5   SOCIO- ECONOMIC STUDIES

5.1 Introduction

Socio-economic studies have been utilized as tools to evaluate and measure various aspects of human life. The social implications of a society are always closely related to the economic aspects that these two fields are normally merged together in studies on human behaviour. It covers issues like human diets to consumerism to commerce and the environment (Hazra and Goel, 2009; Lancaster *et al*., 2005; Shen, 2005; Ishikawa and Toda, 2005).

The socio-economic level of a society has major implications to the environment as it influenced the utilization of earth's resources, as well as, the generation of wastes. Natural resources have been exploited ever since human's first existence on the planet. The exponential growth of human population is diminishing the availability of non-renewable resources at a rate higher than the level predicted (Haberl, 2006, Odum and Odum, 2006). Resource consumptions by the populations increase with the development and the socio-economic level of the population (Wada *et al*., 2009; Agamuthu, 2001; Scharff, 2000; Hoornweg, 2000). Report by UNEP indicated that cities which comprised 2% of the total land surface, exploited 75% of the world's resources leaving only 25% for the less urbanized area i.e. 98% of the remaining land surface. Population, gross net production (GNP) and resource consumptions are strongly related to the trend and rate of waste generation (Agamuthu *et al*., 2009; Scharff, 2000).

Daily waste generation in urban areas in Asia reach more than 760 000 tonnes of municipal solid waste (MSW) (Hoornweg, 2000; Scharff, 2000). The generation is projected to increase to more than 1.8 million tonnes per day in 2025 due to rapid urbanization (Scharff, 2000).

The current refuse generation in Malaysia had exceeded 500 kg/capita/year. In the state of Selangor, the generation of waste was 3000 tonnes in 1997 and is projected to increase 6.2% to 3200 tonnes in 2017 (Agamuthu *et al.*, 2004). Kuala Lumpur alone produced 2800 tonnes/day in 1997, 3 000 tonnes in 2001, and is predicted to generate about 3 200 tonnes in 2017 (Agamuthu *et al.*, 2009; Agamuthu, 2001). This rate was found to be higher than the estimated waste generation i.e. 3.2% at the national level.

An integrated waste management system would benefit waste managers economically and improve the environmental quality (Fauziah and Agamuthu, 2006; Muller *et al.*, 2002.). Unfortunately a society with a conservative mentality made the improvement almost impossible (Wada *et al.*, 2009; Fahmi, 2005; Bulle, 1999). This is because waste management also incorporates the roles of all relevant stakeholders including the society (Hazra and Goel, 2009; Refsgaard and Magnussen, 2009; Fahmi, 2005; Muller *et al.*, 2002; Bulle, 1999; Wegelin and Borgman, 1995). Therefore, it is very crucial to change the negative mind-set of the society in order to enhance the improvement of a waste management system in the country (Refsgaard and Magnussen, 2009; Wegelin and Borgman, 1995). This incorporates efforts to create positive attitudes towards

environmental issues and environmental consciousness (Hazra and Goel, 2009; Muller *et al.*, 2002.)

Some approaches were found to be effective in creating environmental awareness among the society particularly in the urban areas (Read, 2005). Li'ao *et al.* (2009) and Zhang (2000) showed that the expectation of the people in cities in China on the environmental protection issues has been growing and more are ready to accept drastic changes to improve the quality of the environment. In USA, it was reported that the willingness to pay more for green goods and green service is relatively high (Winter and Davis, 2006; Kotchen, 2005; Garcia-Gil *et al.*, 2000). The situation was also similar regarding other environmental issues and public involvement in many parts of the world (Graham *et al.*, 2009; Hazra and Goel, 2009; Robertson and McGee, 2003; Stave, 2003; Gouveia *et al.*, 2004; Lober, 1996) especially when public welfare is at stake (Refsgaard and Magnussen, 2009; Gutrich *et al.*, 2005; Pavlikakis and Tsihrintzis, 2003; Myatt *et al.*, 2003; Al-Yaqout *et al.*, 2002).

In Malaysia, environmental awareness was very low in the 1970s, as the issue was not considered critical due to the very low generation of MSW. Therefore, very minimal attention was focused on creating awareness among the public until the early 80s. Irra, (1999) reported that approximately 60% of the respondents are moderately aware with some basic knowledge on MSW issues. While this is relatively satisfactory, 10% of the respondents have no knowledge and were unaware of MSW issues. The awareness generally was lacking particularly in less urbanized areas (Aziana, 2003).

In 2003, a survey carried out by Irina and Chamhuri showed that 93% of Malaysians are aware of recycling programs. However, from the number, only 28% Malaysians practiced it through source-reduction. The survey indicated that the most preferred recycling method among Malaysians is selling the recyclable materials to door-to-door itinerant buyers (72%). The survey also showed that only 20% of Malaysians were aware about waste minimization programs, which is relatively low when compared with recycling program (93%) (Irina and Chamhuri, 2003). Though implementations of recycling programs are costly and time-consuming, it can only be successful when more convincing methods reached the public (Refsgaard and Magnussen, 2009; Wada *et al*., 2009; Li'ao *et al*., 2009; Stave, 2003; Bench *et al*., 2005; Robinson and Read, 2005; Zhang, 2000).

On average, 58% Malaysians practiced home-based reuse activities such as repairing old materials, donate to others to reuse it, sell as recyclable items and reuse (e.g. usage of glass containers to store food). It is believed that awareness in waste minimization program will increase if more waste minimization facilities are provided to public and more waste minimization activities are implemented ((Refsgaard and Magnussen, 2009; Agamuthu *et al*., 2004; Lober, 1996). Therefore, it is essential to conduct studies to collect information on the possibility to improve the existing waste management.

This study was aimed to determine the level of environmental awareness among the public in the state of Selangor. It was also aimed to derive statistical correlations between educational background, gender, age and other factors with various environmental issues,

and analyzing public attitude towards the improvement of current waste management system.

5.2 Methodology of Socio-Economic Studies

5.2.1 Determination of Scope

The scope of the study involved nine (9) main areas which correspond to active landfills in Selangor in 2002 and 2003. The areas included two urban, four sub-urban and three rural landfills. Socio-economic lifestyle of people and its relationship with waste characteristics and quantity will be investigated. Information on waste generations, waste types and quantity will be correlated with the living standards of people, educational background and other factors. Waste reduction options including recycling of the waste generated will also be identified and the possibility and viability of recycling will also be examined.

5.2.2 Compilation of Background Information

Background information including population data, racial composition, and the socio-economic level was obtained from literature search and interviews with relevant authorities including the Statistical Department of Malaysia and the local authorities.

5.2.3 Socio-Economic Survey

Socio-economic survey was conducted at each study area with the use of questionnaires (Appendix 5.0) to gather information on public perception on the environmental issues and state of MSW management. Survey also involved in-person interviews with

randomly selected individuals in the corresponding areas. Random sampling was applied to prevent biased results (Green, 1979).

The questionnaires contained 51 close-ended questions and 3 open-ended questions. In order to overcome predetermined bias, the closed-ended questions were constructed based on general and current issues of waste management such as understanding of environmental problem, satisfactory of waste management system, perceptions on changes in future waste management and others. On the other hand, open-ended questions were focusing on the quantitative data such as number of occupants in the premises, size of premises and size of garbage bins. The questionnaires were distributed among 786 respondents to cover 4.1 million population. This is to provide 96% of confidence (minimum samples of 625 respondents) as indicated in Appendix 5.1 (Yamane, 1967). It gives a probability of less than 4 % or $p< 0.04$. Therefore, results of the study can be considered significant at a level of 0.04 or lower. The racial criterion was also given consideration since it was reported that there is a significant correlation between race and the attitude towards environmental issues (Irina and Chamhuri, 2003; Irra, 1999). Responses obtained were computed using Statistical Package for Social Sciences (SPSS) to derive the statistical significance and correlations of particular socio-economic factors to MSW management related issues, through Pearson Chi-square Correlation test.

5.3 Results and Discussions

The survey addressed a wide range of environmental issues regarding the management of MSW. The perception of the public from the corresponding study areas was discussed in the subsequent paragraphs. Generally, the respondents were 12 to 59 years old with the majority being males. Professionally they ranged from students to blue and white-collar workers to business personnel. Table 5.1 summarized the background information of the respondents in each study areas based on the majority group i.e. the largest percentage of the relevant categories.

