waste management, which costs Malaysia between RM110 and RM130 to collect and dispose one ton of MSW (Razack, 2007). From this value together with the increasing in municipal waste generation every year, there is an urgent need for a better waste disposal option.

Malaysian government has proposed a National Policy on Solid Waste management (NPSW) in the 9th Malaysia plan 2006-2010. This policy is aimed to establish a comprehensive, integrated, cost-effective, sustainable and socially

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acceptable of SWM and also to implement SWM based on waste management hierarchy that give priority to waste reduction through reduce, reuse & recycle (3R), intermediate treatment and final disposal (Sreenivasan*et al.,* 2010). Figure 1.2 shows the desirable waste hierarchy of solid waste management in accordance with JSPN (2012)

This hierarchy shows that the government is committed to get alternative for waste reduction and disposal. Although methods, procedures and policies are mandated to reuse and recycle but there still exists a gap when it comes to practical. Public are still not manage to get the policy rightly (Agamuthu *et al.,* 2010). Therefore, this study aimed to identify the behavioral factors that influence the public to take part in waste segregation activity.

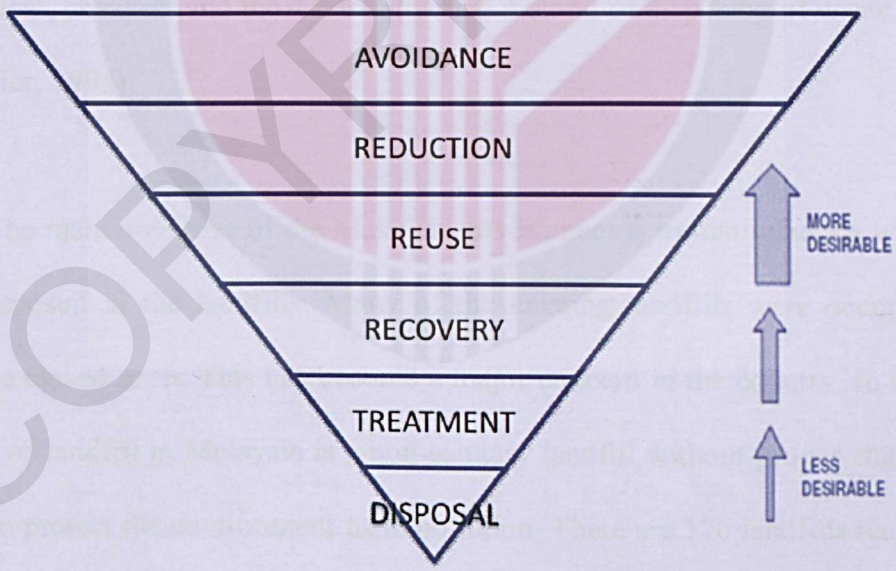

Figure 1.2: Desirable waste hierarchy of solid waste management.

Source: JPSPN(2012)

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According to the JPSPN (2012), the priority of waste management is to reduce the waste generated, reduce the waste in point source, use anything that could be used again, gain again energy from recycled material, composting and landfill as a last choice.

1.2 Problem Statement

Malaysia is facing an urban solid waste management issues as landfills are rapidly filling up, increasing amount of waste are generated, shortages of disposal land, that resulting of serious environmental and human health impact (Sanaz, 2009). Increasing in domestic waste produced by the household resulted to waste disposal problem. Landfilling is the main solid waste disposal practice in Malaysia since it is the simplest, cheapest and most cost-effective method of disposing of waste (Barrett and Lawler, 1995).

The main objective of the Malaysia government is to minimize the waste that being disposed in the landfills. Many of the existing landfills were occupied and should be closed soon. This has become a major concern in the country. In addition, majority of landfill in Malaysia is a non-sanitary landfill without proper engineering control to protect the environment from pollution. There are 176 landfills recorded in Malaysia, with improper management status and only 10 of them are sanitary landfill (Ministry of housing & Local Government, 2009). Table 1.2 shows the landfill status

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in Malaysia. In consequence, the implementation of waste segregation system is one of the good alternatives to help reducing volume of waste disposed in landfill as well as protecting the environment.

Table 1.2: Landfills status in Malaysia

State	Operating	End of life	Sanitary
Perlis	1	1	0
Kedah	10	5	0
Penang	1	2	0
Perak	20	9	0
Pahang	19	13	1
Selangor	6	12	3
Putrajaya	0	0	0
Kuala Lumpur	1	7	1
N. Sembilan	8	10	0
Malacca	2	5	0
Johor	13	21	1
Kelantan	13	4	0
Terengganu	9	12	0
Labuan	1	0	0
Sabah	21	1	0
Sarawak	51	12	3
Total	176	114	8

Source: Ministry of Housing and Local Government (2009)

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Although the government has a policy on effective waste management and awareness program of waste recycling, but there is still a gap in the actual practice. Moreover, easily available information and user friendly waste segregation system and facilities are crucial in order to make waste segregation and recycling a success. However, the perception was also that recycling infrastructure such as recycling bin was not easily available that has limit the willingness of public to recycle (Agamuthu *et al.,* 2010). The user friendly designed facility was not enough if a household do not contribute to help in managing this waste. Therefore, this study was aimed to measure the commitment, attitude and behavioral change of the household towards waste segregation practices through a supported system introduced among community in Serdang Jaya, Selangor. The households were supplied with a separate waste bin for recycle item, food waste and general waste in this study. They were also provided with a regular collection services to determine how they react towards the segregation program implemented in this study. This study measure the willingness of the community to take part in waste segregation program and the reduction of waste before and after the program implemented.

The cost benefit analysis was conducted to measure the capital and the revenue that was incurred by the government if this program being implemented to the community. The program implemented in this study is expected to predict the acceptance and awareness level of public towards waste segregation program.

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1.3 Study Justification

Increase of waste and lack of segregation activities have increased the burden of solid waste management in the country. Recyclable items represent 75% of the total waste volume and if no segregation done, these valuable materials will be disposed into landfill (PPSPA, 2012).Waste segregation is not just environmentally important but also an economic concern. Waste segregation activity is targeted to increase national recycling target to 22% by 2020. In addition, even though with comprehensive awareness program, only few of them succeed. One of the reasons of the failure is because of insufficient and inappropriately located recycling facilities (Agamuthu et al, 2010). Therefore a study to assess factors that influence the acceptance of community in waste segregation program is important to overcome the waste management problem.

The study of behavioral changes is also one of the determinants in health aspect of community.According to Blum (1981) (Figure 1.3), based on his Environment of Health Model, there are four major determinants contribute to the health and human beings of humans and one of it is the behavior and lifestyle.

The behavior of preserving environment by maintaining the natural resources by doing waste minimization and also prevent is the accumulation of waste in landfill is also one of health aspect. Improperly managed solid waste poses a risk to human health and the environment.Uncontrolled dumping and improper waste handling

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cause a variety of problems, including water contamination and attracting insects and rodents (USEPA, 2002).

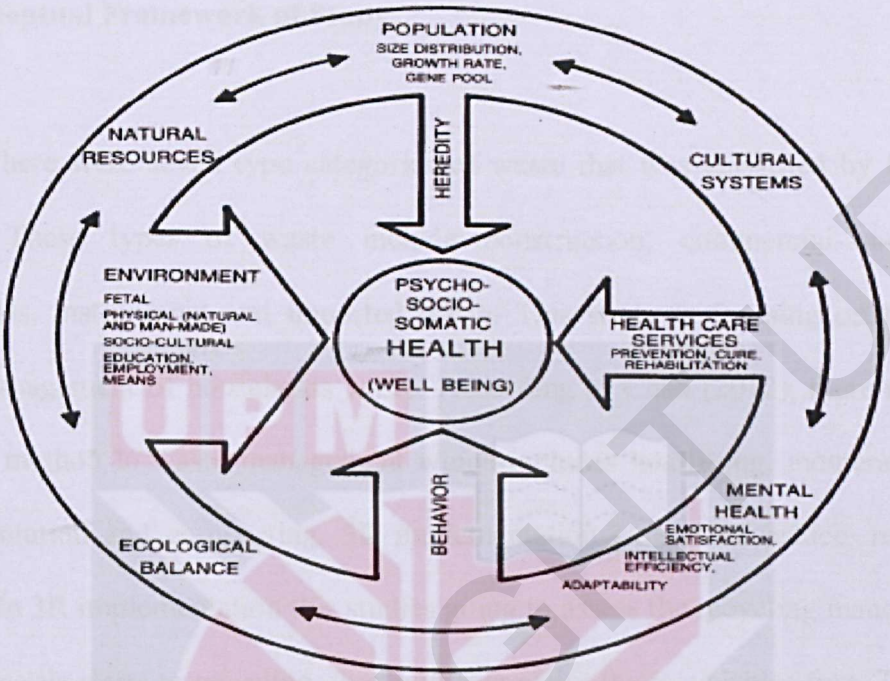

Figure 1.3: Environmental Health model (Blum, 1981)

Behavioral changes of household towards waste segregation (acceptance and willingness) were assessedbased on the Theory of Planned Behavior (Ajzen, 1991). This theory has been approved in previous studies to be the best theory in describing behavior of recycling (Ramayah et al., 2012; Knussen and Yule, 2000).

The community in Serdang Jaya was selected in this study as they have no waste segregation program yet in this area at present. This location also was set up with a good waste collection scheduled and nearly 100 percent of their waste was

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collected by the local authority. Thus, we can measure the total waste that was thrown by the household before the waste was picked up by the contractor.

1.4 Conceptual Framework of Study

There were seven type categories of waste that was classified by PPSPPA (2012). These types of waste include construction, commercial, industrial, households, institutional and imported waste. This study is focusing on the solid waste management of households waste. According to Chan (2012), there are three types of method in waste management which includes landfilling, incineration, 3R implementation and composting. 3R implementation consist of reduce, reuse and recycle. In 3R implementation this studies going to assess the recycling management. Before people starts to recycling, they will segregates the recyclables first. Then, the waste segregation at point source will encourage to recycling behavior. According to Sidique (2008) there are also several factors that influence community in waste segregation activity. The factors are street size, socio demographic, behavior, socioeconomic and policy. This study focused on the behavior of community towards waste segregation activity. The behaviors were assessed through the waste segregation program that was conducted. Therefore, the behavioral changes were assessed before and after the waste segregation program that was conducted. Lastly, cost benefits analysis is calculated for the implementation of waste segregation programs in the communities. Figure 1.4 showed the conceptual framework of the study.

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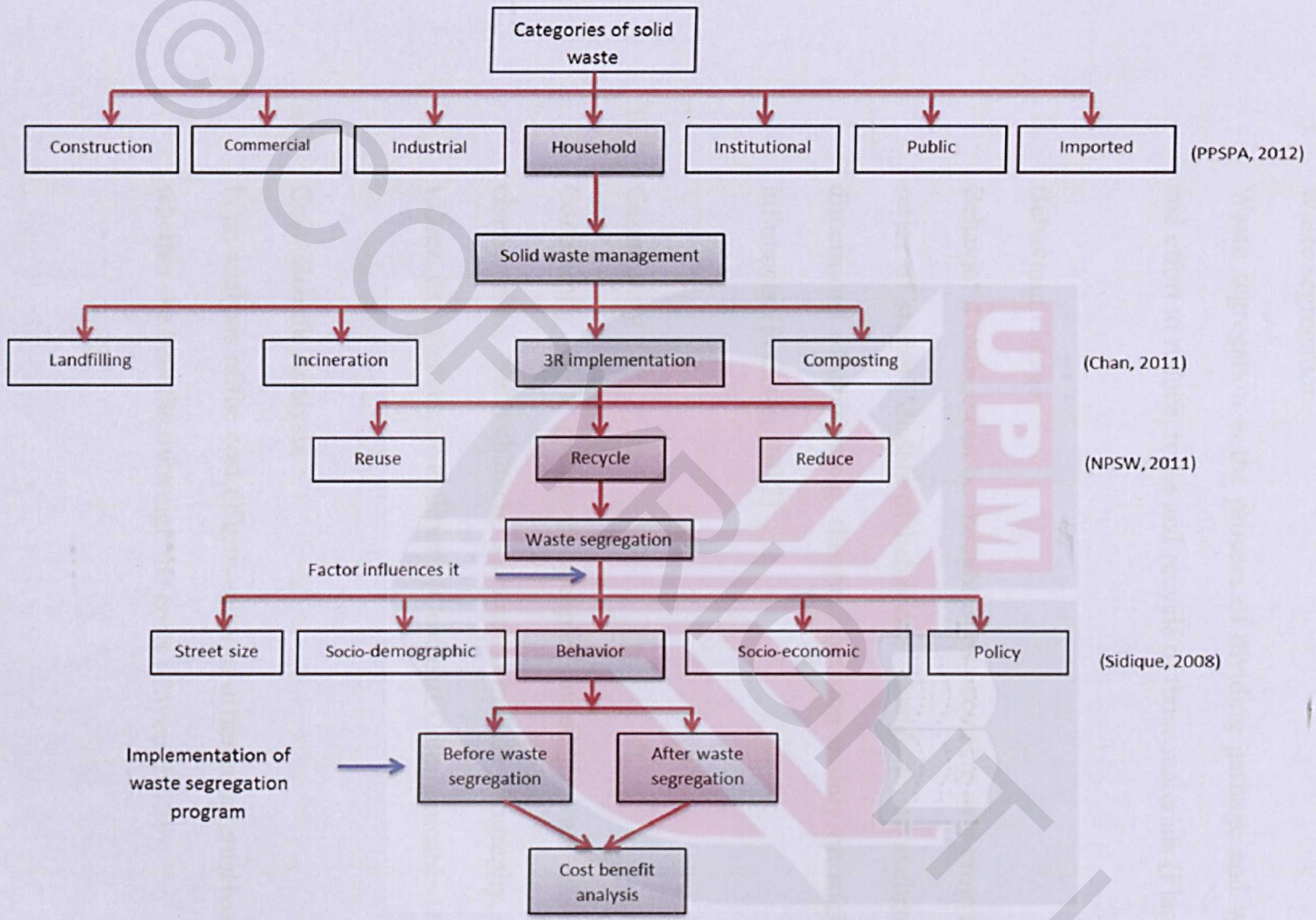

Figure 1.4: Conceptual Framework of the Study

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1.5 Definition of terms

1.5.1 Conceptual Definition

i. Waste segregation

Waste segregation is the process of dividing garbage and waste product in and effort to reduce, reuse and recycle of those materials (Flanders, 2012)

ii. Behaviour change

Behavioral change can be thought of as occurring as a progression through a series of stages. Models of behavioral change focus exclusively on certain dimensions of change e.g. theories focusing mainly on social or biological influences (Petersen, 2012)

iii. Community

Community is a group of people united by at least one common characteristic. Such characteristics could include geography, shared interests, values, experiences, or traditions (Centre of Communicable Disease, 2012)

iv. Cost- Benefit Analysis

Is an analysis of the cost effectiveness of different alternatives in order to see whether the benefits outweigh the costs (Covec, 2012)

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1.5.2 Operational Definition

i. Waste segregation

Waste segregation is segregated by providing household with waste bin. Households were asked to segregate waste according to three type of waste. Waste that was segregated was recycling waste, food waste and general waste.

ii. Behavioural changes

A behavioral change was assessed based onthe Theory of Planned Behavior by Ajzen (1991). This theory used to predict the changes of households in segregating their household waste into three different categories of waste which were general waste, recycled waste and food waste.

iii. Community

Community in this study was referring to the household that take part in this research which was residents of Taman Sri Andalas Serdang Jaya.

iv. Cost- Benefit Analysis

In the cost-benefit analysis, the environmental impacts related to collection, sorting, transport, landfilling, incineration (with an average rate of energy recovery) and recycling were translated into monetary values. These monetary values allow the aggregation of and the comparison between

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internal (financial) and external (environmental and social) costs of the various options considered (PIRA, 2003). The monetary value is the property of having material worth often indicated by the amount of money something would bring if sold (Farlex, 2013).

