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## The Effects of Socio-Economic Influences on Households Recycling Behaviour In Iskandar Malaysia

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### Abstract

This paper investigates the effect of socio-economic factors that might influence on recycling practices in Malaysia. We conducted interview surveys to 600 households in the newly emerging conurbation of Iskandar Malaysia Region. The results revealed that socio-economic variables have a positive relationship in recycling activities. The outcomes indicate that elderly people displayed a pro-environmental behaviour. The younger generation is less inclined to recycle. The findings enable the government to generate suitable options that suit the various characteristics of households. The paper recommends several options to improve solid waste management. These include providing the infrastructures and incentives and raise environmental knowledge and values.

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**Keywords:** Household waste; socio-economic factors; recycling behaviour; Iskandar Malaysia

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### 1. Introduction

Solid waste management is the most critical environmental problems particularly in urban areas of developed and developing countries of the world. The trends of solid waste generation are seen a parallel to the growth of urbanization, industrialization and economic development. This environmental problem continues to be a threatening the environment and the public health if environmental measures are not introduced and efficiently

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enforced (UNEP, 2010). Recycling is the best approach to address the issue since it reduces the waste to be directly disposed of in a landfill (Connet and Sheehan, 2001). Additionally, recycling has the potential to reduce disposal costs, waste transport costs and to prolong the lifespan of landfills site (Bolaane, 2006, Folz, 1991). Studies have shown that we can create a new product from the source materials that indirectly benefit the environment and the economy (Vicente & Reis, 2008). However, the successful of the recycling program is depending on the actively public participation in the separation of recyclable waste (Vicente & Reis, 2008). Keramitsoglou.M.K et.al. , 2013 stated that a recycling programme is traditionally imposed top-down by the municipal authorities without public participation in decision-making on implementation. The particular components are what materials the community people are willing to recycle, and what collection system would be more convenient for them or what economic instruments would result in sustainable recycling schemes. There are numerous studies related to recycling behaviour. In the developed countries, most studies on waste recycling focused on technical applications such as models and tools (Daskalopoulos et al., 1998; Barlishen et.al, 1995). They also involved policy analysis on measures to improve recycling practices. These include command-and-control as well as social-psychological and economic incentives (Taylor, 2000). In Malaysia, most studies are centered on a general picture of the status of solid waste management (Yiing,2014). Other aspects of recycling received less attention, for example, the problems of a household in carrying out recycling activities. This study investigates the practice of recycling among households and, in particular, the demographic profile and the socio-economic influence on recycling behavior, conditions for active participation and options for improving solid waste collection services. This information is most useful regarding household waste disposal, recycling planning, and overall waste management.

### *1.1. Solid waste management in Malaysia*

In Malaysia, solid waste generation increased from 19,100 tonnes daily in 2006 to 33,000 tonnes daily in 2012 (New Straits Times, 2013). The amounts had exceeded the projected generation of 30,000 tonnes by 2020. The amount of solid waste and its composition can be associated with income levels and urbanization. Households waste is the main primary source of municipal solid waste. With rising incomes and urbanization economies produce, more at higher levels if the solid waste per capita will increase (Omran. et. al, 2009). Hence, we should organise proper waste management to achieve a good environment, public health and safety. Currently, recycling is not a universal way of life in Malaysia (Omran et.al,2009). Public participation in the recycling program in Malaysia is very low. Malaysia targeted 22% of recycling rate by the year 2020, but the current recycling rate was only 9% in 2012 (JPSPN,2013). This recycling rate is very much lower than the neighbouring countries. Singapore recorded a 60% recycling rate in 2012 (NEA,2013) and Philippines (Manila) from 28% in 2006 (Antonio, L. C.,2010).