Table 5.1: Brief description of the majority group among respondents of the survey

Area Studied	Age	Profession	Income	Education level
Panchang Bedena	40-49	self-employed	RM 701- RM1500	SPM/STPM
Kpg Hang Tuah	30-39	white collar workers	RM1501-RM2000	secondary education
Kundang	30-39	White collar workers	RM2001-RM3000	SPM/STPM and tertiary education
Sungai Sedu	30-49	blue collar workers	RM1501-RM2000	SPM/STPM
Ampar Tenang	40-49	white collar workers	RM2001-RM3000	SPM/STPM and tertiary education
Bukit Beruntung	40-49	self-employed	RM2001-RM3000	SPM/STPM
Kerling	20-39	white collar workers	RM2001-RM3000	SPM/STPM
Hulu Yam Bharu	20-49	white collar workers and self-employed	RM2001-RM3000	SPM/STPM
Sungai Kembong	30-49	self-employed workers	RM2001-RM3000	SPM/STPM and tertiary education

Note: SPM – equivalent to O-Level

STPM – equivalent to A-Level

1USD = RM3.80

Subsequent sections discuss the findings of the survey in detail.

5.3.1 Detailed socio-economic survey.

Findings of the socio-economic survey were analysed accordingly to generate reliable outcomes.

5.3.1.1 Reliability Test

In order to determine the consistency of the responses obtained, reliability test was applied. Analysis with Cronbach's alpha (α) was conducted to establish the reliability scale and the internal consistency of the survey. The Cronbach's α obtained ranged from 0.618 to 0.648. It indicates that results from the survey can be accepted with 96% confidence. Therefore, the results are reliable and would generate similar findings if it is to be repeated in the future (Aron and Aron, 1997).

5.3.1.2 Frequencies and Significant Test

In general, surveys conducted in urban, sub-urban and rural areas produced almost similar trends. Approximately 90% of the respondents indicated that the waste collection frequencies in their area were daily, once every two days or once every three days. In the sub-urban and rural areas, waste collection was mainly on a daily basis while in the urban areas it is on alternate days. Since most the sub-urban and rural communities are using communal bins, the collections are more frequent due to the fast accumulation of waste. These communal bins need to be attended everyday to prevent overflow of waste as compared to individual residents in urban areas. Wastes in urban areas generally were collected directly from their residence that the authorized waste collector has to cover a larger area in a day in addition to the larger number of premises to serve. As a result,

collections were done on alternate days since storing time is less than 48 hours. Hazra and Goel (2009) reported that waste collection frequencies will determine the satisfactory of the public on certain waste management services.

Plastic Garbage Bags

Approximately 50% of the respondents used plastic bags to dispose their MSW while others used rattan basket or plastic bins. Among the three areas, the lowest usage of plastic bags as waste storage was in rural areas. Less access to plastic bags among the rural inhabitants as compared to people living in the urban and sub-urban areas probably has slightly reduced its usage for waste storage. On the other hand, the concept of shopping for groceries in bulk among urbanites and the sub-urbanites provides large size plastic bags which become very handy to be used as garbage bags. While limited supply of plastic bags among the rural inhabitant reduce the quantity of its usage, the abundant plastic bags in sub-urban and urban area made it convenient as a method to amass waste prior to its disposal from a household. The high usage of plastic corresponds to the MSW composition in Malaysia which consists of 11% plastic (Fauziah and Agamuthu, 2009; Agamuthu *et al*., 2004). It was reported that disposal of plastic into landfill and lack of plastic recycling will result with detrimental effects to the environment (Wada *et al*., 2009).

Waste Separation Practice

For waste separation practice, the highest frequency (68%) was among the rural respondents followed by the sub-urbanites (42%) and urban dwellers (26%) as illustrated

in Figure 5.1. Living in the rural area probably made it reasonably convenient to conduct waste separation as compared to the hectic urban life. In addition, rural community tend to dispose their MSW on their own land because of the availability of space for burning or burying. The survey indicated a significant correlation between gender and waste separation practice where more female respondents in sub-urban (0.191) and rural (0.127) areas practiced waste separation than the male respondents. This is possibly because females generally are more involved in household chores than the males that waste separation has become a routine task for them.
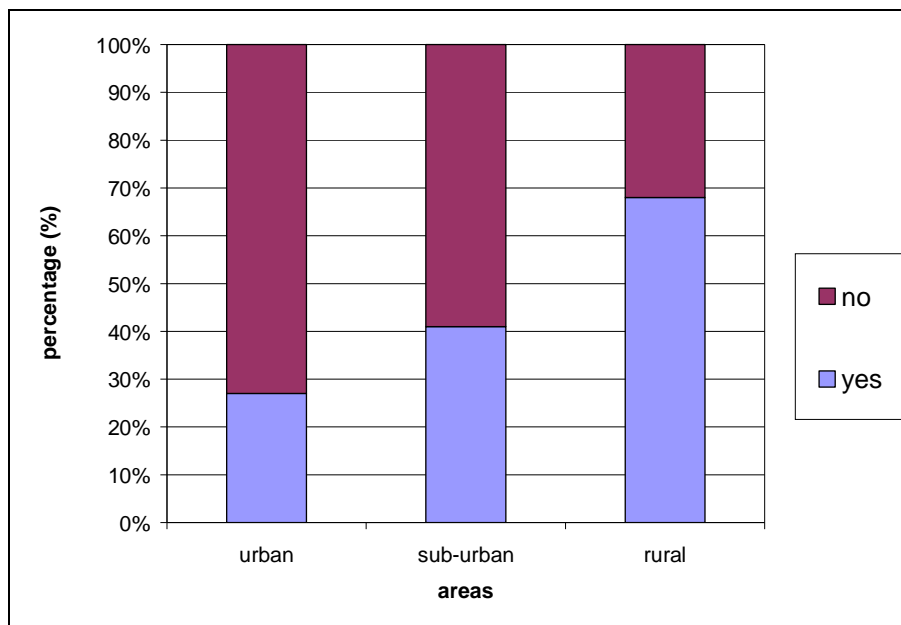

Figure 5.1: Percentage of respondents who separate their waste versus different level of urbanization

The study also indicated a significant correlation between waste separation and race of the sub-urban respondents (0.231) indicating that non-Malays are more susceptive in waste separation than the Malays. This is agreeable with the findings of a survey in Kuala

Lumpur by Irra (1999) where the non-Malays were more involved in source separation than the Malays. Based on the percentage of urban respondents with different income level, a significant correlation was derived (0.224) with waste separation practice. In urban area, respondents with high income tend to be involved in waste separation more than the low-income group. This probably contributed to the fact that high income group can afford to utilize goods which are easily separated for recycling purposes. In addition, high-income household normally hires maid that waste separation is taken care by the maid (Fauziah and Agamuthu, 2005a). Among the urbanites, significant correlation (0.195) was derived indicating that more of the older generation involved in waste separation as compared to the younger generation. This probably is due to the awareness among the adults to separate their waste for the convenience of the waste collector.

Kitchen wastes were the most frequently generated waste. The majority of the respondents (85%-92%) produced kitchen waste on a daily basis. This corresponds with the findings on the high percentage of food waste (approximately 60%) observed in previous findings (Fauziah *et al*., 2004; Agamuthu *et al*., 2004). Cardboard, plastic bottles, glass wastes, aluminium cans, textile waste and rubber based wastes were occasionally discarded by 82%, 49%, 85%, 52%, 81% and 97% of the respondents, respectively. The generation of these recyclables is agreeable with studies that found that recyclables are present in high percentage in the rural MSW (Choy *et al*., 2002; Agamuthu and Fauziah, 2005). The high generation of various recyclables would be beneficial if the waste were separated accordingly.