1.6 Objectives

1.6.1 General Objective

- To determine the commitment, attitude and behavioral change of community towards waste segregation activity in Serdang Jaya

1.6.2 Specific Objective

1. To determine the socio-demographic factors of the household.
2. To compare the difference of communities' behaviour before and after waste segregation program.
3. To measure the volume of waste segregated by the community before and after waste segregation program.
4. To determine the relationship of behavioral changes and volume of waste segregated before and after the waste segregation program.
5. To determine the cost benefits of waste segregation program.

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1.7 Hypothesis

1. There is a significant difference of communities' behaviour before and after waste segregation program.
2. There is a significant difference in volume of waste that segregated by the community before and after the program.
3. There is significant relationship between behavioural changes and volume of waste segregated.
4. There is a significant cost benefit of the waste segregation program.

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CHAPTER 2

LITERATURE REVIEW

2.1 Generation of solid waste in Malaysia

The problem of solid waste management (SWM) is the main concern around the world due to the increasing amount of waste produced and lack of place to dispose these solid waste. Othman (2002) defined SWM as the control of waste generation, storage, collection, transfer and transport, processing and disposal of solid wastes (SW) consistent with the best practices of public health, economics, financial, engineering, administrative, legal and environmental considerations.

Malaysia is not excluded from having a problem on solid waste management. The total population of Malaysia was 27 billion in 2009 and predicted to increase to 28 billion in 2013 (Adon, 2008). Waste generation is increasing as population increased. Solid waste generation volume increased at the rate of 1.5% per year due to increase in urbanizations, change in living standards and consumption patterns of community (Adon, 2008).

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The major aim problem of waste management is to minimize the volume of waste disposed to landfill. In Malaysia, landfills have been the most common methods of waste disposal. About 95% of waste disposed in the landfill. Dependence on landfill to dispose waste will increase the greenhouse effect to 50 % in 2020 (JPSPN, 2012). In most cases, open dumping is being practiced and takes place at about 50% of the total landfills (Adon, 2008).

2.2 Problem in waste segregation

2.2.2 Problem in recycling facility

The main problem in implementing the recycling facilities in Malaysia is lack of facility in recycling. Local authority at many places in the country does not provide waste collection for recyclable. They only provide collection for general waste. Even though the households agreed that recycling is important, not many of them recycling due to severalreasons. The quantity of recyclables collected in Malaysia indeed very small (Chong, 2012) if compared to other developed country such as German (74 %), Belgium (71%), Austria (67 %) and Netherlands (66%) (PPSPA, 2012). For example, in Malaysia the main reason of low recycling rate is due to misdirection in the campaign. Although much money was spent on advertisements to raise awareness level among community, there is a clear misinformation (Omran*et al.,* 2009). It is observed that advertisement campaigns are focused on informing households to sort their recyclables and place them in separate

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bins. However, such bins can only be found at designated public places, which are usually at a distant from residential areas (Omran*et al.,* 2009). This cause troublesome to households brings their recycle items to recycling center.

Adenso-Díaz (2005) indicated that resident who are environmentally concerned have a waste segregation bin in their house have more tendency to recycle than walk for a longer time to drop off the waste at nearest recycling center. From this observation, he concluded that distance and access to the bins is obviously an incentive to recycling .The benefit of facility may bring to local residents can influence attitudes (Lima, 1996). In this study, waste segregation program is addressed to make a prediction of households' behavior in segregating their waste after being provided with the bin facilities.

2.3 Waste segregation activity promote recycling of waste

Recycling seems to be an increasingly popular solution, because it is not only reducing the waste, but also turning materials into valuable resources. In recent study, lack of facilities really does impact households' intentions to recycle (Chen & Tung, 2009). Waste segregation program is conducted to assess household participation in recycling. In this program recycling facilities such as waste collection and bin for storage of recyclable items were provided to household.

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2.4 Relationship of behavior and health.

Behavior has long been identified as an important factor in determining health (Zaitun, 2011). According to Blum (1981) based on his environment of health model, there are four major determinants contribute to the health and human beings of humans and one of it discussed about the behavior and lifestyle. In this model, behavior is one of the aspects that contribute to people health and well-being. From this perspective there are indirectly relationship between health and behavior. Behavior of preserving environment by maintaining the earth resources by doing waste minimization and also prevent the accumulation of waste in landfill is also one of health aspect. Improperly managed solid waste poses a risk to human health and the environment. Uncontrolled dumping and improper waste handling causes a variety of problems, including contaminating water, attracting insects and rodents, and increasing flooding due to blocked drainage canals or gullies (USEPA, 2002). People who live in clean environment will have good health because the environment also a part of health. Clean environment come from the positive behavior and this is much related to Blum (1981) model as discussed above.

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2.5 The Theory of Planned Behavior (TPB)

The behavior of recycling can be explained using TPB. TPB suggested social behavior based on the understanding of the cognitive processes that guide behavior (Ajzen and Fishbein, 1980). The Theory of Planned Behavior is the extension of the Theory of Reason Action (TRA) (Fishbein & Ajzen, 1975). In the TRA models; behavior is a function of intention to engage in specified behavior. Intention is determined by the attitude towards the act and subjective norm. However, it has been criticized that the intention predicts the behavior only if the person can decide to perform or not to perform (volitional behaviors). TRA are not applicable when predicting behavior required skill, resources or opportunities (Takiyama et al). TPB differs from TRA in its addition of 'perceived behavioral control' (Tang et al, 2010). It refers to 'the person's belief as to how easy or difficult performance of the behavior is likely to be' (Ajzen, 1991). According to the Ajzen (1991) TPB, a behavior is predicted by attitudinal factors, normative factors, and perceived control (Table 2.1).

1. Attitude factors, is the individual's favourable or unfavourable evaluation of performing the behaviour.
2. The subjective norm factors, is the individual's perception of social pressure to perform or not to perform the behaviour.
3. Perceived behaviour control, is the individual's perception of their ability to perform the behaviour.

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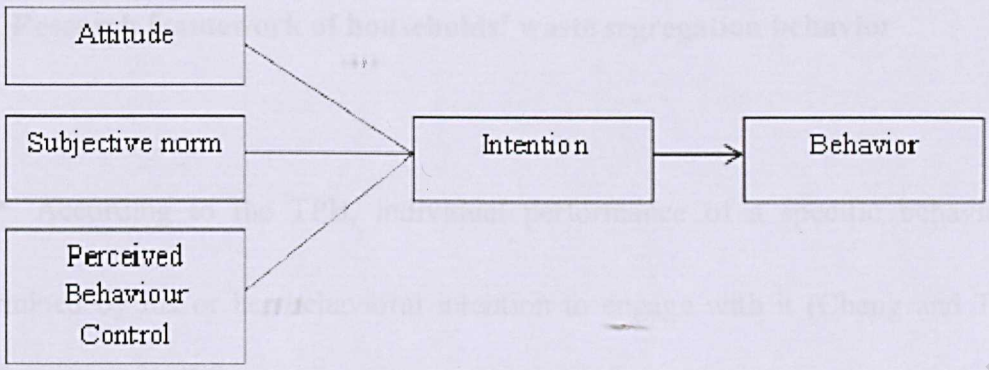

Figure 2.1: Diagram of the Theory of Planned Behaviour (Ajzen, 1991)

The TPB allows for the incorporation of additional variables, provided that these variables make a significant contribution to the explanation of behavior (Ajzen, 1991). Therefore, a few predictor variables for waste segregation recycling behavior were added in this study. These additional variables include situational factors, outcomes, consequences, perceived lack of facility and moral norm. These variables were grouped as households' waste segregation behavior.

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2.5.1 Research framework of households' waste segregation behavior

According to the TPB, individual performance of a specific behavior is determined by his or her behavioral intention to engage with it (Cheng and Tung, 2009). The behavioral intentions in this study were assessed by involving the community in waste segregation activities. In this study, recycle bins and waste collection services were provided by the researchers. These provisions become determinants that assessed behavioral changes of the community involved. Figure 3.1 shows the framework of the Theory of Planned Behavior for assessing behavior of waste segregation. The following section explains about this theory in more detail.

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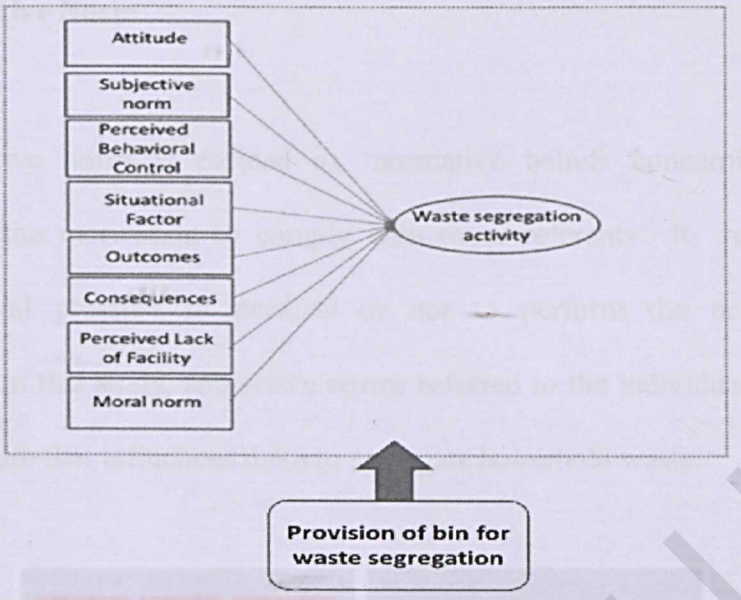

Figure 2.2: The framework of the Theory of Planned Behavior used in assessing behavior of waste segregation.

(Source: Tonglet *et al.,* (2004))

1. **Attitude**

Attitude is 'the degree to which person has favorable or unfavorable evaluation or judgment of behavior in question'(Ajzen, 1991,pg. 188). According to Takiyama (2008), attitude is a predictor that determines the intentions to perform a suggested behavior.In the current study, attitude is referred as the individual's perceptions about the intention in doing waste segregation.

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2. Subjective Norm

Subjective norm is defined as 'normative beliefs concerning referents, multiplied by the motivation to comply with those referents'. It refers to the perceived social pressure to perform or not to perform the behavior(Ajzen, 1991,pg. 188).In this study, subjective norms referred to the individual's perception of social pressure that influences them to segregate household waste.

3. Perceived Behavioral control

Perceived behavior control is defined as 'the role of individual's ability to control his or her behavior' (Davies et al., 2002).Perceived ease or difficulty of performing the behavior and it is assumed to reflect past experience as well as anticipated impediments and obstacles (Ajzen, 1991,pg. 188). In the context of this study, it focuses on individual's perception of their ability to perform the waste segregation activities.

4. Situational factor

Situational factors may facilitate or inhibit waste segregation behavior of households (Davies et al., 2002). Individuals may hold positive attitudes towards recycling but not necessarily they will engage in recycling behavior. Tonglet *et*

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al.,(2004) argued that physical factors may be constrained by the lack of opportunities, facilities, skills or resources.

5. Outcomes

Outcomes is a measure that assessed the costs and benefits of recycling behavior (Davies et al. 2002).In this study, the outcome was studied in term of environmental effect based on the definition provided byDavies *et al.,* (2002).

6. Consequences

Similar to the study of Tonglet *et al.,* (2004), consequences of the waste segregation program in this study were focused on the individual's knowledge of the consequences of performing the recycling behavior.

7. Perceived lack of facilities

These variables were referred as the perception of individuals about lack of facilities such as bins that discourage them from participating in the waste segregation activity.Perceived lack of facilities was expected to influence the relationship between perceived behavior control and intentions to recycle or segregate the waste. Knussen *et al.,* (2004) suggests that this relationship was expected to be weaker when facilities were perceived to be lacking.

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8. Moral norm

Moral norm is defined as 'a positive value that determines willingness of households to do waste segregation activity' (Tonglet et *al.,* 2004). He further explains that the moral norm relates to the individual's personal beliefs about the moral correctness or incorrectness of performing a specific behavior.

2.6 The Theory of Planned Behavior, Ajzen (1991) and its applications to researches on household recycling behavior.

The Theory of Planned Behaviour (TPB), Ajzen (1991) suggests a theoretical frame-work for systematically determining the potential factors that influence recycling participation among people. This theory has been used by several studies as a basis to examine peoples' behavior towards recycling for example in Tang *et al.,* (2010), Ramayah *et al.,* (2012) and Chen and Tung (2009). Results of a number of studies related to recycling behavior have confirmed this theory (Ramayah *et al.,* 2012; Knussen and Yule, 2008).

Boldero (1995) suggests that the situational factors may include the amount of effort involved, inconvenience, storage space and access to recycling schemes. Moral norms and consequences and outcome of recycling are considered by Tonglet *et al.,* (2004) as important determinants of households' recycling intentions and these variables should be included in the research framework. According to Chen and Tung (2009), perceived lack of facilities is observed in some previous studies to

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exert some influences on households' behavioral intentions to recycle waste. They proposed that this factor should also be included in the research framework of households' behavioral intentions to recycle waste.

Belk (1995) argued that even though the Theory of planned behavior has been confirmed by a number of previous studies, the actual behavior is not always equally well predicted by households attitudes and even stated behavioral intentions (Belk, 1985). Chen and Tung (2009) recommended that further researchers must investigate households' actual recycling behavior through observation.

Ramayah (2012) has reviewed several related literature on recycling behavior and conclude that communication and education efforts aimed at improving awareness of recycling can influence individuals to engage more in recycling behavior. Her conclusion was supported by the findings of Sidique et al. (2009) who also found out that communication and education efforts significantly encouraged recycling behavior. Therefore, based on these findings, this study introduced a waste segregation program where specific bin were provided for a specific waste (recycle and food waste bin) to one community as a sample, to assess and observe the behavioral change of the study participants. In addition, communication and education efforts were also practiced in the program to increase the awareness level of the respondents.

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CHAPTER 3

METHODOLOGY

3.1 Study Location

This study was conducted at the residential area of Taman Sri Andalas, Serdang Jaya; Serdang, Selangor. Serdang Jaya is located at the western region of Peninsular Malaysia. The community in Serdang Jaya was selected in this study as they have no waste segregation program yet in this area at present. This location was also set up with a good waste collection schedule and nearly 100 percent of their waste was collected by the local authority. Thus, behavior could be assessed from the beginning of implementing waste segregation program. Streets that involved in this study are Jalan Raya 5, Jalan 4/4, Jalan 4/1, Jalan 4/2 (Lorong 4/2A, 4/2B, 4/2C) and Jalan 4/3(Lorong 4/3A, 4/2C, 4/3C) (Figure 3.1).