The Federal Governments of Malaysia launched recycling programs in 1993. In 2001, the Minister of Housing and Local Government had launched for the second time (Agamuthu et.al.,2010). Furthermore, 11 November has declared as the National Recycling Day (AM. Latifah et.al,2009). Even though various successive campaigns, such as recycling advertisement, were carried out to instill awareness among Malaysians, there has been a failure to motivate the community to respond positively. The level of concern and awareness among Malaysian public does not match the living standards of the participation towards sustainable waste management through 3Rs is severely lacking. In Malaysia, awareness of recycling is high among Malaysians (82%) but very few practise recycling for various reasons (Mutang & Haron, 2012). Even though, a lot of printed and electronic media on recycling were disseminated, and they failed to educate and create awareness. Some of the community even look down on these efforts, implying that recycling is considered less unimportant compared to other issues (Zain et al., 2012). Several studies stated that the reasons of Malaysian refuse to recycle is because the recycling facilities provided are insufficient and inconvenient practice for them (Fauziah et.al, 2009).

## **2. Literature review**

The complexity and diverse nature of recycling behaviour among households have attracted a lot of studies. Researchers have developed various models to explain factors that induced people to behave in environmentally responsible manner. The Theory of Planned Behaviour (TPB) is widely used the model in the literature to explore

pro-environmental behavior. The TPB (Ajzen, 1988) suggests that we can predict behaviour by asking people if they wish to behave in a particular manner (Jaarsma, 2012). From various studies on pro-environmental behaviour, three sets of variables appear to be persuasive in categorizing environmentally conscious individuals (Gilg et al., 2005). These centered around environmental and social values, socio-economic variables and psychological factors. In Malaysia, Latif, et al., (2012) used the TPB model to identify environmental values and situational factors (Latif, et al., 2012) to predict recycling behavior. Recycling intention among the school students also applied the similar model (Mahmud, S. N. D. et.al, 2010), In these studies, researchers stressed the relevance of environmental values and attitudes to environmental behavior. Attitudes on the importance of recycling and the belief about the convenience of recycling practice are identified as predictors of recycling participation (McCarty and Shrum, 2001). According to Tonglet et al., (2004) people can be persuaded to recycle if they have opportunities, facilities and knowledge. We can enhance recycling practices if people are not deterred by the issues of physically recycling for example time, space and inconvenience.

To achieve the recycling targets, the waste management problem should become an issue and responsibility of the local community rather than of the local council waste services (Keramitsoglou.M.K et.al.,2013). Since the household is one of the main primary sources of municipal solid waste (Tariq and Mostafizur, 2007; Sujauddin et.al,2009), it is only logical to examine household characteristics. There is evidence to show that demographic variables such as age, education, income and types of households are associated with recycling behavior (Hansmann et al. (2006). However, research into the impact of socio-demographic factors on recycling behavior has led to not only generalization of a causative relationship (Gilg et al., 2005) but also inconsistent findings (Vicente and Reis 2008). According to Gamba & Oskamp (1994), Margai (1997) and Scott (1999) age is a positive influence in recycling participation. Findings from Corral-Verdugo (1996), Werner & Makela (1998) and Valle et al. (2004) however reveal a non-significant correlation between age and recycling participation. The studies of Lansana (1992), Derkesen & Gartrell (1993) and Owens et al. (2000) demonstrate a positive correlation between education and recycling participation. These findings are in contrast to Corral-Verdugo (1996), Werner & Makela (1998) and Valle et al. (2004). Gender cannot predict recycling participation according to Gamba & Oskamp (1994) and Werner & Makela (1998). Nevertheless socio-economic factors namely, consumption patterns, education, gender, age, and income correlate with recycling behaviour (Kishino et al., 1999; Hanyu et al., 2000; Domina and Koch, 2002;Troschinetz, A. M., & Mihelcic, J. R. 2009). Such findings also found support from studies in developing countries. Socio-economic and demographics factors such as gender, age, and household income were most influential in the recycling activities in Wuhan, China's fifth largest city (Li, 2003). The elderly females of low-income families were most likely to recycle ((Li, 2003). Despite these inconsistencies, Antonia (2001) maintained that demographic characteristics are the best segmentation tool to determine the characteristics of recyclers and non-recyclers.