Knowledge on Waste Disposal

The knowledge on waste disposal option was highest among the sub-urban respondents (82%) followed by rural and urban respondents (77%). Figure 5.2 illustrated that only a small group (18 - 23%) did not know anything about the disposal of their waste and think that their responsibility ended when the appropriate authorities collect the wastes.
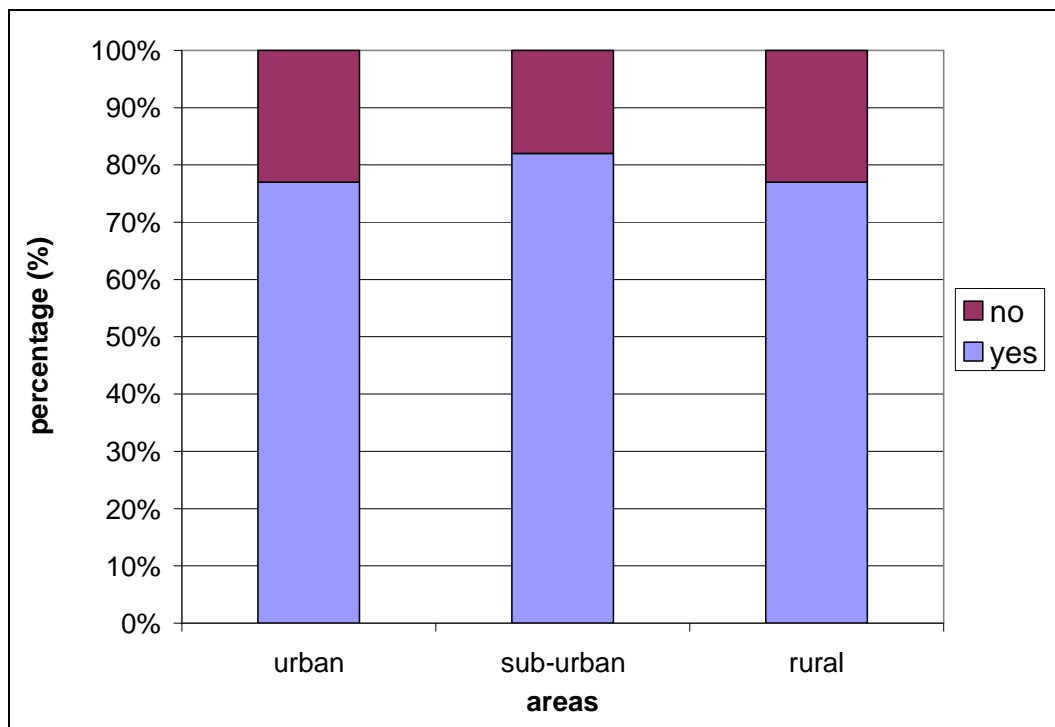

Figure 5.2: Respondents knowledge on waste disposal option.

Even though a minority of the respondents lacked knowledge on waste disposal, all respondents knew that the waste collector was responsible to manage and collect the waste from their areas. This probably contributed to the fact that people will only get themselves involved if their welfare is at stake (Refsgaard and Magnussen, 2009; Liu and Kondo, 2008; Myatt *et al*., 2003; Gouveia *et al*., 2004; Al-Yaqout *et al*., 2002). Highest percentage of knowledge on waste disposal activities was among the sub-urbanites

(82.8%), probably due to the presence of disposal site within the area. With distance, location, land value and other factors to be taken into consideration, sub-urban site generally is the most cost-effective area to locate a landfill (Kontos *et al.*, 2005; Agamuthu, 2001; Westlake, 1997; Zeiss and Lefsrud, 1995). As a result, sub-urban dwellers will be more aware of the waste disposal activities.

Correlation (correlation coefficient= 0.259) between knowledge and income level was significant among the rural respondents indicating that lower income groups have better knowledge on waste management systems than those of higher income. This probably was due to the fact that lower income groups are more involved in waste management activities including recycling that they are more aware of the issues. This knowledge was also found to be significantly correlated to race among the urbanites with Pearson's Chi Test (0.225).

Findings also indicated that approximately 74-87% of the total respondents were serviced by Alam Flora (P) Ltd. (AFSB), a private consortium responsible for managing waste in the areas. 13- 22% were managed by private contractors appointed by AFSB or the local authorities. AFSB was appointed by the Ministry of Housing and Local Government of Malaysia (MHLG) for the central region where this study took place (Mohamed Siraj, 2000).

In terms of waste management efficiency, majority of the respondents (88%) found that the waste collection system was satisfactorily efficient. Among the sub-urbanites, 89%

found the system efficient while among the urbanites, only 88% agreed. This probably was due to the frequent collection service provided by the waste collectors. As a result, MSW was left unattended for a very short time, which is highly convenient for the waste generators' comfort. Only 12% claimed that the service was not satisfactory. The satisfactory level was found to correlate significantly (0.137) with race where more Malay respondents were satisfied with the existing collection efficiency than the non-Malays. However reverse correlation was derived among the urban respondents. In urban area, more non-Malays find the service satisfactory than the Malays. This was probably due to the fact that Malay residences' are located in areas with lower service frequency. Also obtained was a significant correlation between satisfaction in waste collection and gender. Sub-urban (0.220) and urban (0.184) females were more satisfied than their male counterparts. This might be contributed by the higher expectation of the male group that the current service was not satisfactory. Previous study indicated that among Malaysians, females tend to be content with the available services if it is appropriately provided (Irra, 1999).

Pay As You Throw (PAYT) System

With regards to Pay As You Throw (PAYT) system, 52 to 59% of the respondents think that PAYT system is fair. Approximately 46 to 57% agreed with its implementation while 24% to 43% disagreed as indicated in Figure 5.3. The highest disagreement (43%) was among the rural respondents probably due to the fact that they generate larger quantity of waste which comprised of garden or yard waste. With the implementation, they would pay extra fees for the bulk of the wastes. It is agreeable to the findings in

many studies that people would strongly object proposals that would affect their livelihood particularly in the economical aspects (Li'ao *et al.*, 2009; Wada *et al.*, 2009; Gutrich *et al.*, 2005; Pavlikakis and Tsihrintzis, 2003; Myatt *et al.*, 2003; Al-Yaqout *et al.*, 2002). The slightly high percentage of positive responses among the sub-urbanites was probably due to the fact that their generation of waste is reasonably low. This was proven with the lower generation of MSW daily by the sub-urbanites (Fauziah and Agamuthu, 2004).
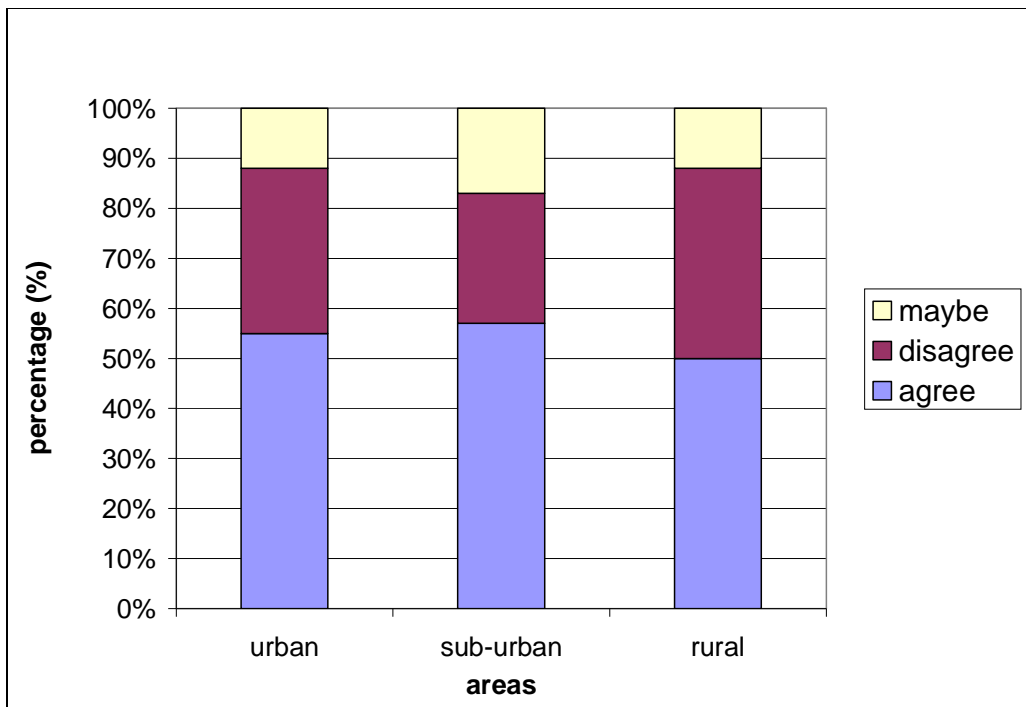

Figure 5.3: Response to the implementation of PAYT system

Among the rural respondents, the high-income groups were more supportive toward the PAYT system as compared to the low-income group. The correlation between the total income of respondents and the acceptance of PAYT system was significant (0.112). This was generally contributed by the affordability of the respondents to the system. Studies

found that individuals with better economical state would perceive new changes better than individuals with unstable financial position (Refsgaard and Magnussen, 2009; Wada *et al*., 2009; Lober, 1996; Gutrich *et al*., 2005). As for age, adult respondents were more positive towards PAYT system as compared to the younger group. This probably contributed by the fact that these groups feel the PAYT system is inappropriate in the country.