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Figure 3.1: The street distribution house of respondents and the satellite view of the study location (triangle shows study area)

3.2 Study Design

This study was cross-sectional study. This study wasassessing the commitment, attitude and behavioral change of community towards waste segregation program in Serdang Jaya.

3.3 Sampling

3.3.1 Sampling method

Simple random sampling was applied in this study. The randomization was done by street rather than by individual household level. This sampling was chosen because of the expectation that recycling behavior is influenced by subjective norms. A subjective norm is individual's perception of social pressure to recycle household waste. If they see their neighbors in the same street do recycling, they will be also influenced by that behavior (Cotterill *et al.,* 2008).

3.3.2 Sampling population

The population of the respondent consists of community in Taman Perumahan Serdang Jaya.

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3.3.3 Sampling frame

The sampling frame of this study is a list of houses of residents in Taman Perumahan Serdang Jaya which was obtained from the local authority of that area.

3.3. 4 Study sample

The study sample consists of 74 houses of residents. The study sample was calculated based on the formula of Kirkwood (1988) (E.q.1). Based on the research done by Ramayah (2011), the prevalence of recycling behavior among student in Universiti Sains Malaysia was 81 %.

$$N = \frac{p(1-p)}{e^2} \quad \text{..... (E.q.1)}$$

Where, N : Sample size

P : 81% prevalence of recycling behavior Ramayah (2011)

e^2 = standard error (5%)

$$N = \frac{0.81\ (1-0.81)}{0.05^2}$$

$$= 61.56$$

An additional of 20% is made to the sample size to overcome the problem of non-responses. Thus, the total sample is 74.

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3.4 Data Collection and Instrumentation

3.4.1 Data collection- Waste Segregation Program

Data collection consists of three phases. Figure 3.3 shows the process flow of data collection of this study.

a) Phase 1

Households that involved in the program were given a short briefing about the waste segregation program. Households were given a set of questionnaire that was constructed based on the Theory of Planned Behavior, Ajzen (1991) to assess the behavior change of household towards waste segregation. Questionnaire was constructed based on the study of behavior by Loannou*et al.* (2011) and Knussen *et al.* (2004). Then, waste in the existing bin was weighed to determine the volume that was thrown by household for one week period.

b) Phase 2

Every households that taking part in this study was provided with recycle bin. Recyclable bin for collecting recycle items will be placed at each house involved in this program. Then, households taught on how to recycle their waste through pamphlet and individual consultation. After one week, household waste was

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weighted. The waste was weighed and they were asked to fill in the questionnaire to assess their behavioral change after the provision of recyclable bins.At this stage, the volume of waste being recycled in the bin was determined. This data was then recorded into a table (Wilhelm and Colleary, 2008).

c) Phase 3

In phase 3 of the research, each household was provided with one more bin i.e. food waste bin. At this stage, household was asked to segregate three types of waste; general waste, recycled waste and food waste in separate bin. After one week,the household's waste was assessed and weighed and they were asked to fill in the questionnaire to assess the behavioral change after the provision of recyclable bins.

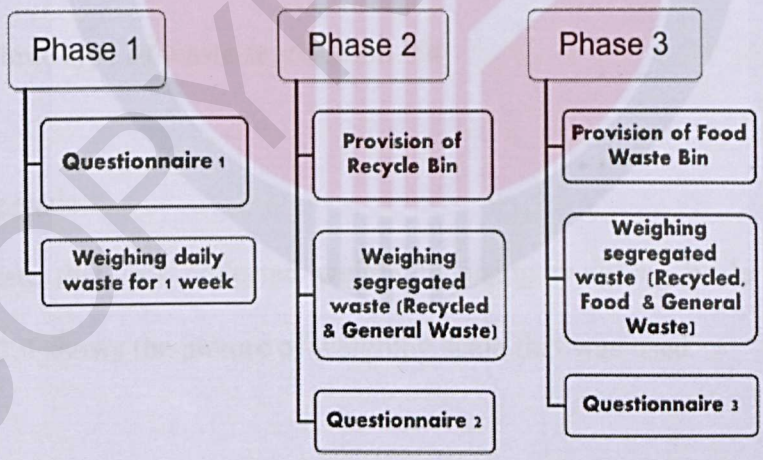

Figure 3.2: Diagram of waste segregation program conducted in community

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3.4.4 Instrumentation

i. Kerbside-bin facility

This study was conducted by providing the household with the bin to sort the recyclables waste as well as organic waste. A set of bin was provided to each house. Figure 3.4 shows the picture of the three types of bin that was used in this study.

General Waste Bin Recycled Bin Food Waste Bin

Figure 3.3: Three type of waste segregation bin

ii. Weighing scale.

The waste that was collected weight by using weighing scale up to 10 kg. Figure 3.4 shows the picture of weighing scale that was used.

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Figure 3.4: Weighing scale to weight the segregated waste

iii. Questionnaire Design

The questionnaire consists of two components. The first component measures socio-demographic and socio-economic background. Research in demographic background becomes important as women show to involve more recycling household waste than men (Takiyama, 2008).

The second components measure the waste segregation behaviour. The second part of this questionnaire was constructed based on the previous study (see for example Knussen et. al, Ramayah et al, Tonglet et. al, Tang et. al) on the recycling behaviour literature that use the same theory 'the Theory of Planned Behaviour'. There wereeight predictor factors of household waste segregation behaviour included in this questionnaire.

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iv. Questionnaire Items

Table 3.1: Questionnaire design based on the Theory of Planned Behavior, Ajzen (1991)

Constructs	Items	Source
Attitude	I find the idea of waste segregation is pleasing. I am not interested in the idea of waste segregation. My feelings about waste segregation are positive. I find the idea of waste segregation unpleasant. My feelings towards waste segregation are favorable.	Knussen et al. (2004)
Subjective Norm	Most of my friends think that household recycling is a good thing to do. Most of my family thinks that I should segregate my waste. My neighbor thinks that I will segregate my waste for recycling. Most people who are important to me want me to engage in household waste segregation. It is hard to see any acquaintance of mine make waste segregation for recycling.	Knussen et al. (2004)
Perceived Behavioral control	Waste segregation for recycling is easy for me The local council provides satisfactory resources for waste segregation. I have plenty of opportunities to do waste segregation. I know what items can be recycled. I know where to take my household waste for recycling. I know how to segregate my household waste.	Tonglet et al. (2004)
Situational factor	Waste segregation takes up too much time Waste segregation takes up too much room Waste segregation is too complicated Waste segregation programs are a waste of money I am not doing waste segregation because recycling center was far from my house	Tonglet et al. (2004)
Outcomes	Waste segregation for recycling helps to protect the environment Waste segregation for recycling reduces the amount of waste that goes into landfill Waste segregation for recycling preserves natural resources I cannot see the point in waste segregation for recycling	Tonglet et al. (2004)
Consequences	Waste segregation for recycling saves energy Waste segregation for recycling saves money Waste segregation for recycling creates a better environment for future generations	Tonglet et al. (2004)
Perceived lack of facilities	I fail to do waste segregation because recycling facilities are not easily available. I am not doing waste segregation because there are no local collections I think local authority should responsible for waste collection	Knussen et al. (2004)
Moral norm	I feel I should not waste anything if it could be used again I would feel guilty if I did not do waste segregation for my household waste Not do waste segregation goes against my principles Everybody should share the responsibility to segregate household waste	Tonglet et al. (2004)

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3.5 Quality Assurance and Quality Control

Quality assurance and quality control can be defined as those aspects of laboratory, policy or practice, which ensure that all test results are reported accurately. Explanation of the study and questionnaire is given to the respondents prior to administering the questionnaire. Further clarification on the questions in the questionnaire also explained to the respondents who did not understand the questions.

Pre-testing was conducted among 10% of the same sample population in another location that was likely representing this study population. Corrections and modifications to the questionnaire were done before data collection.

3.6 Statistical Analysis

3.6.1 (SPSS) version 21

All data analysis was analyzed using the statistical analysis by performing software SPSS 21.0 (Statistical Package for Social Science) and Microsoft Excel 2007 for Window Seven. Descriptive statisticalanalysis to obtain mean, median, and standard deviation were run to analyze the distribution of all variables included in this study.

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The volume of waste reduction was analyzed by using the paired t-test. The statistical analysis to assess the behavioral changes for this study is Friedman test which is a non-parametric test for repeated measure One-way ANOVA. Spearman rho test was used to assess the relation between the behavioral changes and volume of waste segregated. Principal components analysis was used to determine factors affecting willingness participation of community in waste segregation activity. The different was considered significant at a value of $p<0.05$.

3.6.2 Cost Benefit Analysis

Cost-benefit analysis was conducted to analyses the cost effectiveness of the waste segregation program. The components of the cost benefit analysis were as follow (Covec, 2007):

The benefits of recycling are estimated from:

- Savings in landfill costs which are made up of the financial costs of landfill and externalities (environmental costs)
- The saved costs of collection for disposal
- Indirect benefits

The costs of recycling are estimated from:

- Total operational cost
- Total capital cost

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3.7 Ethical concern

i. The ethical clearance was obtained from the Medical Research Ethics Committee, Faculty of Medicine and Health Sciences, University Putra Malaysia (UPM).

ii. Respondents were given an explanation about the study procedure

iii. All information about the respondents was confidential.

iv. Written consent was obtained from the respondents prior to the assessment.

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CHAPTER 4

RESULTS

4.1 Socio-demographic background and volume of waste collected

Table 4.1 shows the distribution of socio-demographic characteristics of respondents. More than half of the respondents were in the age of 56-65 years old (58.0%), males (64%), married (88.4%) and Malay (94.2%). The number of occupants per household from 4 to 7 (65%). Most of the respondentshad completed at least upper secondary school level (53.6%).The range of family income for most family was between RM 2001 to RM 3000 (24.6%). Most of the breadwinners took pension scheme.

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Table 4.1: Distribution of Socio-Demographic Characteristics among respondents (N=69).

Socio-Demographic Characteristics	n (%)
Gender	
Male	44 (63.8)
Female	24 (34.8)
Age	
20-35	9(13.0)
36-45	4(5.8)
46-55	11(15.9)
56-65	40(58.0)
65 Over	5(7.2)
Households	
≤3	20 (29.0)
4-7	45(65.2)
≥8	4(5.8)
Ethnicity	
Malay	65 (94.2)
Chinese	2 (2.9)
Indian	2 (2.9)
Marital Status	
Single	3 (4.3)
Married	61 (88.4)
Divorced	5 (7.2)
Religion	
Islam	65 (94.2)
Christian	1 (1.4)
Buddhist	1 (1.4)
Hindu	2 (2.9)
Education Background	
Primary school	3 (5.8)
Lower secondary school (PMR)	1 (1.4)
Upper secondary school (SPM)	37 (53.6)
High school (STPM)/Diploma	17 (24.6)
Degree	10 (14.5)
Occupation	
Government	22 (31.9)
Private	6 (8.7)
Pension	24 (34.8)
Self-employment	7 (10.1)
No-employment	10 (14.5)
Income	
Less than or equal 2000	28 (40.6)
2001-4000	29 (42.1)
4001 above	12 (17.3)

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Table 4.2 represents the total waste generated by households for each week. The total waste generated for the whole three weeks was 3,117.4 kg. The mean ± SD of the weight of waste per household was 45.18 ±15.43 kg/week. In average household generates 2.15 ± 0.73 kg of waste per day.

Table 4.2: Total waste generated by households for the period of three week

Waste generated in 3 week (Phase 1, Phase 2 & Phase 3)		
Week	Waste (kg)	Mean ± SD per household for three weeks
1st (phase 1)	974.28	14.12 ±5.39
2nd (phase 2)	1050.4	15.22 ±5.54
3rd (phase 3)	1092.7	15.84 ± 6.18
Total (1st, 2nd, & 3rd)	3117.4	45.18 ± 15.43

4.2 Response rate

In this study, 75 households or houses were approached and only 69 of them participated in all three phases of the program and returned all questionnaires. The response rate was 92%.

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4.3Variables description

The attitude and commitment of community towards waste segregation activity in Serdang Jaya were assessed by using the Theory-of Planned Behaviour that was proposed by Ajzen (1991).The attitude of the community were assessed by using the attitude variables and also the commitment were assessed by using the perceived behavior control variables. The perceived behavior control shows the commitment of community to control the performed behavior. Then, variables such as subjective norm, situational factor, outcomes factors, consequences factor, perceived lack of facility and moral norm was added up to assess the behavioral changes of waste segregation activity.

There were eight components including attitude, commitmentand others variables were assessed in the questionnaire. The questionnaire variables: (1) attitude; (2) perceived behavioral control (commitment) ; (3) subjective norm; (4) situational factor; (5) outcomes factors; (6) consequences factor; (7) perceived lack of facility; (8) and moral norm alsotreat as the indicator of behavioral changes. These eight components were assessed via Likert-scale responses. The scales weredefined as: (1) strongly disagrees = 1; (2) disagree = 2; (3) not sure = 3; (4) agree = 4;and (5)strongly agrees = 5.

The component of attitude consisted of: (1) pleasing; (2) interest; (3) positive; (4) unpleasant; and (5) favor. The second component, commitmentcomprised of: (1)

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easy; (2) council; (3) opportunities; (4) recycle items (5) recycling centreand (6) segregation. The component of subjective norms included: (1) friend; (2) family; (3) neighbors; (4) important people; and (5) acquaintance. The situational factorconsists of (1) time; (2) room; (3) complicated; (4) waste of money and (5) far. Outcome factor consist of (1) protect environment; (2) reduce waste to landfill; (3) preserve natural and (4) no point. Consequence consists of (1) energy; (2) money and (3) better environment. Perceived lack of facility consist of (1) not available; (2) no collection and authority responsible. Lastly, moral norm consist of (1) wasting; (2) guilty; (3) against principle and (4) shares responsible. Table 4.3 lists and defines variables that were assessed in the study questionnaire.

Table 4.4 describes the eight components of variables towards waste segregation activities along with the respective distribution of Likert-scale responses and descriptive statistics. The scale is defined as (1) strongly disagrees, (2) disagree, (3) not sure, (4) agreeand (5)strongly agrees. There were 3 set of questionnaires that were distributed to assess the behavioral changes of households. The response score represent the first phase (the current practice), the second phase (a program with recycle bin) and also the third phase (a program with recycle and food waste bin) of program respectively.