Several studies on recycling have addressed the environmental psychology especially on recycling attitude and the evaluation of recycling programmes implementation (Keramitsoglou and Tsagarakis, 2013). Unlike other countries, Malaysian do not rank solid waste generation as a critical issue thus recycling behavior is not widely practiced. This paper, therefore, needs to look closely at socio-economic and demographic variables as a starting point to support future actions and communication strategies to enhance people's involvement in recycling programmes. Personal factors including attitude and values together with demographic variables are strong predictors of recycling behaviour ( Mutang & Haron, 2012). Therefore, we need to increase our understanding of households characteristics to enable the development of other support tools to enhance pro-environmental behavior further.

### **3. .Methodology**

#### *3.1. Study area*

The study area in this paper is Iskandar Malaysia (IM). IM lies at the heart of South East Asia at the southern tip of Peninsular Malaysia and within minutes from Singapore. The location of IM is strategically at a major crossroads of East-West trade routes of fast-growing countries like China and India. From a regional perspective, the

development of IM will lend a greater competitive edge to the region and will benefit significantly from the air and sea linkages within Asia-Pacific countries. IM has also been considered to have a wider impact on the zones of influence of the global cities of Kuala Lumpur and Singapore (Rizzo & Khan, 2013). IM covers an area of about 2216.3 km<sup>2</sup> that is about three (3) times the size of Singapore and two times the size of Hong Kong Island. IM ranked as the second most important conurbation in Malaysia is envisioned to rival other city regions of East Asia such as Hong Kong and Singapore (FTCPD, 2005). The population of IM in 2010 is about 1.35 million. The population are expected to increase to 3 million in the year 2025. Fig. 1 shows the information on population size and the waste generated in 2010 as well as the projected amount by 2025.

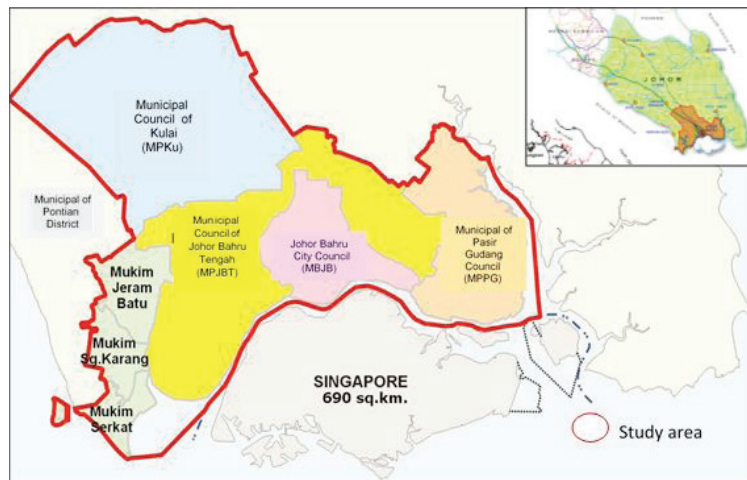


Fig. 1 Study area.

Source : Low Carbon City 2025 –Sustainable Iskandar Malaysia

There are five local authorities in IM. They are Johor Bahru City Council (MBJB) and Central Johor Bahru Municipal Council (MPJBT), Kulai Municipal Council (MPKu), Pasir Gudang Municipal Council (MPPG) and some parts of Pontian District Council. The Comprehensive Development Plan (CDP) has been formulated to provide the strategic framework that consists of visions, the key direction, principles and the development strategies for the region. They are aspired to be a livable region for its people, where its community can live their life with pride, pleasure and harmony. The formulation of the CDP provides a blueprint to achieve the vision of a 'strong, sustainable conurbation of international standing'. It also aspires in creating a livable and attractive environment for residents, businesses and visitors. In the coming years, more new developments are expected in the region. It will be mostly high-end residential projects. The area in IM such as Danga Bay and Nusa Jaya are expected to be dominated by more affluent communities. Since IM seeks to adopt low carbon city initiatives (Ho et. al., 2013) it is highly critical that we promote pro-environmental behaviour among the communities.

### 3.2. Survey and questionnaire design

The survey was conducted using direct face to face interviews to the households in selected neighbourhoods in Iskandar Malaysia. We divided the questionnaire into three sections. The first section included respondent's profile. The second section examines solid waste separation practices. It covers the current situation of household solid waste management especially the disposal method. This section also asks on willingness to practices waste separation. The third section evaluates household options of improving solid waste management service. The options open to the respondents is divided into four (4) attributes, which are including the level of quality in term of

collection frequency, separation of waste at source, disposal method and a monthly charge. These options apply to others similar situation as suggested by Othman (2002).