Approximately 40-50% of the respondents agreed that PAYT will encourage the public to reduce the waste volume while 60% disagreed or were unsure. Respondents with higher education level agreed more that PAYT will reduce waste generation, particularly among the sub-urban and the urban communities. This indicated that respondents from the higher education group were more positive that extra charges will encourage people to minimized the MSW generation. It is agreeable with the reports by Wada *et al*. (2009) and Li'ao *et al*.(2009).

It was also found that more of the low income groups agree that PAYT system would reduce waste generation. This is significant among the sub-urban and urban respondents. High income groups are less agreeable to the statement possible because they feel there are many other factors that contribute towards the rate of waste generation. It is agreeable as previous findings indicated that waste generation was not solely effected by the economic level but also depended on factors such as culture, social attitude, climate and others (Refsgaard and Magnussen, 2009; Rathi, 2005). A correlation (0.139) was also

significant between age and the agreement that PAYT system would reduce waste generation indicating more of the older generation agreed to the statement.

Approximately 43- 52% of the respondents think that it would be unfair to pay according to the weight of the waste they generate. This was probably because they generate large volume of waste that if the system is implemented, the charges they have to cover would be extremely high and inconvenient for them. These groups who were not in favour of PAYT system generally are from the business and commercial sectors. On the other hand, 48 - 57% felt that the system is fair as the waste generator should be responsible for the mass of waste generated. More of the older generation think that PAYT is not fair to waste generators probably due to the fact that their waste generation was higher and their exposure to alternative waste management activities were only limited to direct disposal to landfill. The younger generation generally would have better understanding on other options in waste management including reuse, reduce and recycling that they feel it is appropriate and fair to charge a waste generator according to PAYT system as there are various methods to reduce waste generation and waste disposal. Similarly, more of the educated respondents think that PAYT system is fair (correlation coefficient = 0.180). Knowledge is evidently crucial as to improve current waste management so that the implementation such as PAYT system is workable. The correlations were agreeable with findings of previous studies (Graham *et al*, 2009; Rathi, 2005; Siebenhand and Winkler, 2000; Wang, 2000; Irra, 1999; Lake *et al*., 1996).

With numerous recycling campaigns in the country, only 82-88% of the total respondents knew the meaning of recycling with urban people being the highest (Figure 5.4).
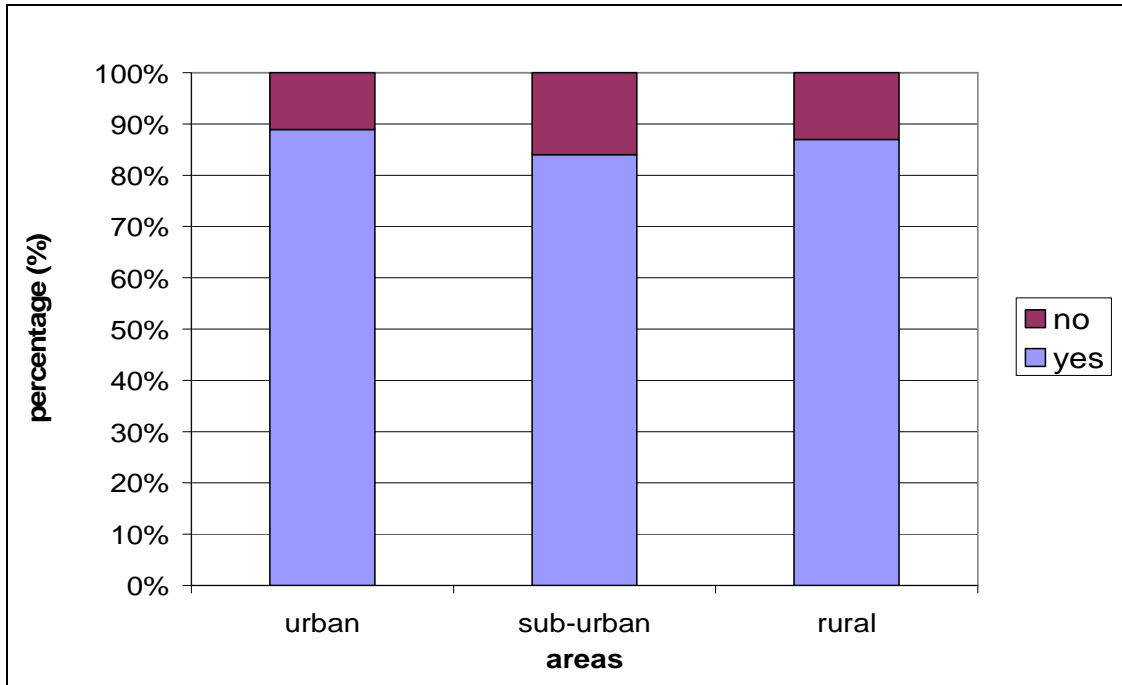

Figure 5.4: Respondents who knew the meaning of recycling.

As much as 12-18% of the respondents did not know the meaning of recycling, which indicates the need for more serious and intensive campaign on recycling and other related issues. This was similarly observed in studies by Irina and Chamhuri (2003) that the majority of public knew the meaning of recycling while a small percentage has no understanding of the issue. Significant correlations were derived between age of rural (0.151) and sub-urban (0.333) respondents, and their knowledge in recycling. This indicates that younger respondents have better knowledge in recycling. This was probably contributed by campaigns and teachings in schools and learning institutions. This is agreeable to findings obtained from previous survey conducted in Klang Valley and other parts of the world (Graham *et al.*, 2009; Wada *et al.*, 2009; Irra, 1999).

Among the sub-urbanites, females have better understanding in recycling than the male respondents. This is also agreeable with previous findings by Irra (1999). Women were more aware of environmental issues including recycling as compared to their male counterpart (Irina and Chamuri, 2003; Irra, 1999). More of lowly educated respondents knew the meaning of recycling compared to those with higher education (correlation coefficient = 0.209). This is somewhat contradicting with the findings by Irra (1999). This was probably attributed to that fact that highly educated people normally are well paid that they are less involved with recycling activities (Graham *et al*., 2009). On the other hand, the lower education group with insufficient income tends to recycle more as to generate some side-income by selling certain materials. Their direct involvement in recycling activities generates more understanding in the concept of recycling as compared to those without (Li'ao *et al*., 2009). This corresponds with the correlation of total income of respondents and the understanding of recycling concept (correlation coefficient = 0.168) indicating that low-income groups have better understanding in concept of recycling as compared to the high-income group. This is particularly true since in the hectic urban environment, low-income group sell recyclable materials to generate extra side-income to sustain life in cities (Hazra and Goel, 2009).