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Table 4.3: Definition of variables

Table 4.3.1: Variable definition of Attitude components

Variable	Definitions
PLEASING	Idea of waste segregation is pleasing.
INTEREST	Interest of household to segregated waste.
POSITIVE	Positive feeling to segregated waste
UNPLEASANT	Segregated waste is unpleasant
FAVOR	Favorable feelings to segregated waste

Table 4.3.2: Variable definition of Commitmentcomponents

Variable	Definitions
EASY	Perception of recycling is easy
COUNCIL	Perception of local council provide satisfactory facilities
OPPORTUNITIES	Available opportunities to segregate waste
RECYCLE ITEMS	Knowledge on recycle item
RECYCLING CENTRE	Knowledge on recycling center locations
SEGREGATE	Knowledge to segregate waste

Table 4.3.3: Variable definition of Subjective normcomponents

Variable	Definitions
FRIEND	Friends influence to segregate waste
FAMILY	Family influence to segregate waste
NEIGHBOUR	Neighbors influence to segregate waste
IMPORTANT PEOPLE	Important people influence to segregate waste
ACQUAINTANCE	Acquaintance influence to segregate waste

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Table 4.3.4: Variable definition of Situationalcomponents

Variable	Definitions
TIME	Belief that waste segregation time consuming
ROOM	Belief that waste segregation take up too much room
COMPLICATED	Belief that waste segregation considered complicated
WASTE MONEY	Belief that waste segregation waste of money
FAR	Not recycle because recycling center far away

Table 4.3.5: Variable definition of Outcomes components

Variable	Definitions
PROTECT ENVIRONMENT	Recycling protect environment
REDUCE LANDFILL USED	Recycling reduces amount of waste to landfills
NATURAL RESOURCES	Waste segregation preserves natural resources
NO POINT	Belief that doing waste segregation for recycling is no point

Table 4.3.6: Variable definition of Consequencecomponents

Variable	Definitions
ENERGY	Perception recycling save energy
SAVE MONEY	Perception recycling save money
BETTER ENVIRONMENT	Perception recycling create better environment

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Table 4.3.7: Variable definition of Perceived lack of facility components

Variable	Definitions
NOT AVAILABLE	Recycling facilities are not easily available.
NO COLLECTION	No local collections for recycling
AUTHORITY RESPONSIBLE	Responsibilities of local authority for waste collections

Table 4.3.8: Variable definition of moral norm components

Variable	Definitions
WASTING	Feel of should not waste anything if it could be used again
GUILTY	Feeling of guilty if did not do waste segregation
AGAINST	Feeling waste segregation goes against life principles
SHARE RESPONSIBILITY	Feeling of everybody should share responsible to segregate waste.

4.3.1 Attitude Component

More than half of the respondent agreed that waste segregation is a PLEASING (55.1%, 69.6%, 73.9%), POSITIVE (55.1%, 59.4%, 56.5%) and FAVOR (63.8%, 75.4% 68.1%) activity. Most of the respondents disagreed of the statement that they are not interested to participate in the waste segregation program (39.1%, 55.1%,and 55.1%) and the program is unpleasant (UNPLESNT) (47.8%, 55.1%, and 49.3%) (Table 4.4a).

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4.3.2 Commitment Component

For the commitment, more than half of respondents agreed with the statements of waste segregation is easy (EASY) (55.1%, 71.0%, 78.3%), plenty opportunities for them to do waste segregation (OPPORTUNITIES) (50.7%, 63.8% and 68.1%), they know about the recycle items (RECYCLE ITEMS) (55.1%, 72.5%, 72.5%) and they know how to segregate their waste (SEGREGATE) (56.5%, 72.5%, 75.4%) in all three phases (Table 4.4b).The score for question whether the local council provides satisfactory resources for waste segregation for them (COUNCIL) was not consistent between disagree and not sure. In the first phase, most respondent was not sure (36.2%), while in the second phase the score was equal (30.4%) between not sure and disagree and in the third phase the respondents disagreed to the statement (39.1%).

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Table 4.4 (a): Attitude distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Frequency (%) Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
PLEASING	I find the idea of waste segregation is pleasing.	1st	0	2(2.9)	12(17.4)	38(55.1)	17(24.6)
		2nd	0	5(7.2)	6(8.7)	48(69.6)	10(14.5)
		3rd	0	4(5.8)	3(4.3)	51(73.9)	11(15.9)
INTEREST	I am not interested in the idea of waste segregation.	1st	15(21.7)	27(39.1)	19(27.5)	7(10.1)	1(1.4)
		2nd	8(11.6)	38(55.1)	14(20.3)	9(13.0)	0
		3rd	12(17.4)	38(55.1)	12(17.4)	7(10.1)	0
POSITIVE	My feelings about waste segregation are positive.	1st	0	0	7(10.1)	38(55.1)	24(34.8)
		2nd	2(2.9)	1(1.4)	8(11.6)	41(59.4)	17(24.6)
		3rd	1(1.4)	0	8(11.6)	39(56.5)	21(30.4)
UNPLESNT	I find the idea of waste segregation unpleasant.	1st	14(20.3)	33(47.8)	11(15.9)	9(13.0)	2(2.9)
		2nd	7(10.1)	38(55.1)	18(26.1)	6(8.7)	0
		3rd	10(14.5)	34(49.3)	16(23.2)	9(13.0)	0
FAVOR	My feelings towards waste segregation are favorable.	1st	0	2(2.9)	11(15.9)	44(63.8)	12(17.4)
		2nd	0	1(1.4)	6(8.7)	52(75.4)	10(14.5)
		3rd	2(2.9)	3(4.3)	2(2.9)	47(68.1)	15(21.7)

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Table 4.4 (b):Commitment distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Percentage Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
EASY	Waste segregation for recycling is easy for me	1st	0	0	21(30.4)	38(55.1)	10(14.5)
		2nd	0	1(1.4)	10(14.5)	49(71.0)	9(13.0)
		3rd	0	1(1.4)	6(8.7)	54(78.3)	8(11.6)
COUNCIL	The local council provides satisfactory resources for waste segregation.	1st	6(8.7)	21(30.4)	25(36.2)	14(20.3)	3(4.3)
		2nd	3(4.3)	21(30.4)	21(30.4)	19(27.5)	5(7.2)
		3rd	3(4.3)	27(39.1)	16(23.2)	21(30.4)	2(2.9)
OPPORTUNITIES	I have plenty of opportunities to do waste segregation.	1st	2(2.9)	5(7.2)	22(31.9)	35(50.7)	5(7.2)
		2nd	0	4(5.8)	10(14.5)	44(63.8)	11(15.9)
		3rd	0	2(2.9)	8(11.6)	47(68.1)	12(17.4)
RECYCLE ITEMS	I know what items can be recycled.	1st	0	2(2.9)	12(17.4)	38(55.1)	17(24.6)
		2nd	0	0	7(10.1)	50(72.5)	12(17.4)
		3rd	0	0	9(13.0)	50(72.5)	10(14.5)
RECYCLING CENTRE	I know where to take my household waste for recycling (recycling centre)	1st	3(4.3)	8(11.6)	30(43.5)	20(29.0)	8(11.6)
		2nd	3(4.3)	9(13.0)	20(29.0)	32(46.4)	5(7.2)
		3rd	3(4.3)	10(14.5)	22(31.9)	31(44.9)	3(4.3)
SEGREGATE	I know how to segregate my household waste.	1st	0	2(2.9)	7(24.6)	39(56.5)	11(15.9)
		2nd	0	3(4.3)	8(11.6)	50(72.5)	8(11.6)
		3rd	0	2(2.9)	5(7.2)	52(75.4)	10(14.5)

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4.3.3 Subjective Norm Component

For the subjective norm, most respondent agreedthat their friends (53.6%, 58.0% and 46.4%), family (69.6%, 76.8% and 66.7%) and important people (44.9%, 68.1% and 63.8%) influenced their behavior towards the program (Table 4.4b). Majority of the respondent not sure of the influenced from their neighbour in the first phase (46.4%) but then the perception changed to agree in the second and third phase (55.1% and 49.3% respectively). For the ACQUAINTANCEfactor, most of the respondents score as not sure (50.7%, 56.5% and 44.9%) to see any acquaintance of them made waste segregation for recycling.

4.3.4 Situational Factor Component

The respondent scores for situational factor mostly disagree with the negative statement that waste segregation is time consuming (TIME) (40.6%, 55.1%, 62.3%), take too much of the space (ROOM) (40.6%, 42.0%, 46.4%), complicated (COMPLICATED) (43.5%, 56.5% and 59.4%) and waste of money (WASTE MONEY) (52.2%, 53.6% and 63.8%). They were also disagree to a statement that they were not segregating their waste because of the facility is far away from where they live (FAR) (37.7%, 36.2% and 34.8%) (Table 4.4d).

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Table 4.4 (c): Subjective norm distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Percentage Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
FRIEND	Most of my friends think that household recycling is a good thing to do.	1st	2(2.9)	4(5.8)	14(20.3)	37(53.6)	12(17.4)
		2nd	1(1.4)	9(13.0)	14(20.3)	40(58.0)	5(7.2)
		3rd	1(1.4)	4(5.8)	27(39.1)	32(46.4)	5(7.2)
FAMILY	Most of my family thinks that I should segregate my waste.	1st	2(2.9)	1(1.4)	10(14.5)	48(69.6)	8(11.6)
		2nd	1(1.4)	1(1.4)	8(11.6)	53(76.8)	6(8.7)
		3rd	1(1.4)	2(2.9)	10(14.5)	46(66.7)	10(14.5)
NEIGHBOUR	My neighbour thinks that I will segregate my waste for recycling.	1st	0	3(4.3)	32(46.4)	28(40.6)	6(8.7)
		2nd	1(1.4)	1(1.4)	26(37.7)	38(55.1)	3(4.3)
		3rd	1(1.4)	2(2.9)	34(49.3)	29(42.0)	3(4.3)
IMPORTANT PEOPLE	Most people who are important to me want me to engage in household waste segregation.	1st	0	2(2.9)	28(40.6)	31(44.9)	8(11.6)
		2nd	1(1.4)	1(1.4)	19(27.5)	47(68.1)	1(1.4)
		3rd	0	1(1.4)	21(30.4)	44(63.8)	3(4.3)
ACQUAINTANCE	It is hard to see any acquaintance of mine make waste segregation for recycling.	1st	2(2.9)	8(11.6)	35(50.7)	20(29.0)	4(5.8)
		2nd	2(2.9)	10(14.5)	39(56.5)	15(21.7)	3(4.3)
		3rd	2(2.9)	7(10.1)	31(44.9)	27(39.1)	2(2.9)

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Table 4.4 (d): Situational factor distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Percentage Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
TIME	Waste segregation takes up too much time	1st	2(2.9)	28(40.6)	20(29.0)	16(23.2)	3(4.3)
		2nd	3(4.3)	38(55.1)	14(20.3)	13(18.8)	1(1.4)
		3rd	6(8.7)	43(62.3)	10(14.5)	10(14.5)	0
ROOM	Waste segregation takes up too much room	1st	0	28(40.6)	14(30.3)	21(30.4)	6(8.7)
		2nd	1(1.4)	29(42.0)	20(29.0)	17(24.6)	2(2.9)
		3rd	4(5.8)	32(46.4)	13(18.8)	19(27.5)	1(1.4)
COMPLICATED	Waste segregation is too complicated	1st	7(10.1)	30(43.5)	19(27.5)	13(18.8)	0
		2nd	5(7.2)	39(56.5)	12(17.4)	10(14.5)	3(4.3)
		3rd	6(8.7)	41(59.4)	12(17.4)	8(11.6)	2(2.9)
WASTE MONEY	Waste segregation programs are a waste of money	1st	12(17.4)	36(52.2)	16(23.2)	5(7.2)	0
		2nd	14(20.3)	37(53.6)	12(17.4)	6(8.7)	0
		3rd	8(11.6)	44(63.8)	11(15.9)	6(8.7)	0
FAR	I am not doing waste segregation because recycling center was far from my house	1st	3(4.3)	26(37.7)	13(18.8)	21(30.4)	6(8.7)
		2nd	3(4.3)	25(36.2)	20(29.0)	14(20.3)	7(10.1)
		3rd	4(5.8)	24(34.8)	17(24.6)	15(21.7)	9(13.0)

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4.3.5 Outcome component

Most respondent strongly agreed that waste segregation is to protect the environment (PROTECT ENVIRONMENT) (56.5%, 52.2%, and 52.2%) in all phases in this study.They were also agree that waste segregation is to reduce volume of waste to the landfill (REDUCE LANDFILL USED) (43.5%, 43.5% and 43.5%) and to protect the nature reserve (NATURAL RESOURCES) (50.7%, 53.6% and 58.0%) in all phases. They disagreed to a statement that they cannot see the point in waste segregation for recycling (NO POINT) (42.0%, 47.8% and 52.2%) (Table 4.4e).

4.3.6 Consequences component

As for the consequences factor, most of the respondents agreed with the statement of waste segregation is saving energy (ENERGY) (58.0%, 69.6% and 68.1), save money (SAVE MONEY) (55.1%, 58.0% and 55.1%), and for a better environment (BETTER ENVIRONMENT) (53.6%, 62.3% and 60.9%)(Table 4.2f).

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Table 4.4 (e): Outcomes factor distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Percentage Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
PROTECT ENVIRONMENT	Waste segregation for recycling helps to protect the environment	1st	0	0	5(7.2)	25(36.2)	39(56.5)
		2nd	0	1(1.4)	6(8.7)	36(52.2)	26(37.7)
		3rd	0	3(4.3)	4(5.8)	36(52.2)	26(37.7)
REDUCE LANDFILL USED	Waste segregation for recycling reduces the amount of waste that goes into landfill	1st	0	0	6(8.7)	30(43.5)	33(47.8)
		2nd	0	3(4.3)	8(11.6)	30(43.5)	28(40.6)
		3rd	2(2.9)	3(4.3)	10(14.5)	30(43.5)	24(34.8)
NATURAL RESOURCES	Waste segregation for recycling preserves natural resources	1st	0	0	8(11.6)	35(50.7)	26(37.7)
		2nd	0	1(1.4)	12(17.4)	37(53.6)	19(27.5)
		3rd	0	0	10(14.5)	40(58.0)	19(27.5)
NO POINT	I cannot see the point in waste segregation for recycling	1st	16(23.2)	29(42.0)	18(26.1)	6(8.7)	0
		2nd	9(13.0)	33(47.8)	17(24.6)	10(14.5)	0
		3rd	9(13.0)	36(52.2)	16(23.2)	8(11.6)	0

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Table 4.4 (f): Consequences factor distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Percentage Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
ENERGY	Waste segregation for recycling saves energy	1st	0	0	12(17.4)	40(58.0)	17(24.6)
		2nd	0	1(1.4)	12(17.4)	48(69.6)	8(11.6)
		3rd	0	1(1.4)	8(11.6)	47(68.1)	13(18.8)
SAVE MONEY	Waste segregation for recycling saves money	1st	0	0	16(23.2)	38(55.1)	15(21.7)
		2nd	0	2(2.9)	18(26.1)	40(58.0)	9(13.0)
		3rd	0	1(1.4)	19(27.5)	38(55.1)	11(15.9)
BETTER ENVIRONMENT	Waste segregation for recycling creates a better environment for future generations	1st	0	1(1.4)	8(11.6)	37(53.6)	23(33.3)
		2nd	0	0	7(10.1)	43(62.3)	19(27.5)
		3rd	0	0	2(2.9)	42(60.9)	25(36.2)

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4.3.7 Perceived lack of facility component

For the perceived lack of facility, most the respondent agreed with the statement of they fail to do waste segregation because of recycling facilities are not easily available (NOT AVAILABLE) (49.3%, 43.5% and 42.0), there were no local collection provided (NO COLLECTION)(39.1%, 37.7% and 46.4%) and the local authority should responsible for waste segregation collection (AUTHORITY RESPONSIBLE) (42.0%, 44.9% and 50.7%) (Table 4.4g).