#### 4. 4 Results and discussions

##### 4.1. Profile of the respondents

Table 1 reports the descriptive statistics of the main socio-economic characteristics of the respondents. The respondents are 55.6% men and 44.4% women. This proportion is similar to 2010 census of Malaysia. We categorized the age into three groups. Following Afroz et.al. 2011, the study categorises age group 18-24 as the youngest group, the age group 25 to 34 as a middle age group and the age group over 35 as the older group. The average age was 41 years. More than 50% of the respondent are over 35 years old and categorized as older people. About 97.8% of the respondents had formal education with 62.6% completed secondary education. Only 22.3% respondents obtained a higher education while 2.2% have no formal education.

Table 1. Profile of respondents.

| Age                      | %     |
|--------------------------|-------|
| 18- 24                   | 7.2   |
| 25-34                    | 24.7  |
| 35-44                    | 27.0  |
| 45-54                    | 22.9  |
| 55-64                    | 13.3  |
| 65 and above             | 4.8   |
| Total                    | 100.0 |
| Gender                   | %     |
| Male                     | 55.6  |
| Female                   | 44.4  |
| Total                    | 100.0 |
| Education                | %     |
| Have not attended school | 2.2   |
| Primary school           | 12.3  |
| Secondary school         | 62.6  |
| Tertiary education       | 22.8  |
| Total                    | 100.0 |
| Income Group             | %     |
| <RM1000                  | 3.7   |
| RM1000-1499              | 5.2   |
| RM1500-1999              | 10.6  |
| RM2000-2499              | 16.1  |
| RM2500-2999              | 9.7   |
| RM3000-3999              | 24.3  |
| RM4000-4999              | 11.0  |
| RM5000 and above         | 19.4  |
| Total                    | 100.0 |
| Homeownership            | %     |

|        |       |
|--------|-------|
| Own    | 78.1  |
| Rent   | 20.0  |
| Others | 2.0   |
| Total  | 100.0 |

#### 4.2. Household solid waste management

##### 4.2.1. Disposal method of household solid waste

Currently, households in study area place their waste bags in waste bins in front of their houses. The private collectors will collect the wastes twice or thrice a week. We asked the respondents, how and where they dispose of their household waste for each listed items. Fig. 2 shows that recycling method vary according to types of material. The analysis on the method of recycling demonstrated two types of highly recycled material. Basic recyclable materials are glass, paper and old clothes i.e. 61.8%, 69% and 72.5% respectively. Other materials are aluminium (55.2%), types of plastic (48.3%). These materials are sold to door to door collectors. The door to door collection is done by private collectors or Non Governments Organization (NGOs) using various methods, for example, a collection bin. They may also collect the material by lorry or van. The majority of the households dispose of their wastes such as polystyrene, plastics, and food waste into a waste bin without separation.

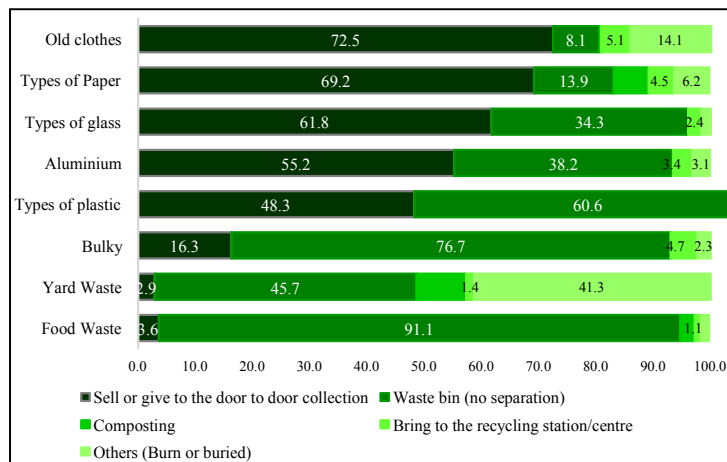


Fig. 2. Disposal method by materials.