Recycling Practices

Even though 88% of the respondents from the urban zone knew the meaning of recycling, only 60% practiced it, while 40% are not involved in recycling activities (Figure 5.5). This was most probably due to the "not bothered" attitude among the public. Similar

findings were also obtained from survey conducted among the public in Klang Valley and Malacca (Aziana, 2003; Irra, 1999).
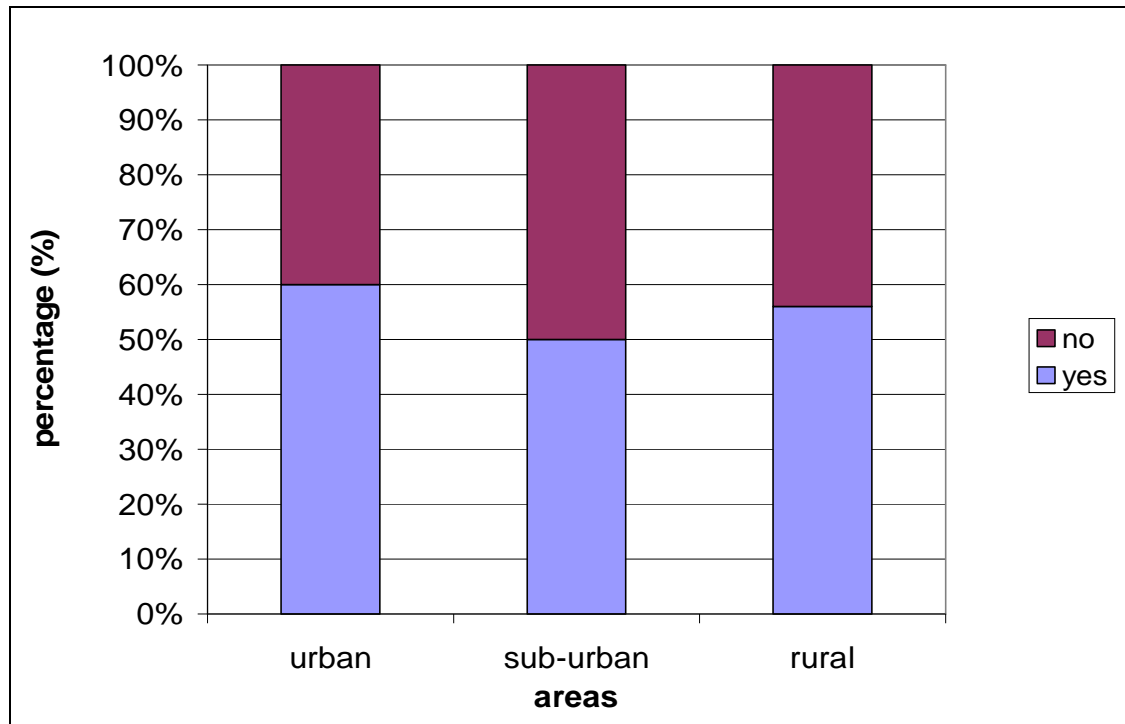

Figure 5.5: Respondents practicing recycling.

The percentage of respondents practicing recycling was obviously much lower as compared to the knowledge on recycling. This probably contributed by the fact that knowledge does not necessarily create awareness and motivation to pursue recycling activity (Refsgaard and Magnussen, 2009). Particularly, when facilities provided were insufficient (Graham *et al*., 2009; Lober, 1996). Respondents who practiced recycling were highest among the urbanites which accounted up to 60%. This could be due to the availability of more recycling centres in urban areas as compared to other places. Even though recycling was highest among the urbanites, the percentage of respondents that practice waste separation was the lowest.

The correlation between level of education and the practice of recycling among the sub-urbanites was significant (0.205). It indicated that respondents with lower education level practiced more recycling than those of higher education level. This was found to be contradicting with previous study by Irra (1999). The low recycling activity among the higher educational level probably discouraged by time constrain where more time is spend to work and recycling is not convenient (Li'ao *et al*., 2009).

Significant correlations were derived between age and recycling practices among rural (0.180) and sub-urban (0.199) respondents. It indicated that more of the younger generation practiced recycling as compared to the older generation. This could be influenced by the campaigns and environmental talks launched at schools and other learning institutions. Again, knowledge and awareness were found to promote improvement in a waste management system, aligned with findings from most studies (Refsgaard and Magnussen, 2009; Rathi, 2005; Siebenhand and Winkler, 2000; Wang, 2000; Irra, 1999; Lake *et al*., 1996). Also obtained from this study was a significant correlation (0.130) between race and recycling practices among sub-urban respondents. More Malays practiced recycling as compared to the non-Malays. This was probably to generate extra income for the household.

The correlation between gender of the rural respondents and the recycling of aluminum is significant (0.137) indicating that female respondents recycled more cans than the male respondents. A similar observation was obtained from the survey among the sub-urban respondents. This perhaps was contributed by the factor where household cleaning

normally is conducted by females that the responsibility to recycle is taken by them. In addition to that, a significant correlation (0.168) was also derived between race and recycling of aluminum cans among the urbanites where more of the non-Malays are involved than the Malays. Due to the lifestyle of the non-Malays to serve and have canned drinks at home resulted with them generating more aluminum cans which can be translated to higher recycling of aluminum cans among this group as compared to the Malays. Also indicating significant correlation is the level of education and the recycling of aluminum cans (0.153) where more of the less educated urbanites recycle aluminum cans than the educated respondents. Factors which might be preventing this practice among the highly educated people are the lack of recycling facilities and lack of appropriate motivation to do so (Refsgaard and Magnussen, 2009). The trend is similar to that observed among the sub-urban respondents (0.299). This was probably due to the good demand for aluminum cans (Agamuthu *et al.*, 2004).

Recycling of newspaper was significant (coefficient = 0.139) for gender and level of education among sub-urban and urban respondents, respectively. More females recycled newspaper than their male counterparts possibly because they are the ones responsible for housekeeping that it would be convenient for them to collect and recycle it. Among the urbanites, the educated groups recycle less newspaper. As observed for the aluminum cans recycling trend, inconvenience becomes the main set-back. Also, the unattractive returns for selling newspaper may discourage this activity among those of higher education since time is also a major constrain.

The correlations between glass bottles recycling and income level are significant among rural (0.196) and urban (0.266) respondents indicating that more of the low income respondents recycled more glass bottles than the high income respondents. This could be caused by the necessity to generate extra income among the low-income group that the practice was somewhat encouraged (Agamuthu *et al.*, 2009a) However, due to the unsatisfactory monetary returns from recycling of glass bottles, it is not favoured by the high income groups. Correlation between races and recycling of glass bottles was significant (0.128) signifying that more of the Malays recycled the items as compared to the non-Malays. Significant correlations were derived between age and recycling of glass bottles among the rural (0.117) and urban (0.260) respondents. The correlations indicate that more of the older generations recycled glass bottles compared to the younger generation. This was possibly caused by the previous trends in the 70s where glass bottles were returned back to manufacturers to be reused that the habit comes more naturally for the older generation to recycle glass bottles. Reused of glass bottles were widely practiced throughout the globe in the 70s and early 80s (Waite, 1996).

Similar to the recycling of glass bottles, significant correlations (0.240) were derived for plastic bottles indicating that low income groups recycled more plastic bottles than the high income group in sub-urban areas. In addition to that, the less-educated groups were found to recycle more plastic bottles than the more educated groups. This was probably due to time constrain where the highly educated were more immersed in work that less time is available to actually participate in sorting and sending off recyclables to recycling centers (Li'ao *et al.*, 2009). Among the urbanites, significant correlations (coefficient =

0.181) were derived between the recycling of plastic bottles and races. It implied that more of the non-Malays were involved in recycling of plastic bottles compared to the Malays. This was probably encouraged by the increase in price for plastic with the increase in petroleum. The good price of plastic in the market profited those who recycled plastic materials such as plastic bottles.

Significant correlation was also derived from recycling of plastic bags and total income. Among the urbanites, the correlation (0.206) implies that recycling of plastic bags increase with the income level. Generally this is possible since the higher is the income the higher is the purchasing power of an individual. Therefore, since Malaysian commercial facilities still provide plastic bags to their customer it will result with more abundant plastic bags to be recycled. It is also significantly correlated with the age of respondents where this practice increased with the increase in age (0.162). Among the sub-urbanites, recycling of plastic bags was correlated to the races (0.171) of the respondents. More of the non-Malays were found to be involved in the recycling of plastic bags than the Malays. The correlation between plastic bag recycling and education level was also significant (0.154) among the sub-urbanites implying that more of the less educated people recycle plastic bags as compared to the more educated people. This could be resulted from the fact that less-educated people were more involved in recycling activities as to generate extra income that they are more involved in recycling of plastic bags. Besides that more of the educated groups tend to refuse plastic bags when shopping as to prevent and reduce plastic usage in the country as the awareness and environmental consciousness has increase among this group (Liu and Kondo, 2008). It is agreeable to

findings of Irina and Chamuri (2003) and Aziana (2003) that reported the increase in environmental awareness among the educated group resulted with reduction in plastic bag usage.