4.3.8 Moral norm component

In a moral norm, respondent agreed to the statement that they should not waste anything if they could use it again (WASTE) (60.9%, 62.3% and 75.4), they feel guilty if they did not do waste segregation for my household waste(GUILTY) (43.5%, 65.2%, and 72.5%) and everybody should share the responsibility to segregate the household waste (SHARE RESPONSIBILITY) (62.3%, 56.5% and 52.2%) activity. Most respondent was not sure to the statement of waste segregation goes against their principles of life (AGAINST) in the first phase (40.6%) and agreed in the second and third phase (53.6% and 62.3%) (Table 4.4h).

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Table 4.4 (g): Perceived lack of facility factor distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Percentage Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
NOT AVAILABLE	I fail to do waste segregation because recycling facilities are not easily available.	1st	2(2.9)	18(26.1)	10(14.5)	34(49.3)	5(7.2)
		2nd	3(4.3)	17(24.6)	12(17.4)	30(43.5)	7(10.1)
		3rd	5(7.2)	18(26.1)	9(13.0)	29(42.0)	8(11.6)
NO COLLECTION	I am not doing waste segregation because there are no local collections	1st	4(5.8)	16(23.2)	16(23.2)	27(39.1)	6(8.7)
		2nd	4(5.8)	13(18.8)	18(26.1)	26(37.7)	8(11.6)
		3rd	3(4.3)	14(20.3)	12(17.4)	32(46.4)	8(11.6)
AUTHORITY RESPONSIBLE	I think local authority should responsible for waste segregation collection	1st	5(7.2)	10(14.5)	13(18.8)	29(42.0)	12(17.4)
		2nd	3(4.3)	7(10.1)	18(26.1)	31(44.9)	10(14.5)
		3rd	3(4.3)	2(2.9)	14(20.3)	35(50.7)	15(21.7)

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Table 4.4 (h): Moral norm distribution and descriptive statistics of Likert -scale variables

Variable	Survey Statement	Phase	Percentage Distribution of Response				
			Strongly disagree	Disagree	Not sure	Agree	Strongly Agree
WASTE	I feel I should not waste anything if it could be used again	1st	2(2.9)	6(8.7)	7(10.1)	42(60.9)	12(17.4)
		2nd	2(2.9)	1(1.4)	11(15.9)	43(62.3)	12(17.4)
		3rd	0	3(4.3)	3(4.3)	52(75.4)	11(15.9)
GUILTY	I would feel guilty if I did not do waste segregation for my household waste	1st	3(4.3)	3(4.3)	25(36.2)	30(43.5)	8(11.6)
		2nd	0	2(2.9)	11(15.9)	45(65.2)	11(15.9)
		3rd	0	0	9(13.0)	50(72.5)	10(14.5)
AGAINST	Not do waste segregation goes against my principles	1st	2(2.9)	10(14.5)	28(40.6)	23(33.3)	6(8.7)
		2nd	0	7(10.1)	18(26.1)	37(53.6)	7(10.1)
		3rd	0	4(5.8)	15(21.7)	43(62.3)	7(10.1)
SHARE RESPONSIBILITY	Everybody should share the responsibility to segregate household waste	1st	3(4.3)	1(1.4)	11(15.9)	43(62.3)	12(17.4)
		2nd	1(1.4)	0	9(13.0)	39(56.5)	20(29.0)
		3rd	0	0	7(10.1)	36(52.2)	26(37.7)

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4.4 The comparison of communities' commitment, attitude and others behavioral change before and after the program

Behavioral changes were assessed to determine the different of community behavior before and after the provision of bin for waste segregation. Phase 1 of program is considered as a phase before the provision of bin and it was defined as before program. Household was provided with recycled bin in phase 2. In phase 3, households were provided with recycled bin and also food waste bin. Besides, in phase 2 and phase 3, households also were educated on the way how to segregate their waste for recycling by using the pamphlet as the medium of communication.

The Friedman test is a non-parametric test for testing the difference between several related samples. The Friedman test is an alternative for Repeated measures analysis of variances which is used when the same parameter has been measured under different conditions on the same subjects (Conover, 199).

4.4.1 Attitude behavior before and after the program

The Friedman test was used to analyze the difference in 3 phases of attitude scores i.e. PLEASING, INTEREST, POSITIVE, UNPLEASANT and FAVOR factors. There was no significant difference in the score before (phase 1) and after the program (phase 2 and 3) (Table 4.5a). This result indicates that the attitude of

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respondents towards the program had not changed and they have no problem to participate in the program as the average mean score was between 4.25 and 3.91.

Table 4.5 (a): Assessment changes in attitude variables

Behavior of attitude	Mean score		F	*p*-Value
PLEASING	1st	4.01	0.98	0.612
	2nd	3.91		
	3rd	4.00		
INTEREST	1st	2.30	1.58	0.453
	2nd	2.35		
	3rd	2.20		
POSITIVE	1st	4.25	2.99	0.224
	2nd	4.01		
	3rd	4.14		
UNPLEASANT	1st	2.30	0.013	0.994
	2nd	2.33		
	3rd	2.35		
FAVOR	1st	3.96	2.80	0.246
	2nd	4.03		
	3rd	4.01		

Significant value, $p < 0.05$

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4.4.2Commitment

There were no significant difference of perceived behavioral changes (commitment) scores before (phase 1) and after the program (phase 2 and 3) except for OPPORTUNITIES factor. Households believed that the have more opportunities to do waste segregation after the program (Table 4.5b).

Table 4.5 (b): Assessment changes in commitment variables

Behavior of perceived behavior control	Mean score		F	*p*-value
EASY	1st	3.84	5.722	0.057
	2nd	3.96		
	3rd	4.00		
COUNCIL	1st	2.81	2.539	0.281
	2nd	3.03		
	3rd	2.88		
OPPORTUNITIES	1st	3.52	23.46	<0.001*
	2nd	3.90		
	3rd	4.00		
RECYCLE ITEMS	1st	4.01	0.514	0.773
	2nd	4.07		
	3rd	4.01		
RECYCLING CENTRE	1st	3.32	1.463	0.481
	2nd	3.39		
	3rd	3.30		
SEGREGATE	1st	3.86	4.785	0.091
	2nd	3.91		
	3rd	4.01		

*Significant, $p < 0.05$

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4.4.3 Subjective Norm behaviors

Subjective norms scores for behavioral changes in FRIEND, FAMILY, NEIGHBOUR, IMPORTANT PEOPLE and ACQUAINTANCE factors are as follow (Table 4.5c). There were no significant difference in the score of subjective norm before (phase 1) and after the program (phase 2 and 3). In average the mean score for these factors were underlying between 3.10 and 3.90 indicating that they were not sure about if social pressure cause them to do waste segregation.

Table 4.5 (c): Assessment changes in subjective norm variables

Behavior of subjective norm	Mean score		F	*p*-value
FRIEND	1st	3.77	3.96	0.138
	2nd	3.57		
	3rd	3.52		
FAMILY	1st	3.86	0.02	0.991
	2nd	3.90		
	3rd	3.90		
NEIGHBOUR	1st	3.54	3.79	0.150
	2nd	3.59		
	3rd	3.45		
IMPORTANT PEOPLE	1st	3.65	1.24	0.537
	2nd	3.67		
	3rd	3.71		
ACQUAINTANCE	1st	3.23	3.89	0.143
	2nd	3.10		
	3rd	3.29		

Significant, $p < 0.05$

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4.4.4Situational Factor behavior

There was no significant difference before (phase 1) and after the program (phase 2 and 3) for the situational behavioral factor scores i.e. ROOM, COMPLICATED, MONEY and FAR factors except for TIME (Table 4.5d).

Table 4.5 (d): Assessment changes in situational factors variables

Behavior of situational factors	Mean score		F	*p*-value
TIME	1st	2.86	19.66	<0.001*
	2nd	2.58		
	3rd	2.35		
ROOM	1st	3.07	5.660	0.059
	2nd	2.86		
	3rd	2.72		
COMPLICATED	1st	2.55	1.128	0.569
	2nd	2.52		
	3rd	2.41		
MONEY	1st	2.20	1.492	0.474
	2nd	2.14		
	3rd	2.22		
FAR	1st	3.01	0.090	0.956
	2nd	2.96		
	3rd	3.01		

*Significant, p< 0.001

4.4.5Outcomes Factor behavior

There was no significant difference of outcomes factor behavior before and after the program except for PROTECT ENVIRONMENT factors (Table 4.5e). The

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mean score for PROTECT ENVIRONMENT was 4.49 in phase 1 before decreasing to 4.26 and 4.23 in phase 2 and 3.

Table 4.5 (e): Assessment changes in outcome factors variables

Behavior of outcome factor	Mean score		F	*p*-value
PROTECT ENVIRONMENT	1st	4.49	11.41	0.003*
	2nd	4.26		
	3rd	4.23		
REDUCE LANDFILL USED	1st	4.39	4.912	0.086
	2nd	4.20		
	3rd	4.03		
NATURAL RESOURCES	1st	4.26	3.355	0.187
	2nd	4.07		
	3rd	4.13		
NO POINT	1st	2.20	4.711	0.095
	2nd	2.41		
	3rd	2.33		

*Significant, $p < 0.05$

4.4.6 Consequence Factor behavior

(Table 4.5f).As for consequence factor behavior, there weresignificant difference of scores before (phase 1) and after the program (phase 2 and 3). The mean score for ENERGY was 4.07 before the program starts, and reduced to 3.91 in phase 2 and increased to 4.04 in phase 3. The mean score for MONEY was also decreased from 3.99 in phase 1 to 3.81 in phase 2 and increased to 3.86 in phase 3. As for BETTER ENVIRONMENT the mean score has increased from 4.19 in phase 1 to 4.33 in phase 3.

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Table 4.5 (f): Assessment of changes in consequences factors variables

Behavior of consequences	Mean score		F	*p*-Value
ENERGY	1st	4.07	6.500	0.039*
	2nd	3.91		
	3rd	4.04		
MONEY	1st	3.99	6.196	0.045*
	2nd	3.81		
	3rd	3.86		
BETTER ENVIRONMENT	1st	4.19	6.080	0.048*
	2nd	4.17		
	3rd	4.33		

Significant, $p < 0.05$

4.4.7 Perceived Lack of Facility behavior

(Table 4.5g). There were no significant difference in perceived lack of facility behavior before (phase 1) and after (phase 2 and 3) except for AUTHORITY RESPONSIBLE. The mean score increased from 3.48 to 3.83.

Table 4.5 (g): Assessment of changes in situational factors variables

Behavior of perceived lack facility	Mean score		F	*p*-Value
NOT AVAILABLE	1st	3.32	0.097	0.953
	2nd	3.30		
	3rd	3.25		
NO COLLECTION	1st	3.22	1.822	0.402
	2nd	3.30		
	3rd	3.41		
AUTHORITY RESPONSIBLE	1st	3.48	6.095	0.047*
	2nd	3.55		
	3rd	3.83		

Significant, $p < 0.05$

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4.4.8 Moral Norm Behavior

There was no significant difference of moral norm behavior score before and after the program except for GUILTY and AGAINST factor (Table 4.5h). The mean score has increased in both factors from 3.54 to 4.01 for GUILTY and 3.30 to 3.77 in AGAINST. This result indicated that the program has changed the moral norm of the respondents.

Table 4.5 (h): Assessment of changes in situational factors variables

Moral norm	Mean score		F	*p*-Value
WASTE	1st	3.81	3.189	0.203
	2nd	3.90		
	3rd	4.03		
GUILTY	1st	3.54	26.126	<0.001*
	2nd	3.94		
	3rd	4.01		
AGAINST	1st	3.30	24.870	<0.001*
	2nd	3.64		
	3rd	3.77		
SHARE RESPONSIBILITY	1st	4.14	1.847	0.397
	2nd	4.12		
	3rd	4.28		

*Significant, p<<0.001

4.5Total volume of waste segregated by the householdsbefore and after waste segregation program

From the assessment, the total waste generated for the whole three weeks (Table 4.6) was 3,117.4 kg. In the first week, before the program start (phase 1), 974.28 kg of waste was generated. When the segregation program started (phase 2),

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the total weight of waste generated was 1050.4 kg and 98.6 kg (9.39%) of them were recycled.In the third phase of the program, total waste was 1092.7 kg, where 115.6 kg of them (10.58%) were recycled and 144.9 kg (13.26%) of them were food waste.The volume of waste segregated for recycled has increased significantly (from 9.39% to 10.58%) through this program. The waste segregation program also shows that 13.26% of the community waste was food waste that can be composted (Figure 4.1). In term of percentage, the volume of waste that ended up to landfill has decreased from 100% in the first phase (without segregation) to 90.61% and 76.16% in phase 2 and phase 3 (with segregation) respectively. This result showed that some good indication of reduction even though the study was conducted for three weeks.

Table 4.6: Volume of waste segregated by households before and after bin provision (N=69)

Waste category	General Wastekg (%)	Recycle waste kg (%)	Food waste kg (%)	Total waste generated kg (%)
Waste (P1)	974.3 (100)	-	-	974.28 (100)
Waste (P2)	951.8 (90.61)	98.6 (9.39)	-	1050.4 (100)
Waste (P3)	832.2 (76.16)	115.6 (10.58)	144.9 (13.26)	1092.7 (100)

Note: P1- Waste with no segregation
P2- Waste with segregation of General Waste and Recycled Waste
P3- Waste with segregation of General Waste, Recycled Waste and Food Waste

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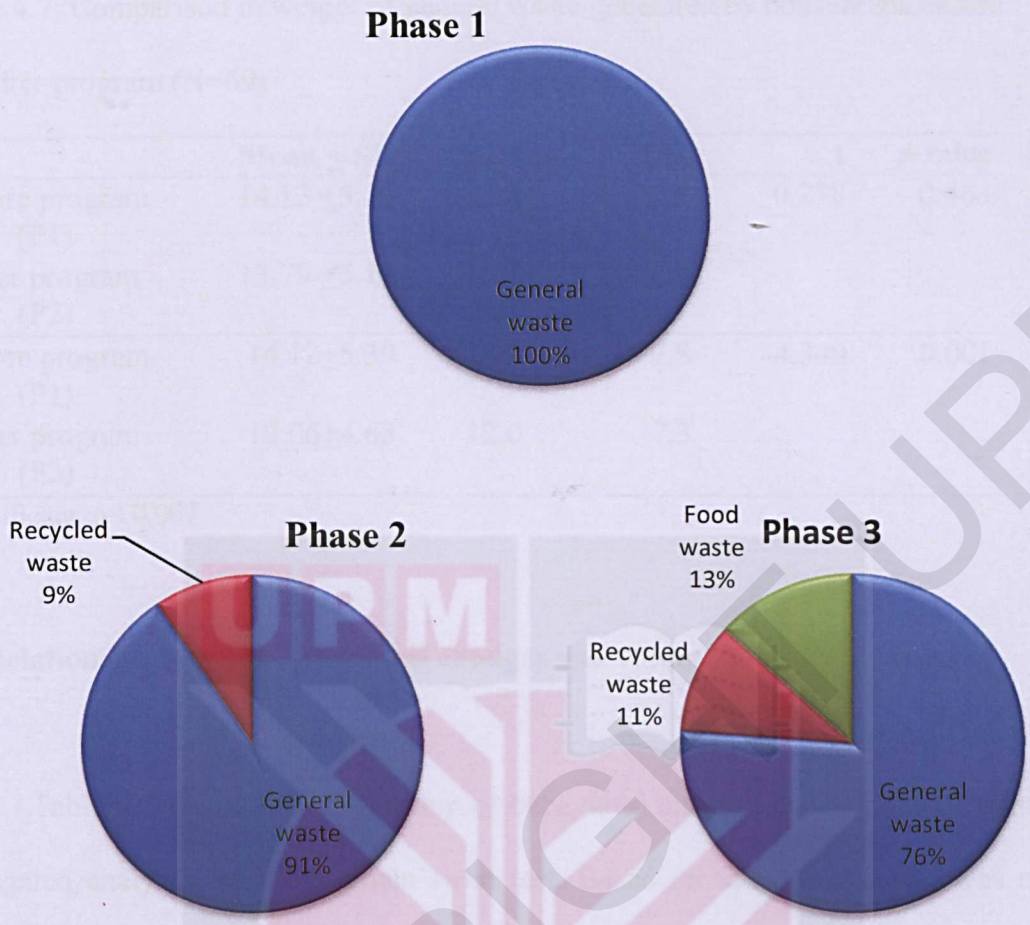

Figure 4.1: Pie charts show the percentage of waste segregated by type of waste

There was no significant difference in terms of weight reduction between phase 1 and phase 2of the program ($p = 0.463$). However, there was a significant differencefound between phase 1 and phase 3 at $p < 0.001$ (Table 4.7). This result indicatedthat the provision of food waste bin together with recycled bin have reduced the volume of waste disposed in landfill.