##### 4.2.2. Solid waste separation practices

The survey reveals that the majority of respondents (37%) claimed that they were practicing waste separation according to the categories, but 26% never practiced. To be more specific, the figure shows 14% sometimes practiced; 12% practiced most of the time, and 11% seldom practiced separating solid waste. The present study shows a positive relationship between age and frequency of recycling. People in the age group of 55 and above (45%) are found to be more active in recycling compared to the younger ones (Fig. 3). Older individuals may be at a phase in their lives that is closer to retirement, or they may already retired, thus have more time dedicated to recycling. Moreover, the responsibilities and time dedicated to caring for the children, if they continue to be a part of the family unit, are also less (Garcés, et.al, 2002). The study shows that waste separation practices are relatively low among the younger age group (18-24 years old).

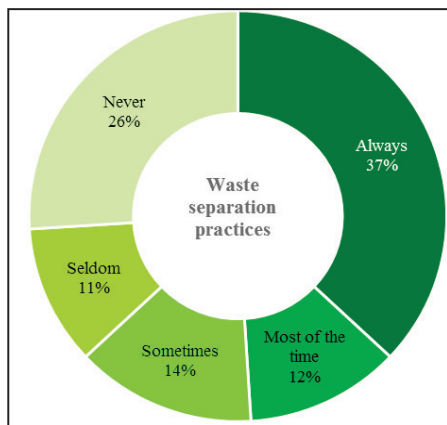


Fig. 3. Frequency of solid waste separation.

This is consistent with the findings from many other studies which also reveal that older households are more likely to participate in recycling activities (Singhirunnusorn, W. et.al, 2012; Bowman et.al, 1998; Meneses and Palacio, 2005; Saphores et al., 2006). However, this finding is contrary to the common expectation that younger people are likely to be more involved in recycling based on the assumption that they are more environmental conscious. The finding of this study is similar to the previous studies by Martin et al.(2006) and Bruvoll et al. (2002) that older people recycle simply because they have more time on their hands; after all, recycling is a time-intensive activity.

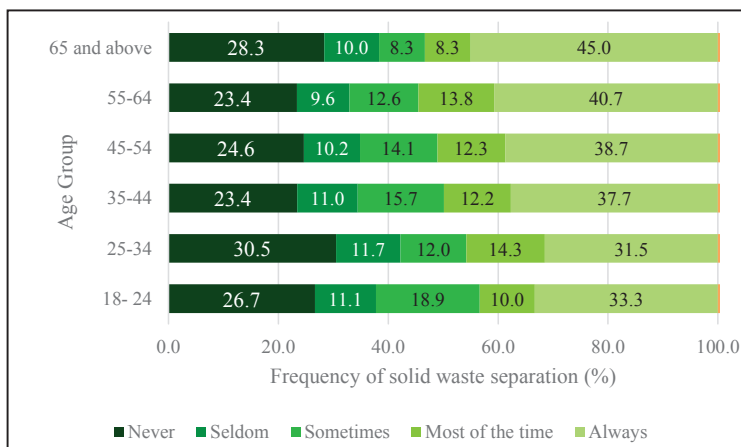


Fig. 4. Frequency of solid waste separation by age group.

Homeownership is found to be predictors of recycling activities (Oskamp et al., 1991). This factor can be explained by the fact that people who owned their houses tend to take better care of those homes. A peer pressure also caused residents especially those in affluent neighborhoods to behave with considerable regards to their neighbours. Thus, if one home recycles then other neighbors will likely do (Lockhart, 2003). Zen, et.al, (2014) and Vencatasawmy, et.al.,(2000) obtained a positive correlation between homeownership and recycling practices. In this study, people who owned their home (38.5%) tend to recycle compared to people who rent their home or those living in company owned houses. Such finding, however, does not concur with Mutang & Haron, (2012), who found no relationship between home ownership and recycling practice.