Establishing more recycling centers

Approximately 65% of the respondents agreed that more recycling centers should be established in order to promote recycling activities while approximately 27% strongly agreed. Establishing more recycling stations would create convenience for the public to participate (Refsgaard and Magnussen, 2009). Respondents of higher education were more agreeable with the establishment of more recycling centers than respondents of lower education level. The correlation is 99% significant (0.317) probably contributed by the fact that the higher their education level, the more they understand the importance of having more recycling facilities. This is agreeable with results obtained by previous studies (Fauziah and Agamuthu, 2005; Irina and Chamhuri, 2003; Irra, 1999). The increase in facilities to manage and collect recyclables not only promotes recycling activities but would also help to improve the economy of the participating individuals. It was proven by previous studies that recycling can be promoted with appropriate facilities in order to create an environment whereby the public find it convenient and comfortable to participate (Refsgaard and Magnussen, 2009; Read, 2005; Fahmi, 2005; Muller *et al*., 2002; Bulle, 1999; Wegelin and Borgman, 1995). Convenient environment encouraged recycling activities that it is no longer a hassle to an individual to willingly participate for an unlimited time.

Willingness to separate waste for recycling purpose

The willingness to separate waste for recycling was 44 to 60 %, illustrated in Figure 5.6.
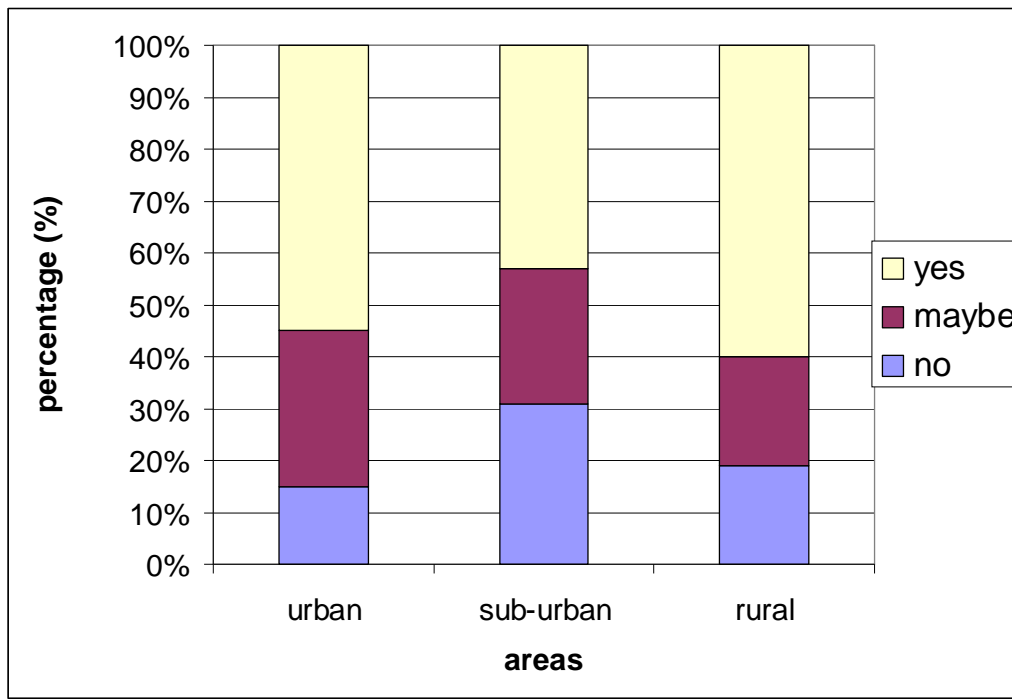

Figure 5.6: Respondents who agree to separate their waste for recycling purpose.

Approximately 21% was not sure while 29% clearly stated that they are not willing to separate their waste as separation activities would be tedious and time consuming. Again the issue of attitude was involved when it comes to extra effort required for a good purpose. This was probably due to the fact that the wastes produced by some of the respondents were separated by others like their parents, spouse, or housemates. Among the sub-urbanites, willingness to separate waste for recycling purpose is significantly correlated to gender (0.177). The correlation shows that more females are willing to separate their waste than the male group. Factors which influenced this finding could be

time availability and convenience among the females particularly those who spend most of their time at home.

Willingness to change to environmental friendly products

In order to ensure the sustainability of the environment, there is the need to utilize environmental friendly product so that the quality of the environment will not be degraded with unfriendly or toxic products. Environmental friendly products generally are more costly than the common merchandises (Winter and Davis, 2006; Kotchen, 2005; Garcia-Gil *et al*., 2000). Therefore, questionnaires were also given to determine the level of willingness of the respondents to pay extra for environmental friendly products. Approximately 27 - 43% of the respondent in the three areas are willing to pay more for environmental friendly products. Slightly smaller percentage (25- 43%) refused to allocate more money on these products while approximately 30% was not sure about their decision and refused to pay extra for such products as that would somehow affect their budget. It was proven that acceptance of changes will decrease with the involvement of financial factor (Graham *et al*., 2009; Lober, 1996; Gutrich *et al*., 2005).

Results indicated significant correlations between income level and the willingness to use environmental friendly products among the rural (0.108), sub-urban (0.133) and urban (0.164) respondents. It indicated that the higher the income of the respondents, the higher is the willingness to buy environmental friendly products. This is possible with the affordability of this group as compared to low income respondents in purchasing environmental friendly products such as organic food and others. Besides being

environmental friendly, these products normally are more expensive and healthier since it lacked unnatural and toxic material (Winter and Davis, 2006; Kotchen, 2005; Garcia- Gil *et al.*, 2000). It is affordable for high income people with high health consciousness that indirectly promote the usage of environmental friendly products. Among the sub-urban and rural respondents, age was also found to be correlated to the willingness to buy environmental friendly products. This generally could be attributed to the fact that as age increased the capability to earn higher salary also increased that purchasing more expensive goods is possible. It is a fact that people of higher income are willing to pay more if it means that their life could be of higher quality (Otoniel *et al.*, 2008; Zhang, 2005; Lancaster *et al*, 2005, Lober, 1996; Al-Yaqout *et al*, 2002).

Extra charges for plastic bags

Since plastic bags were one of the non environmental friendly products, respondents were asked if they are willing to pay extra on plastic bags as a way to reduce its wide usage in the country. The willingness to pay extra on plastic bags was found to be quite low indicating respondents' attitude towards issues related to allocating more money. Approximately 35- 42% disagreed with the proposition as indicated in Figure 5.7. This again shows the "not bothered" attitude among the public especially when it involved some extra 'charges' (Lober, 1996).
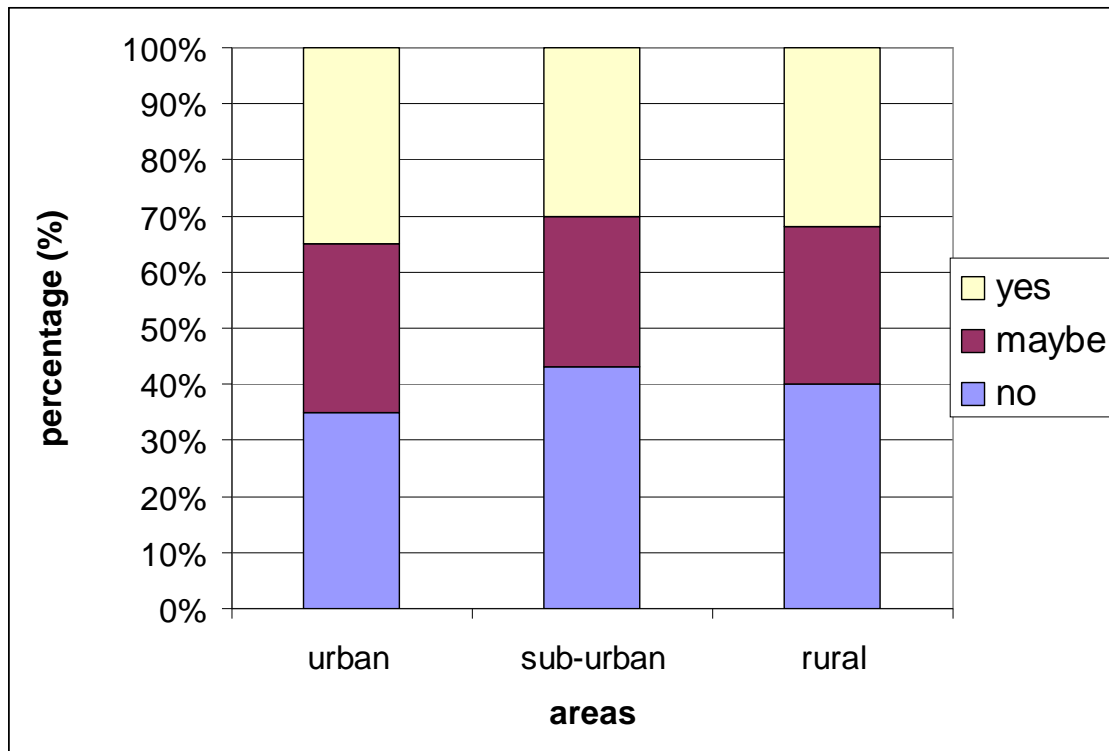
Figure 5.7: Response to impose extra charges on plastic bags.