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Table 4.7: Comparison in weight of general waste generated by households before and after program (N=69)

	Mean ± SD	Median	IQR	t	*p*-value
Before program (P1)	14.12 ±5.39	13.8	7.8	0.738	0.463
After program (P2)	13.79 ±5.17	13.3	7.7		
Before program (P1)	14.12±5.39	13.8	7.8	4.349	0.001
After program (P3)	12.06±4.68	12.0	7.3		

*Significant, p< 0.001

4.6 Relationshipbetween behavioral changes and volume of waste segregated

Table 4.8 shows the relationship of behavioral changes and volume of waste segregated analyzed with Spearman's rho test. Based on the results, there was no significant relationship between behavior changes and volume of waste segregated except for INTEREST, FAVOR, FAMILY and BETTER ENVIRONMENT variables.

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Table 4.8: Relationship between behavioral changes and volume of waste segregated

Variables	Volume of waste segregated	
	r	*p-value*
PLEASING	0.171	0.160
INTEREST	-0.275	0.022*
POSITIVE	0.107	0.381
UNPLEASANT	-0.208	0.086
FAVOR	0.255	0.035*
FRIEND	0.075	0.538
FAMILY	0.294	0.014*
NEIGHBOUR	-0.095	0.439
IMPORTANT PEOPLE	0.070	0.569
ACQUAINTANCE	0.069	0.572
EASY	0.188	0.121
COUNCIL	-0.165	0.177
OPPORTUNITIES	0.223	0.065
RECYCLE ITEMS	0.028	0.821
RECYCLING CENTRE	-0.144	0.238
SEGREGATE	0.143	0.242
TIME	-0.021	0.862
ROOM	0.003	0.979
COMPLICATED	-0.127	0.299
WASTE MONEY	-0.090	0.460
FAR	-0.012	0.921
PROTECT ENVIRONMENT	-0.033	0.790
REDUCE LANDFILL USED	0.214	0.077
NATURAL RESOURCES	-0.021	0.866
NO POINT	-0.106	0.388
ENERGY	0.029	0.815
SAVE MONEY	-0.106	0.386
BETTER ENVIRONMENT	0.287	0.017*
NOT AVAILABLE	-0.041	0.741
NO COLLECTION	-0.110	0.369
AUTHORITY	-0.111	0.365
RESPONSIBLE		
WASTING	0.084	0.493
GUILTY	0.079	0.520
AGAINST	0.066	0.590
SHARE	-0.046	0.705
RESPONSIBILITY		

* Significant at $p < 0.05$

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4.7 Principal Component Analysis factors affecting willingness participation

In assessing factor affecting willingness of households to do waste segregation activity, factor analysis with principal component analysis (PCA) was used with Varimax (orthogonal) rotation. This PCA was run to group the Likert-scale variables into a small number of interpretable factors. PCA will group the variables that are measuring the same construct in the same factor(STATA 2003).This method was used to identify the set of factors that drive the behavior.

The result of PCA of 24 itemsshowed no problematic collinearity across dimensions. KMO=0.765 showed a modest sampling adequacy of factor analysis (Table 4.9). The Bartlett's test is highly significant at p-value equal to <0.05, approved that the PCA is applicable. The factor loadings demonstrated six dimensions, in aggregate explained 66.51% of the total variance in the overall data.

Table 4.9: KMO and Bartlett's Test

Kaiser-Meyer-Olkin measure of sampling adequacy.		.765
Bartlett's test of sphericity	Approx. Chi-Square	814.935
	df	276
	Sig.	0

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According to the eigenvalue criterion, factors with eigenvalues greater than one was retained and factors with eigenvalues less than one was considered insignificant and therefore excluded. Table 4.10 reports the factors that influence the willingness of respondent's participation whichexplained 66.51% of the total variance in the overall data.

Table 4.10: Total variance explained

	Initial Eigenvalues		
Factor	**Total**	**% of variance**	**Cumulative %**
1	7.257	30.238	30.238
2	2.534	10.556	40.795
3	1.934	8.057	48.852
4	1.838	7.659	56.510
5	1.283	5.347	61.857
6	1.115	4.644	66.501

The dimensions of factor loadings were divided into 6 components where Factor 1 and Factor 2 explained the highest variance in the study, 30.24 % and 10.56 % respectively. The result of factor loadings is summarized in Table 4.11. The factors that influenced community behavior in waste segregation program can be classified as difficulty factors (Factor 1),environment responsibility factors (Factor 2), pleasure factors (Factor 3), benefits gain factors (Factor 4),moral norm factors (Factor 5) and knowledge factors (Factor 6).

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Table 4.11: Factor loadings of PCA

	Difficulty	Environment responsibility	Pleasure	Benefits gain	Moral norm	Knowledge
Waste segregation programs are a waste of money	.769					
Waste segregation takes up too much room	.737					
I cannot see the point in waste segregation for recycling	.725					
I find the idea of waste segregation unpleasant.	.630					
I am not doing waste segregation because there are no local collections	.620					
Waste segregation is too complicated	.599					
Waste segregation for recycling helps to protect the environment		.825				
Waste segregation for recycling preserves natural resources		.777				
Everybody should share the responsibility to segregate household waste		.702				
Most of my family thinks that I should segregate my waste.			.746			
My feelings towards waste segregation are favorable.			.739			
The local council provides satisfactory resources for waste segregation.			.651			
I find the idea of waste segregation is pleasing.			.586			
I have plenty of opportunities to do waste segregation.				.751		
Waste segregation for recycling saves energy				.719		
Waste segregation for recycling saves money				.690		
Not do waste segregation goes against my principles					.800	
I feel I should not waste anything if it could be used again					.667	
I would feel guilty if I did not do waste segregation for my household waste					.581	
I know how to segregate my household waste.						.723

Note. Factor loadings < .5 are suppressed

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4.8 Assessment of cost benefits analysis of waste segregation program

The reduction of volume of waste that goes to the landfill also gives the impact to the cost of waste management to the landfill. The reduction of landfill cost was calculated based on the total MSW Operational Expenditure (JPSPN, 2012) (Table 4.12). The cost includes the landfill cost (land) and the collection service cost provided by the local authority. The total cost of landfill operation was RM 218 per household per year (Table 4.12).

Table 4.12: The total MSW Operational Expenditure per household per year

Expenditure	Prices (per household/year)
Landfill cost	RM 62.00
Collection cost	RM 156.00
Total	RM 218.00

From the waste segregation program in this study, we were able to reduce volume of waste to landfill from 100% (phase 1) to 91% in phase 2 and 76% in phase 3. This has reduced the operational cost from RM 218 per household per year (without segregation in phase 1) to RM 198 per household per year in phase 2 and RM 165 per household per year in phase 3. The reduction cost was approximately RM 52 per household per year. This was assuming that 11% of wastes were recycling item and 13% of food wastes were composted (Table 4.13).

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Table 4.13: Operational cost reduction

Phase	Waste to Landfill	Cost
Phase 1 (No segregation)	100%	RM 218.00
Phase 2	91%	*RM 198.38
Phase 3	76%	**RM 165.68

* Waste being recycled 9%
** Waste being recycled 11% and assuming food waste (13%) being composted.

The reduction of operational cost from phase 1 to phase 3 indicated that, the waste segregation program implemented in this study was beneficial in reducing the cost of solid waste management. If this program was continued in a bigger scale, more cost could possibly save, such as high reduction in volume of waste that end up into landfill, increased the lifespan of landfill and help ease the impact of climate change. The waste segregation program also gave a benefit in terms of recyclables items. The gain from the selling of recyclable items in this program was approximately RM 100 (Table 4.14).

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Table 4.14: The gain from selling recycles item

Phase	Selling of recycle items	Prices
Phase 1	-	RM 0
Phase 2	9%	RM 46.06
Phase 3	11%	RM 54.00
	Total	**RM 100.06**

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CHAPTER 5

DISCUSSION, CONCLUSION & RECOMMENDATION

5.1 Commitment, Attitude and Behavioral Changes of Community in Waste Segregation Activity.

5.1.1 Commitment of community in Waste Segregation Activity.

The commitment of community in doing waste segregation activity is assessed by using the perceived behavior control component. The perceived behavior control refers to perceived difficulty or easy to perform the intended behavior and the individual's perception of their ability to perform the behaviour. (Davies *et al.* 2002). The positive control of community to the following behaviors described the commitment of communities in performing waste segregation activity. In perceived behavior control factors, more than half respondents agreed with the statements of waste segregation is easy (EASY), plenty opportunities for them to do waste segregation (OPPORTUNITIES), they know about the recycle items (RECYCLE ITEMS), and they know how to segregate their waste (SEGREGATE). This indicates that the community has developed the commitment to do waste segregation activity.

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This was supported more by the result of this study that shows the communities do the waste segregation activity in the implementation of waste segregation program. Then, there were also have the reduction in volume of waste that goes to landfill.

5.1.2 Attitude of community in waste segregation activity.

The attitude of community was assessed by the five component of behavior factor that consist of following statements which are perception of idea of waste segregation is pleasing (PLEASING) , not interested in the idea of waste segregation (INTEREST), feelings positive about waste segregation (POSITIVE) , feeling idea of waste segregation unpleasant (UNPLESNT) and feelings waste segregation are favorable activity(FAVOR). Attitude of respondents (the opinions of oneself about the behaviour) shows the positive influences of respondents in waste segregation activity. More than half of respondents agree with the statement of idea of waste segregation were PLEASING, POSITIVE and FAVOR. Then, for the negative statement of INTEREST and FAVOR most of the respondents disagree with that statement. This indicated that the respondent have a good attitude of waste segregation activity from the beginning of the program. Therefore the implementation of waste segregation program was not activity that causing them a problem because they already develop an attitude that accept the waste segregation program. This due to most of them had exposed to the environmental awareness and develop attitude towards recycling before. Study done by Agamuthu *et al.* (2010) has proved that recycling campaign and awareness has reached at the community level,

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but only the lack of community participation has caused the recycling rate was still low. The lack of community participation is due to several external barriers that stop them from doing recycling. In addition, Ho (2002) studied in Sweden shows that, people's attitudes and lifestyles are established at an early age. Ho (2002) concluded that environmental education in early stage had important long-term effect on people's awareness and attitude towards environmental issues. Therefore, it can be concluded that the attitude have developed from the beginning of the program. Considering attitude for waste management is the strongest factor that is related to waste management behaviors, and there also should be an educational program and continuous policies for enhancing sustainable pro-environmental attitudes (Azilah *et al.,* 2011).

5.1.3 Behavioral Changes of Community in Doing Waste Segregation Activities.

The score for behavior rate by households was taken for three times. The first time was before the provision of any recycled bin or food waste bin. Second time is assessed together with the provision of recycle bin. The third time, behavior was assessed together with the provision of recycled bin and food waste bin. Increasing accessibility of recycling facilities may be one way to promote recycling behavior as it removes the external barrier that stops households from recycling (Ho, 2002). In the second time, this study also used the pamphlet as a medium to educate and improve knowledge of household to do recycling. Research findings suggest a link between knowledge and behavior. Oskamp et al. (1991) recommended that

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knowledge about the specifics of recycling was more closely related to recycling behavior than knowledge about global environmental issues (as cited in Ho, 2002).

Every item in this behavior theory determines the willingness of households to segregate their households waste. The inconsistency in scoring shows that the households not influence much with the waste segregation program that was conducted. Then, the change in scoring shows the behavior that was assessed influenced by the waste segregation program that was conducted. Even though the change in score was not significant, a little change is still can be considered as changes if compared to our sample size that was small. Small sample size reduced the power of this study to detect a significant outcome (Wahidah, 2012).

Attitude factors score was inconsistent from the first phase of program to third phase of program. There was a slight increase in scoring of attitude for certain attitude variable assessed in this study after the program. According to Ramayah (2010) attitude was found to have a significant but relatively smaller impact on recycling behavior in Malaysia. The score for all attitude variables shows that it influences waste segregation behavior of household. But, no significant changes of all attitude variables from phase 1 to phase 3 of program. Study done by Ho (2009) suggests that positive attitude towards household waste recycling is already well formed among Singaporeans before coming to Sweden that have more convenient recycle facility than Singapore. This support the result of this study that no significant increase in attitude prediction of households to do waste segregation after

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the program. This is because the attitude behavior is well formed among households before the provision of bin and collections facilities.

In commitment, the score for statement OPPORTUNITIES (I have plenty of opportunities to do waste segregation) shows significant changes from phase 1 to phase 3of the program. The households believed that opportunities in doing waste segregation increased after they have joined the program. According to Knussen (2008), people will not recycle if it is difficult for them, even if they feel that they have the ability to do so. Hence, this result supports the findings that there is a significant change in behavior after the bin provision.

The score for subjective norm was not consistent for all factors. Five social level was assessed which are family, friends, neighbor or, important person and acquaintanceperson. Households feel that family, friends, neighbor or and important person to them influence their behavior to segregate household waste. Then, households seem not sure if they had social support from their acquaintance in doing waste segregation activity for recycling along the program. There is no significant difference in behavioral changes for all subjective norm factors. Therefore, several variables in social pressure influence households to segregate waste but show no changes along the phase of program. The social pressure not showing significant changes with the provision of recycles bin.

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In terms of situational factor, there is significant changes in the perception that waste segregation take up too much time (TIME). Household did not agree that waste segregation take too much time of their time after they have been provided with recycle bin. According to Ho (2009), this result indicates that with available facility and collection services provided, less time was consumed to segregate waste.

Households show significant changes in behavior of the outcome variables that waste segregation helps to protect the environment (PROTECT ENVIRONMENT). These findings indicated that the awareness level of households have increased after the program. These changes resulted from the distribution of pamphlet regarding recycling role in conserving the environment to the households as well as the provision of bins. Results of a study by DANIDA, (2009) in Malaysia showed that the level of environmental awareness and the interest of hawkers in doing composting produced from the segregated food waste were increased after participating in a composting program. These findings suggest that an awareness program in this study causespositive changes of household's behavior.