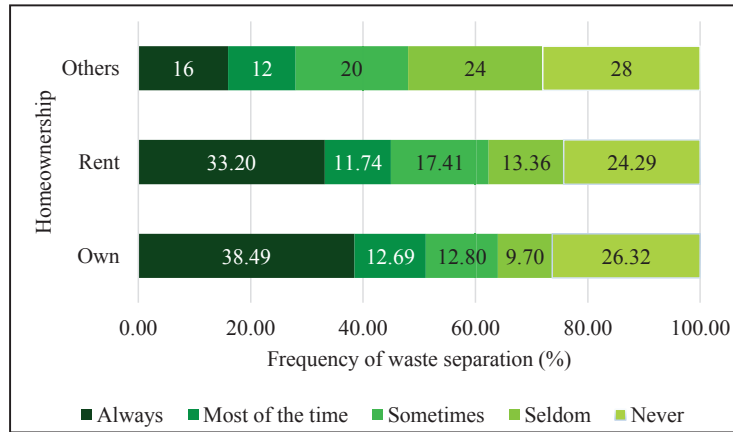


Fig. 5. Frequency of solid waste separation by homeownership.

4.3. Enablers for willingness to participate in routine recycling activities

The availability of an effective recycling infrastructure that enables householders to recycle their waste is clearly a crucial part of any recycling programme. Nevertheless, there should be supporting factors to motivate householders to make use of that infrastructure (Martin, et.al, 2006). In this study, the response ‘Yes, more likely’ to participate was the highest (80%) received in Iskandar Malaysia Region (Fig. 6). The result indicates very encouraging feedback by respondent. However, the results show in Fig. 6 revealed those older age groups (45 to 64 years old) are more likely to participate in recycling activities. This correlate concurs with the majority of studies that have similar findings where older households are more likely to recycle (Singhirunnusorn, W.et.al,2012; Bowman, N et.al.,1998). This implies that the elders are more willing to participate in recycling practices than the younger ones.

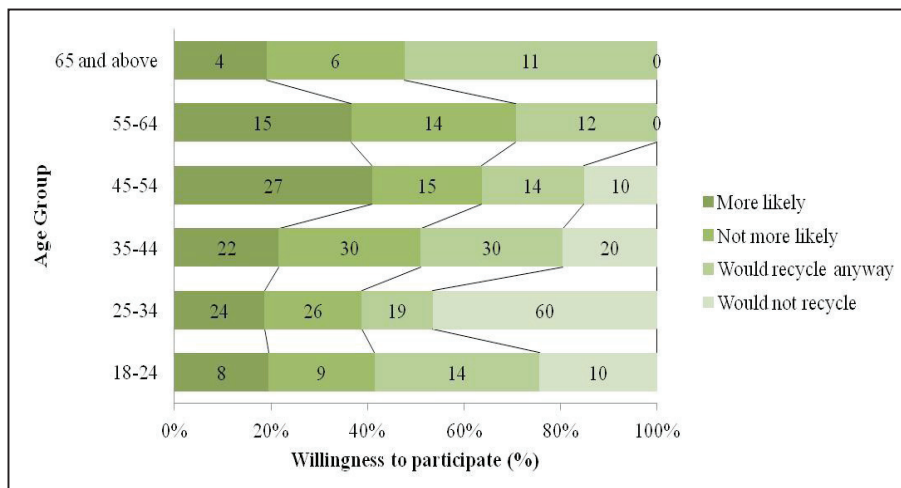


Fig. 6. The willingness to participate in waste separation by age group.

This research also seeks opinions on the best approach to increase recycling among the households. Although 24% of the respondents feel that the law should sanction recycling, the majority of respondents (70%) will willingly participate without the legal sanction. Almost all the respondent (82%) also agreed that they would more likely



recycle if the municipality provides the facilities for waste separation at the curbside. Only 7% stated that they would recycle even if there are no such facilities.

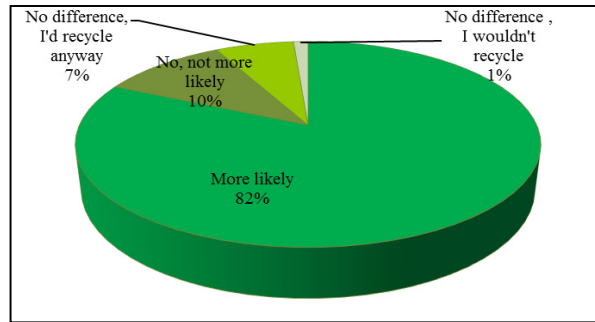


Fig. 7. The willingness to participate in waste separation.