A small percentage (35%) agreed and was willing to pay extra on plastics bags as they feel it would reduce the excessive and uncontrolled usage of plastic bags in the country. The correlation between total income of respondents and the support to pay extra charges on plastic bags is significant (0.130) among the rural respondents. The correlation indicates that the higher the total income of the respondents, the higher the support on extra charges of plastic bags. This is so because this group can afford to spend more money so that they are able to enjoy a healthier environment. Results also indicate significant correlation between age and the support on extra charges of plastic bags (0.192) among the rural respondents. The factor could be the fact that being young, the teenagers are unable to spend more money for the extra charges (Wada *et al*., 2009).

While this is not affordable among the youngster, the adults find it reasonable to take in the charges as to improve the quality of the environment.

Race is also found to be correlated to the support on extra charges of plastic bags where among the rural respondents (0.111). It signifies that more of the non-Malays are supportive of the proposal as compared to the Malays. Since more of the non-Malays are involved in the commercial sector, they probably deal with the usage of plastic that they feel unnecessary in their trades. Females were found to be more supportive of this proposal as compared to their male counterpart. This probably is because women are more involved in buying goods for the household that they may realize the abundant use of plastic bags sometimes are unnecessary (Bakewell and Mitchell, 2006). Therefore, as a method to avoid the over-usage and uncontrolled plastic bags accumulation, it should be charged. In addition, the implementation of appropriate policies is necessary to control the presence of plastic in MSW disposal (Slack *et al.*, 2009, Otoniel *et al.*, 2009).

The majority of the respondents knew that plastics were non-degradable and it will stay intact even after a very long time after disposal into landfills. Only a small percentage (7%) (Figure 5.8) were not aware of the situation.
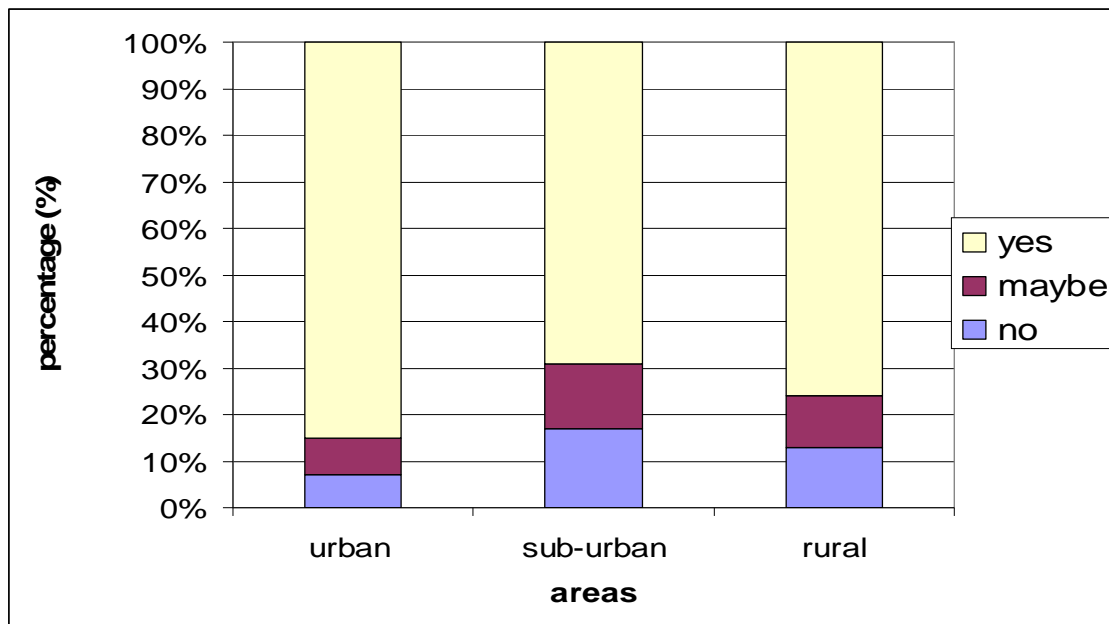
Figure 5.8: Knowledge that plastics are non-degradable.

The correlation between total income and the knowledge that plastic is non-degradable was significant among the sub-urbanites (0.197). It indicated that more of the high income respondents knew that plastic bags are not degradable in landfill. High income respondent possibly can obtain more knowledge from various sources that they are aware of more environmental issue including plastic unchanged characteristic in landfill environment.

Implementation of degradable plastic bags usage

As plastics are non-degradable, suggestions to implement the use of biodegradable plastic bags were included in the questionnaires. The suggestion to implement the use of degradable plastic bags was supported by approximately half of the total respondents

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participated in the survey as shown in Figure 5.9. The majority 45-63% agreed with the idea of replacing non-degradable plastic bags with the degradable plastic bags.
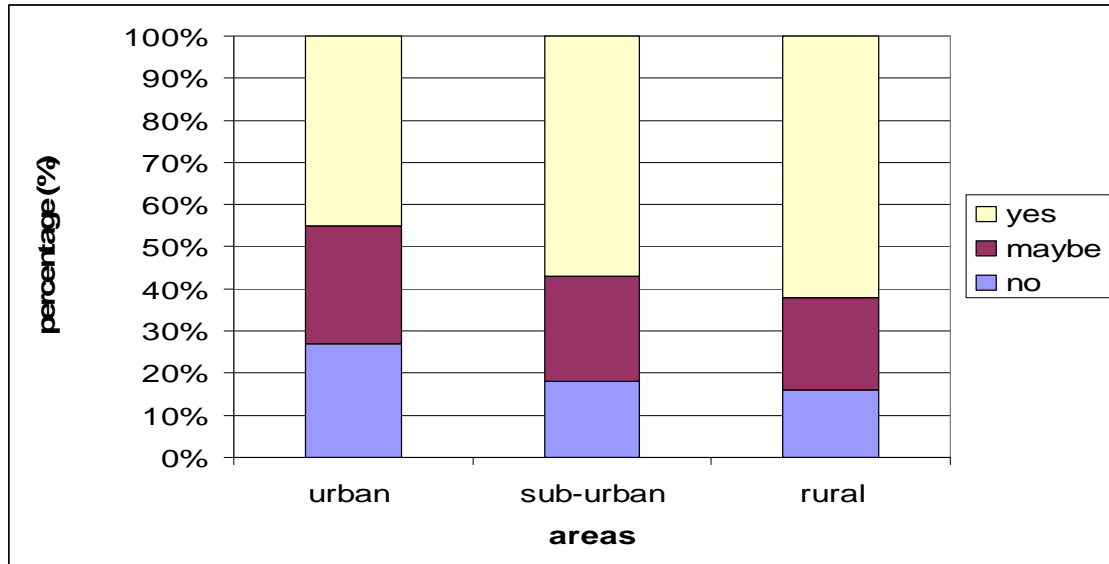

Figure 5.9: Support on the implementation of degradable plastic usage.

Only 16 – 26% disagreed with the idea of the using degradable plastic bags while the remaining 20% was not sure. This probably is because certain groups of people are slow to accept changes which contradicts their normal habits (Graham *et al*., 2009). Among the sub-urbanites, younger respondents were found to be more supportive in the usage of degradable plastic bags than the older respondents (0.177). This was probably contributed by their exposure to campaign and knowledge on the disadvantages of plastic bag usage. The correlation between gender and the respondents' support on the implementation of degradable plastic bags was significant (0.198). Female respondents were more supportive of the implementation of degradable plastic bags than the male respondents. This was probably because females tend to be involved in buying groceries that they realized the huge quantity of plastic waste generated. In terms of level of education, the

educated respondents were more supportive towards the use of degradable plastic than the less educated respondents. This generally would be due to the fact that people with higher education tend to be more aware of the environmental issues. It corresponds with previous findings by Irra (1999), Refsgaard and Magnussen, (2009), and Aziana (2003). Race and income level were also found to be significantly correlated to the support of implementing degradable plastic bags. Between the races, Malays were found to be less supportive than the non-Malays while the high income groups were supportive of the proposal. Based on income level, people of higher income would find the usage of degradable bags affordable that they are more supportive.