All the consequence variables showed significant changes from phase 1 to phase 3 of program. Household believed that segregating waste for recycling saves energy (ENERGY) saves money (MONEY) and creates better environment for future generations (BETTER ENVIRONMENT). These changes appeared to be the consequences of distributing pamphlets which educate households about recycling that promotes energy conservation and helps to protect the environment. This finding

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shows that increases in awareness level predict behavior changes in households. Agamuthu (2001) suggests that an increase in awareness level will increase the rate of recycling amongst the community.

For the perceived lack of facility, the statement of local authority should responsible for waste collection (AUTHORITY RESPONSIBLE) shows a significant different from phase 1 to phase 3 where the respondent agree with that statement. This result supported by the study of Ho (2012) that Singaporeans perceived that recycling is the responsibility of relevant authorities but not themselves. Singapore government starts to realize that increasing recycling through the usual methods of legislation and enforcement will only produce short-term results (Ho, 2012). The rate of recycling is increased after the involvement of the relevant authority. Therefore, in this study, the involvements of authority were demonstrated by the provision of the waste bins to the households and suggest that the local authority should be responsible for it.

In moral norm behavior, there were significant changes of the scores on the statement 'I would feel guilty if I did not do waste segregation for my household waste' (GUILTY) and 'not doing waste segregation goes against my principles' (AGAINST) from phase 1 to phase 2. Households agreed that they feel guilty if not do waste segregation especially after the provision of facility. They also agreed that not doing waste segregation were against their principle.

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5.2 Total volume of waste segregated by the household before and after waste segregation program

From the data, the volume of general waste generated show the reduction from 974.3 kg (phase 1) to 832.2 kg (phase 3). According to paired t-test, there was significant waste reduction from the first phase to the third phase of program. This indicates that after the provision of recyclable bin and food waste bin, reduction of general waste occurred especially in provision of food waste bin in third phase of program. According to JPSPN (2005), segregation of food waste can reduce the waste goes to landfill about 47% from total waste. Hence, it shows the positive aspect of doing waste segregation activity that will reduce the amount of waste that goes to landfills.

Recycled waste also shows increasing in volume of segregation. It increases from 98.6 kg to 115.6 kg in second phase to third phase of program. In percentage values, recycling rate show increasing in percentage values from 9% in second phase to 11% in third phase. Recycling rate in Malaysia is only about 5% per year (PPSPPN, 2012). If this waste segregation program was conducted it is possible to reach government target to increase rate of recycling to 22% by the year 2020 (Agamuthu *et al*, 2010).

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5.3 Relationship of behavioral changes and volume of waste segregated

There is no significant relationship between behavior changes and volume of waste segregated except for INTEREST, FAVOR, FAMILY and BETTER ENVIRONMENT variables. Only four factors out of 35 variables showed significant relationship with the volume of waste segregated. These results indicate that behavioral changes do not have direct relationship with the volume of waste segregated. This insignificant relationship may be due to the short period of time of the assessment. Longer time needed to see the relationship between behavioral changes and volume of waste segregated. According to Azilah *et al* (2009) behavioral change is a process that may take long period in the case of the most radical behaviour shifts.

5.4 Factor affecting willingness to participate in waste segregation program

The principal component analysis conducted shows 6 dimension of factor loadings. The factors were classified as difficulty factors, environment responsibility factors, benefits gain factors, moral norm factors and knowledge factors.

Factor 1 classified as 'difficulty factors', where respondents are willing to participate more in the program if it is easy to them (pleasant activity), not take up too much room and money and also have good collection services. Difficulty in

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doing was segregation can be treated as inconvenience. Study done by Ho (2008) supported that increase in convenience effect directly in the recycling behavior.

Factor 2 was classified as 'the environment responsibility factors', as increase in environment awareness levels will encourage households to do waste segregation. Factor 3 was classified as 'the pleasure factor' where waste segregation that pleasing, favorable, have a satisfaction resource and got supported from somebody explained the pleasure of households in doing waste segregation.

Factor 4 was classified as' the benefits gain factors'. Increase opportunities to recycle, saving money and saving energy is a benefits that gained in the waste segregation program that encourage respondents to participate. Factor 5 was labeled as' moral norm' where the moral norm relates to the individual's personal beliefs about the moral correctness or incorrectness of performing a specific behavior (Tonglet et al., 2004). Finally, Factor 6 represents the 'knowledge factors' where the knowledge makes the activity simply to be done. Gardner and Stern (1996) argued that a lack of knowledge could be a serious barrier to action however Ho (2008) suggested that the ability to recycle is determined by the ability to acquire the skill to recycle through possession of specific recycling knowledge.

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5.5 Benefits, challenges and key lessons of Waste Segregation Program conducted

1. Benefits

The main impacts of this waste segregation program conducted were increasing in awareness levels of households on the needs of waste segregation for recycling and collections facilities. This is a very important and positive message for all future recycling and waste reduction program.

The participant not only made aware of benefits of doing waste segregation and recycling program, but they also involved as a participant of the program. Hence, this gave them opportunities to discover their capabilities, willingness and commitment in doing waste segregation activity for recycling. Evidently, the steady increase of recycling items and food waste segregated by households correlates to the level of awareness and support from the community (DANIDA, 2009).

There was also environmental benefits that can be gain if such project was continued to be implemented to community include:

1. Avoided environmental degradation by the reduced use of landfill space, reduced greenhouse gas emission and leachate formation and reduced human health risk.

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2. The use of compost reduces the usage of chemical fertilizer which saves resources and further reduces environmental degradation.
3. Help to conserve natural resources such as reduce the logging activity for producing paper.

2. Challenges and Key lessons learned from this waste segregation program

A few challenges and key lesson was recognized along the implementation process of waste segregation program that was conducted in Taman Perumahan Sri Andalas, Serdang Jaya.

Pilot test is necessary to be conducted before the implementation of large scale program was continued. The pilot test is expected to capture any conditions that may cause or disturb the data collection process during the real implementation. If any obstruction appeared, necessary steps can be taken first before proceed to the actual program implementation. This also will ensure as far as possible, that all appropriate data and information are accessible and able to be used in project. Unavailability of data will cause a trouble in making assumptions that are difficult to validate.

Support and cooperation from related stakeholder is essential to make this program succeed as planned. In this study the participation of local authority seems will give major impacts towards the community perception and believe to participate

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in the program that was conducted. Community will see the commitment of the program that was conducted if the relevant authority involve directly or indirectly in the program.

Ensuring efficient communication with community that participates in the program is essential. This is especially important in order to safeguard the program objectives and target achieved with the real expected way as planned. Miscommunication between community involved and researcher will cause difficulties in both parties. Efficient communication will generate data that more accurate with high consistency and validity. Communications will also help us to identify any indirect factors that could cause the failure of project from the community that have a lot of experiences in the conditions of study area.

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5.6 Impact of waste segregation program in community perception.

This waste segregation program was received a good attention from the households that were involved. The following is a few comments from the households that were participated in this program:

"I think this program must be continued for extended period of time, to train households doing waste segregation until it become their habits to do waste segregation for recycling purposes"

"This program is a very good program to raise awareness level of community about the benefits of waste segregation for recycling to keep environment clean and help to conserve the environment"

"This waste segregation program supposedly to be conducted a long time before to prevent the environment from polluted with plastics and garbage that was thrown everywhere and cause pollution to the river and environment".

"In the beginning, it looks hard to do, but after joining phase two of program, it becomes easy for me. In the future I hope this program can make available a larger recycled bin".

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"The awareness program like this is very good to be conducted, but it cannot be continued in future because no main recycled bin located near to this residential area. It will be hard for those who do not have a transportation to bring the recycled items to recycling centre. Local authority must support this program to keep it success"

"It was necessary to put waste segregation bin near this residential area at every house street".

"I really impress with this program. It gives me good facility and knowledge that ease me to do waste segregation after I practice the contents of given pamphlet "

"This program helps me to do waste segregation activity even though I have a few problems in doing it. This program was good to raise environment awareness amongst the community".

Several comments from the community make evident that the program that was conducted successfully implemented in that community levels. The result that yielded from this program also concurrent with the comment that received from households that take part. Most of them believe the necessary to have a recycling bin at every house or at the end of street and they also believe it can help to protect and conserve the environment. The outcome variable shows the significant different from

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phase one to phase 3 of program that indicate this program have a great effect to increase awareness level among community.

5.7 Study Strength and Limitation

5.7.1 Study Strength

This study was conducted within the community level. The study of behavior that had been done before by Ramayah (2012) was conducted amongst the students. This study directly assessed the behavior of household that generate most of the domestic waste that was thrown into landfills.

This study also assessed the behavior change of households. The behaviors change was assessed based on the waste segregation program that was conducted. Many study done before only assessed the behavior of the household, not assessed the changes in behavior after adjustment for perceived lack of facility and knowledge on recycling of households.

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5.7.2 Study Limitation

There are several limitations in this study:

1. The sample size of this study was small and thus, it may have reduced the power of this study to detect a significant outcome.

2. The outcome of this study was measured by the answers of respondents from the self-administered questionnaires. Therefore, the results of this study are based entirely on the respondent's honesty and how they perceived their attitudes towards the variables used in this study.

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5.8 Conclusions

These studies have been conducted along with the waste segregation program. Community shows positive attitude and commitment in doing waste segregation program.The waste segregation program conducted has resulted in several behavioral changes of households towards waste segregation activity. An increase in the accessibility of recycling facilities has improved several waste segregation behaviors of a group of community living in Taman Sri Andalas. Several behaviors assessed in this study shows significant improvement after the provision of recycled bin, food waste bin and recycled waste collection facilities. The volume of waste that was segregated by the community was also increased after the provision of recycled bin and food waste bin. The benefit gained from the program was more than the cost of implementing the program.

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5.9 Recommendation

The provision of bin must be provided for inside and also outside the house of community to increase the rate of easy assessed to recycling facility.Increasing accessibility of recycling facilities may be one way to promote recycling behaviour as it removes the external barrier that stops households from recycling (Ho, 2002).

Recycling campaign is important to promote the waste segregation activity. The need for recycling campaign necessary to raise awareness level of community. Less recycling campaign was done for the community assessed in this study.

Provision of three type of recycle bin (glass, paper and plastics) at the end of every street. Increase the accessibility and visibility of the bin to make people motivated to recycle after seeing it.

Responsible authority needs to re-evaluate education efforts towards teaching proper recycling behaviour among households. This study shows that households have the high potential to do waste segregation, but due to lack of awareness and accessible to recycling facilities cause it hard to implement recycling behaviour among households.

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Participation in recycling programs should be made mandatory by introduction of charges or fee creates incentive for households to reduce their production of waste, but the main purpose is to recover the cost of providing collection and treatment services.

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APPENDIX 1

Permission letter to head of residential area Taman Sri Andalas

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APPENDIX 2

Permission Letter to Community

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APPENDIX 3

- Respondent Information Sheet
- Respondent Consent Letter
- Questionnaires

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Nombor Siri:

BORANG SOAL SELIDIK

JABATAN KESIHATAN PERSEKITARAN DAN PEKERJAAN

FAKULTI PERUBATAN DAN SAINS KESIHATAN

UNIVERSITI PUTRA MALAYSIA

TAJUK:

MENGKAJI KOMITMEN, SIKAP DAN PERUBAHAN TINGKAH LAKU KOMUNITI TERHADAP AKTIVITI PENGASINGAN SAMPAH

Adalah dimaklumkan bahawa satu kajian berkaitan komitmen, sikap dan perubahan tingkah laku komuniti terhadap aktiviti pengasingan sampah akan dijalankan di Kawasan Perumahan Taman Sri Andalas. Kajian ini berdasarkan 'projek pengasingan sampah' yang akan dijalankan di taman perumahan ini . Anda diminta menjawab semua soalan yang dikemukakan dengan mengikut arahan yang telah diberikan. Segala maklumat yang anda berikan hanya akan digunakan untuk kajian ini sahaja dan akan dirahsiakan.

NO. SIRI:

Masa yang dianggarkan untuk melengkapkan borang kaji selidik ini adalah selama 5 hingga 10 minit.

Tarikh soal selidik dilengkapkan: _____

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FACULTY OF MEDICINE AND HEALTH SCIENCES
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

HELAIAN MAKLUMAT UNTUK RESPONDEN

TAJUK KAJIAN: Mengkaji Komitmen, Sikap dan Perubahan Tingkah Laku Komuniti Terhadap Aktiviti Pengasingan Sampah

PENGENALAN

Kajian ini dijalankan untuk mengkaji tingkah laku penduduk terhadap aktiviti pengasingan sampah di rumah. Penduduk akan dibekalkan dengan dua jenis tong sampah percuma untuk menjayakan kajian ini.

APA YANG ANDA PERLU LAKUKAN? Jawab soalan yang diberikan dengan jujur

SIAPA YANG TIDAK PATUT MENGAMBIL BAHAGIAN? Sesiapa yang tidak hadir pada hari kajian.

APAKAH FAEDAH DARIPADA KAJIAN INI:

(a) **KEPADA ANDA SEBAGAI SUBJEK?** Subjek akan dapat mengetahui kebolehan mereka untuk menjalankan aktiviti pengasingan sampah untuk tujuan kitar semula.

b) **KEPADA PENGKAJI?**Pengkaji akan dapat menilai tingkah laku subjek dalam menjalankan aktiviti pengasingan sampah.

ADAKAH TERDAPAT SEBARANG RISIKO? Tiada sebarang risiko yang membahayakan keselamatan subjek semasa kajian.

APAKAH HAK ANDA DALAM KAJIAN INI? Semua responden berhak untuk menarik diri

pada bila- bila masa tanpa memberikan apa- apa sebab.

ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL SULIT? Semua maklumat dan identiti akan kekal sulit untuk keperluan kajian ini sahaja.

SIAPAKAH YANG BOLEH SAYA HUBUNGI UNTUK MENDAPATKAN MAKLUMAT YANG LEBIH LANJUT TENTANG KAJIAN INI? Sekiranya anda memerlukan maklumat lanjut mengenai kajian ini, anda boleh menghubungi **CIK HAJAR MARIAH HASHIM** di talian bernombor 013-3023100 atau Dr. Sharifah Norkhadijah di talian bernombor 012-2646712

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UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA

BORANG KEBENARAN (RESPONDEN)

TAJUK KAJIAN : Mengkaji Komitmen, Sikap dan Perubahan Tingkah Laku Komuniti Terhadap Aktiviti Pengasingan Sampah

PENGKAJI : Hajar Mariah Binti Hashim

Saya.....No.K/P.....
alamat.....
.....dengan ini bersetuju untuk mengambil bahagian dalam kajian (soal selidik) seperti di atas.

Saya telah diberitahu berkaitan dengan butir- butir kajian yang akan dijalankan dari segi kaedah kajian (Sila rujuk helaian informasi). Saya tahu bahawa saya mempunyai hak untuk menarik diri daripada kajian pada bila-bila masa tanpa menyertakan sebab saya berbuat demikian. Saya juga tahu bahawa kajian ini sulit dan segala maklumat yang saya berikan berkaitan dengan identiti saya tidak akan didedahkan serta kekal sulit dan persendirian.