4.4. Household option of solid waste management services

Respondents are also asked to select the level of quality of solid waste management. The majority of respondents choose high quality services. This choice implies that most people are conscious of the need for proper waste management and its importance to the environment. This also indicates that the majority are ready to upgrade their waste separation practice. The option for high quality correlates positively with income level, i.e., people with higher income tend to choose a higher quality of services. The Fig. 8 showed that people with higher income are also willing to pay a higher cost to obtain better quality services.

Table 2. Options of solid waste management services.

|   | Low Quality  | High Quality  |
|---|--|---|
| Collection Frequency                        | Irregular 3 times weekly                                     | Alternate days 3 times weekly   |
| Separation of waste at source by households | Separation at source not needed<br>Waste will be not process | Waste separation required facilities and containers provided free<br>Waste will be processing |
| Disposal method                             |  |   |
| Monthly charge                              | Average RM15   | RM25  |

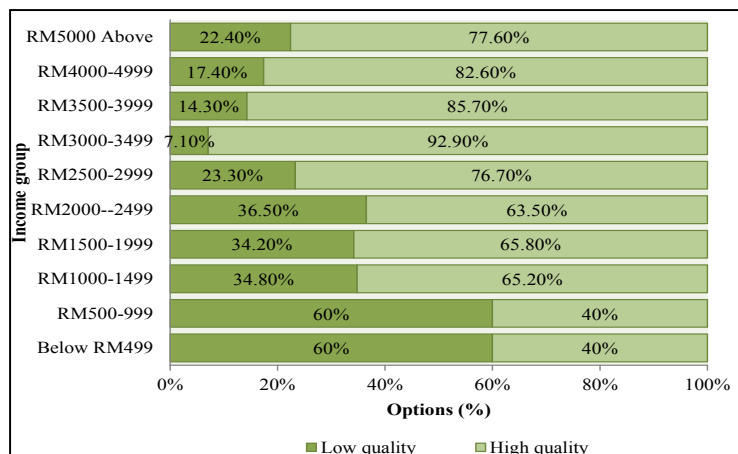


Fig. 8. The options of solid waste management service by income group.

## 5. Conclusion

Many problems hampered solid waste management in Malaysia. The problems are insufficient facilities, weak enforcement, ineffective policy implementation and lack of technology (Agamuthu, 2009; Fauziah SH, 2004). In recent years, reducing and recycling household waste has become increasingly imperative because a waste generation has been increasing due to an increase in population and economic development. Resources as land for landfill had become scarce, making recycling not only sensible but essential. Although there is widespread public support for reducing and recycling of household waste, this is not reflected in participation levels in Iskandar Malaysia.

An important finding from the study indicates a positive relationship of socioeconomic and demographics factors such as age, home ownership and income with a frequency of recycling and option to improve solid waste management service. Elder people are found to be more active in recycling compared to the younger ones. Such finding is consistent with the conclusions from many other studies that also reveal that older households are more likely to participate in recycling activities. Thus, there is a need to encourage the youngsters to get interested and actively involved in the recycling activities. Our study also found homeownership is an important variable to predict willing recyclers. Thus, any initiatives by the government will have to be based on such demographic variable.

This study reveals that the households are ready to receive improvement of solid waste management services. The majority of high-income households choose high-value improvements in the solid waste management program. Specifically, it has been determined that households are willing to pay a higher price for improvements in collection frequency, waste disposal methods, and transportation mode attributes.

The conclusions in the study are coherent with those presented in the literature. It demonstrates the relevance of the role played by the household participation and local authorities in obtaining the environmental target. We recommend strategies namely environmental education, awareness campaigns, and the establishment of adequate collection systems. Such initiatives will improve the community-specific waste management programs. The authority also needs to incorporate waste management into the sustainable development agenda. It is also beneficial to the service provider since the majority of respondents agreed to spend more money to get high quality facilities as well as services.

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