T/ tangan .....
(*Responden*)

Tarikh :.....

T/ tangan .....
(*Saksi*)

Nama :.....

No K/P. :.....

Saya mengesahkan bahawa saya telah menerangkan kepada responden tentang butir-butir kajian dari segi kaedah kajian serta tujuan kajian seperti disebut di atas.

Tarikh .....

T/ tangan .....
(Pengkaji)

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Arahan: Sila tandakan (/) bagi pilihan jawapan anda. Bagi setiap soalan anda hanya dibenarkan memilih satu jawapan sahaja.

BAHAGIAN A –Latar Belakang Sosio- demografik

1	NO .RUMAH	
2	TARIKH LAHIR	
3	BILANGAN AHLI RUMAH	( ) Orang
4	JANTINA	Lelaki ( ) Perempuan ( )
5	BANGSA	Melayu ( ) Cina ( ) India ( ) Lain-lain ( ) (Sila nyatakan): .....
6	AGAMA	Islam ( ) Kristian ( ) Buddha ( ) Hindu ( ) Lain-lain ( ) (Sila nyatakan): .....
7	TARAF PERKAHWINAN	Bujang ( ) Berkahwin ( ) Bercerai/berpisah ( )
8	TARAF PENDIDIKAN	UPSR ( ) SPM ( ) PMR ( ) STPM/Diploma ( ) Diploma ( ) Degree ( ) Pendidikan tidak formal ( )
9	JENIS PEKERJAAN	Kerajaan ( ) Swasta ( ) Pencen ( ) Bekerja sendiri ( ) Tidak bekerja ( )
10	PURATA PENDAPATAN SEBULAN	< 1000 ribu ( ) 3001- 4000 ribu ( ) 1001- 2000 ribu ( ) 4001- 5000 ribu ( ) 2001- 3000 ribu ( ) > 5000 ribu ( )

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BAHAGIAN B: Aktiviti Pengasingan Sampah di Rumah

Arahan: Sila bulatkan pilihan jawapan yang dipilih berdasarkan skala di bawah.

1	2	3	4	5
Sangat tidak setuju	Tidak setuju	Tidak pasti	Setuju	Sangat setuju

a. Apakah padangan anda mengenai aktiviti pengasingan sampah di rumah?

Bil	Kenyataan	Pilihan jawapan				
1	Saya mendapati idea untuk membuat pengasingan sampah adalah sesuatu yang **menyenangkan**	1	2	3	4	5
2	Saya **tidak berminat** membuat pengasingan sampah untuk dikitar semula	1	2	3	4	5
3	Saya merasakan bahawa membuat pengasingan sampah adalah sesuatu yang **positif**	1	2	3	4	5
4	Saya mendapati idea untuk membuat pengasingan sampah adalah **tidak menyenangkan**	1	2	3	4	5
5	Saya merasakan bahawa saya **lebih memihak** untuk membuat pengasingan sampah	1	2	3	4	5

b. Adakah orang sekeliling mempengaruhi anda dalam membuat pengasingan sampah?

Bil	Kenyataan	Pilihan jawapan				
1	**Rakan** saya mempercayai bahawa membuat pengasingan sampah adalah suatu nilai yang murni.	1	2	3	4	5
2	**Keluarga** saya merasakan bahawa saya sepatutnya membuat pengasingan sampah untuk dikitar semula	1	2	3	4	5
3	**Jiran** saya merasakan bahawa saya akan membuat pengasingan sampah untuk dikitar semula.	1	2	3	4	5
4	**Semua orang** yang penting bagi saya mahu saya membuat pengasingan sampah untuk dikitar semula	1	2	3	4	5
5	Sangat sukar untuk melihat **mana-mana kenalan** saya membuat pengasingan sampah untuk dikitar semula.	1	2	3	4	5

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c. Apakah tanggapan anda tentang aktiviti pengasingan sampah?

Bil	Kenyataan	Pilihan jawapan				
1	Membuat pengasingan sampah untuk dikitar semula adalah sesuatu perbuatan yang **mudah** bagi saya.	1	2	3	4	5
2	Pihak berkuasa telah menyediakan kemudahan untuk membuat pengasingan sampah yang **mencukupi.**	1	2	3	4	5
3	Saya mempunyai **banyak peluang** untuk membuat pengasingan sampah	1	2	3	4	5
4	Saya tahu **barang-barang** yang boleh dikitar semula daripada sampah saya	1	2	3	4	5
5	Saya tahu di mana **tempat** untuk mengitar semula sampah saya	1	2	3	4	5
6	Saya tahu bagaimana **cara** untuk membuat pengasingan sampah	1	2	3	4	5

d. Adakah faktor persekitaran anda mempengaruhi anda untuk membuat pengasingan sampah?

Bil	Kenyataan	Pilihan jawapan				
1	Membuat pengasingan sampah untuk dikitar semula memerlukan penggunaan **masa** yang banyak	1	2	3	4	5
2	Membuat pengasingan sampah untuk dikitar semula menggunakan terlalu banyak **ruang**	1	2	3	4	5
3	Membuat pengasingan sampah adalah sesuatu yang **merumitkan**	1	2	3	4	5
4	Membuat program pengasingan sampah adalah sesuatu yang **membazirkan duit**	1	2	3	4	5
5	Saya tidak membuat pengasingan sampah kerana tempat mengitar semula **jauh** dari kediaman saya	1	2	3	4	5

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e. Menurut pandangan anda, apakah kesan-kesan positif terhadap aktiviti pengasingan sampah?

Bil	Kenyataan	Pilihan jawapan				
1	Membuat pengasingan sampah untuk dikitar semula dapat membantu **memelihara alam sekitar**	1	2	3	4	5
2	Pengasingan sampah untuk dikitar semula membantu **mengurangkan jumlah sampah** yang dibuang ke pusat pelupusan sampah	1	2	3	4	5
3	Pengasingan sampah untuk dikitar semula dapat membantu **mengurangkan penggunaan sumber alam**	1	2	3	4	5
4	Saya **tidak** dapat melihat apa-apa kesan positif membuat pengasingan sampah	1	2	3	4	5

f. Menurut pandangan anda apakah impak membuat aktiviti pengasingan sampah pada masa hadapan?

Bil	Kenyataan	Pilihan jawapan				
1	Pengasingan sampah untuk dikitar semula dapat **menjimatkan tenaga**	1	2	3	4	5
2	Pengasingan sampah untuk dikitar semula dapat **menjimatkan kos** perbelanjaan.	1	2	3	4	5
3	Pengasingan sampah untuk dikitar semula menyediakan **persekitaran yang kondusif** kepada generasi yang akan datang.	1	2	3	4	5

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g. Apakah tanggapan anda terhadap kemudahan untuk membuat pengasingan sampah di tempat anda?

Bil	Kenyataan	Pilihan jawapan				
1	Saya tidak membuat pengasingan sampah untuk kerana kemudahan pengasingan sampah **tidak mudah didapati**	1	2	3	4	5
2	Saya tidak membuat pengasingan sampah kerana **tidak ada kutipan berkala** dijalankan	1	2	3	4	5
3	Saya merasakan **pihak berkuasa** perlu bertanggungjawab untuk mengasingkan dan mengutip sampah untuk dikitar semula	1	2	3	4	5

h. Apakah sebab utama anda membuat pengasingan sampah di rumah?

Bil	Kenyataan	Pilihan jawapan				
1	Saya rasa saya **tidak patut** membuat **pembaziran** dengan membuang barang-barang yang masih boleh digunakan di rumah	1	2	3	4	5
2	Saya akan **rasa bersalah** jika tidak membuat pengasingan sampah untuk dikitar semula	1	2	3	4	5
3	**Tidak** membuat pengasingan sampah **berlawanan dengan prinsip** hidup saya	1	2	3	4	5
4	Setiap orang patut **berkongsi tanggungjawab** membuat pengasingan sampah untuk dikitar semula di rumah	1	2	3	4	5

i. Apakah kebolehan anda terhadap aktiviti pengasingan sampah

Bil	Kenyataan	Pilihan jawapan				
1	Pada kebiasaanya, saya akan mengasingkan dan mengitar semula semua barang yang boleh dikitar semula	1	2	3	4	5
2	Kadar penglibatan saya dengan aktiviti mengasingkan sampah adalah sangat tinggi	1	2	3	4	5
3	Saya mempunyai tahap pegangan dan kepatuhan yang tinggi dalam membuat pengasingan sampah di rumah	1	2	3	4	5

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APPENDIX 4

Final Year Project Plan

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Table 7.1 (a) The planning of study by months

	2012				2013				
PLANNING/MONTH	**SEPT**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MARC**	**APR**	**MAY**
Propose title for the project									
Submit the concept paper									
Attach supervisor									
Finishing the proposal									
Submission on ethical clearance									
Permission letter to selected company/head of resident									
Proposal presentation									
Pre-tested questionnaire									
Resubmission of proposal									
Ethical clearance									
Receive approval letter from contractor/resident									
Site visit to sampling area									
Give and collect the consent letter from respondent									
Collect data									
Analyze data									
Preparing the complete thesis									
Submission of final thesis and presentation									

Table 7.1 (a): Gant Chart for overall research planning flow.

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APPENDIX 5

Waste Segregation Pamphlet

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4 LANGKAH MUDAH KITAR SEMULA

1

KERTAS

*Asingkan akhbar & majalah dari kertas lain
*Untuk kotak-buka & ratakan
*Masukan ke dalam tong kitar semula

2

PLASTIK

* Buangkan lebihan cecair atau barang-barang daripada bekas atau beg plastik
*Tanggalkan label pada bekas plastik
*Cuci bekas & keringkan
*Masukan ke dalam tong kitar semula

3

KACA

*Buang cairan lebih pada botol
*Tanggalkan label pada botol
*Cuci botol & keringkan
*Masukan ke dalam tong kitar semula

4

ALUMINIUM

*Buangkan lebihan cecair dari dalam tin
*Bilas & keringkan
*Kemekkan tin
*Masukan ke dalam tong kitar semula

TAHUKAH ANDA???

Mengitar semula **1 tan kertas** boleh menyelamatkan 17 batang pokok berketinggian 35 kaki

Lebih daripada 500, 000 batang pokok boleh diselamatkan setiap minggu sekiranya **akhbar Ahad** dikitar semula

Tenaga yang dijimatkan dari kitar semula **1 botol kaca** boleh menyalakan mentol 100 wat selama 4 jam

 # 20 tin kitar semula boleh dihasilkan pada jumlah tenaga yang sama untuk menghasilkan 1 tin dari sumber asal.

UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

PROGRAM PENGASINGAN SAMPAH DI RUMAH

KITAR SEMULA, FIKIR DULU SEBELUM BUANG!

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KITAR SEMULA, ANDA BAGAIMANA!

BARANG YANG TIDAK BOLEH DIKITAR SEMULA

TIDAK BAGI BARANG-BARANG ELEKTRONIK, BATERI, KOMPUTER, TELEFON BIMBIT, MENTOL, TIN, AEROSOL, TIN CAT, MINYAK ATAU BUANGAN BERBAHAYA

TIDAK BAGI BEKAS MAKANAN& MINUMAN POLISTERINE, SERAMIK, KERTAS MAKANAN BASAH

APA YANG BOLEH DIKITAR SEMULA?

FIKIR DULU SEBELUM BUANG!!!

KOTAK LIPAT

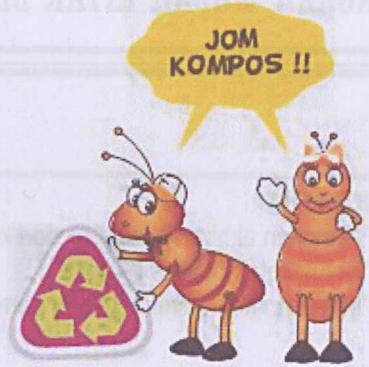
KERTAS BERSIH, SURAT KHABAR
KOTAK BISKUT, KATALOG
MAJALAH, ENVELOPE

TIN ALUMINIUM

BEKAS PLASTIK KERAS/ SABUN

BOTOL MAKANAN & MINUMAN
(ASINGKAN PENUTUP)

MARI AMALKAN PENGASINGAN SISA DARI RUMAH



MUDAH SAHAJA!!!
PASTIKAN ANDA MENGAS-INGKAN SISA MAKANAN KE DALAM TONG YANG DIS-

7.1 Picture of activity (Phase 2)

Figure 7.1 (a) Respondent answering the questionnaire

Figure 7.1 (b): Demonstration of waste segregation using the provided bin

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Figure 7.1 (b): Distribution of recycle bin, food waste bin and plastic garbage for households.

7.1 Picture of weighing Process (Phase 3)

Figure 7.1: Process of weighing General Waste (black plastics).

Figure 7.1: Process of weighing Recycled Waste (green plastics).

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Figure 7.1: Process of weighing Food Waste (white plastics).

Figure 7.1: Collection of food waste segregated by the households

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Figure 7.1: Collection of recycled waste segregated by the households

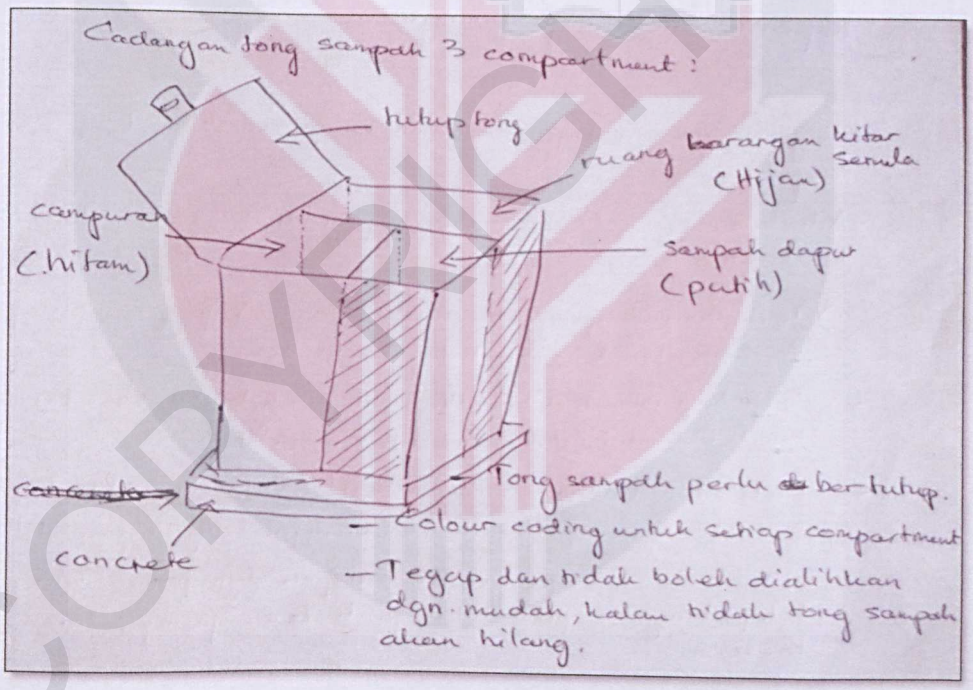

Figure 7.2: Suggestion of bin for waste segregation by one of the respondent involved.

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