The responses distinctively changed when the proposal of degradable plastic bag usage involved government intervention. The statement "if government implemented the use of degradable plastic bags as mandatory" was found to be agreeable by the respondents. Approximately 70% of the respondents agreed to buy and use the degradable plastics bags if the government is making it mandatory, while 30% were unsure as shown in Figure 5.10. It indicates that government intervention is necessary as to obtain positive change among the public (Slack *et al.*, 2009).
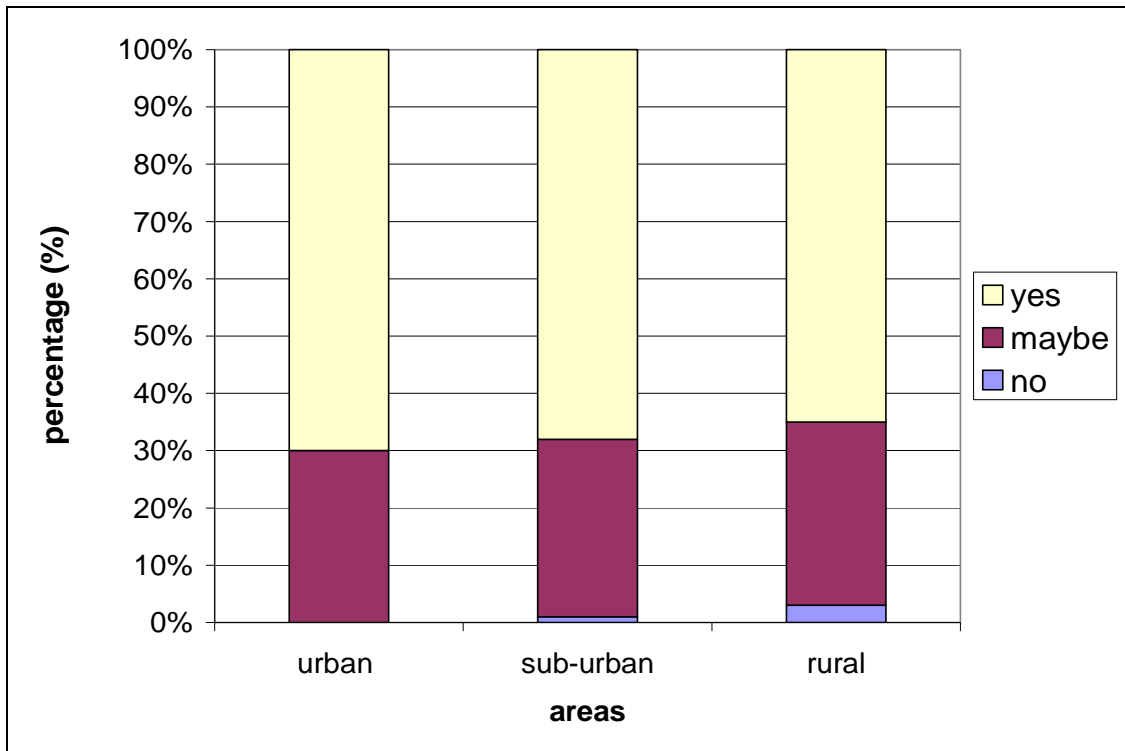
Figure 5.10: Support to buy and use degradable plastic.

Less than 30% of the respondents were unsure or disagreed to support if it is required by law. This negative respond probably contributed by the fact that it is considered as an economic burden. Among the urbanites, a 99% significant correlation was derived between the level of education with willingness to support government's implementation of degradable plastic bag usage. The correlation is significant (0.232) the educated respondents were more supportive of the motion than those less educated. This is agreeable to previous findings that respondents with education showed better participation in environmental issues (Refsgaard and Magnussen, 2009; Irra, 1999; Myatt, 2003). The correlation between total income of the respondents and the support of government's implementation to make use of degradable plastic bags mandatory was also significant among the urbanites (0.144) signifying that respondents with higher income

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are more supportive. Among the sub-urbanites, increase in age was significantly correlated with the proposal (0.169) while gender was found to be correlated with rural respondents. More of the female respondents were more supportive that their male counterpart to use degradable plastic bags if it is compulsory. This indicated the necessity of government intervention in order to improve the current waste management system (Slack *et al*., 2009). The lack of policy on solid waste management is a major set-back that delayed the improvement of waste management in most country (Agamuthu *et al*., 2009a). Many studies had proven that policy and regulations is one of the most effective method to ensure the participation of the public and promote moral acceptance (Refsgaar and Magnussen, 2009; Gutrich *et al*., 2005; Gouveia *et al*., 2004; Myatt *et al*., 2003; Robertson and McGee, 2003; Al-Yaqout *et al*., 2002).

5.4. An Overview of the whole study state of Selangor

In general, majority of the public preferred to dispose their waste using plastics bags. This is contributed by the fact that plastics bags are widely available in Malaysia at a very minimal cost (Mohamad Isa, 1997). Issues regarding presence of high percentage of plastic bags are being seriously discussed by many developing countries (Liu and Kondo, 2008; Tinmaz and Demir, 2006; Fourie, 2004; Mgaya and Nondek, 2004) including Malaysia (Agamuthu *et al*., 2004; Fauziah *et al*., 2004).

As observed in MSW composition of other developing countries, kitchen waste generation was quite high at a more frequent rate (Swati *et al*., 2008; Fauziah and

Agamuthu, 2009; Fauziah *et al*., 2004). Similar to some developed countries like UK and Denmark, kitchen waste contributes 17-22% of the total MSW (Riber *et al*., 2009; Bench *et al*., 2005). This biodegradable portion of the MSW was sent directly to landfills for disposal without any conversion into compost or biogass. The disposal of kitchen waste into landfill without alternative routes caused loss of resources (Odum and Odum, 2006; Haberl, 2006; Tinmaz and Demir, 2006; Fauziah *et al*., 2004, Hoonweg, 2000). Other materials including rubber, textile, and glass were occasionally generated by most respondents from all areas caused more loss of recyclable component to the ultimate disposal.

The survey indicated that very low percentage of respondents practiced waste separation. This was probably due to waste separation activities not being practical in urban and sub-urban areas which were considered more 'hectic and restless' areas compared to the rural (Li'ao *et al*., 2009). This is agreeable with studies conducted in the UK (Read, 2005). Also, previous studies indicated that changing the attitude of the public towards better environmental practice were costly and challenging, particularly among urbanized society (Graham *et al*., 2009; Zhang and Wang, 2005; Bench *et al*., 2005; Zhang, 2000; Scharff, 2000; Hoonweg, 2000).

Overall, survey indicated that 72% of Chinese practiced waste separation which encouraged the recycling activities, while among Malays and Indians, only 67% and 64% conducted waste separation, respectively. However, Malays are still the highest group

among all races that separate their waste at approximately 53%. The responses of waste separation practices within the different races are illustrated in Table 5.2.

Table 5.2: Cross-tabulation of waste separation activities among respondents (% responses)

Races	(Within races)	
	Yes	No
Malays	66.9	33.1
Chinese	72.0	28.0
Indian	63.9	36.1
Others	31.3	68.8

The correlation analysis was found to be insignificant that it could be stated that waste separation practices does not correlate with race as observed in previous survey (Irina and Chamhuri, 2003; Aziana, 2003; Irra, 1999). A significance correlation derived indicated that more females conduct waste separation as compared to their male counterparts. It is agreeable with the findings by Irra (1999) among the Klang Valley respondents. Total income was significantly correlated to waste separation (coefficient = 0.136) which indicated the higher the income the more positive is the waste separation practiced among the respondents. This is generally true since the high income group normally have maid and assistant to help them with the house chores.

Generally, most respondents (76%) possessed some knowledge on waste disposal system. Race and knowledge on waste disposal is significantly (0.111) indicating that more of the non-Malays have higher knowledge as compared to the Malays. It was probably due to the focus given in schools where Malay schools expose less environmental issues to the

students as compared to the non-Malay schools. Chinese and Tamil schools in Petaling Jaya for example have established environmental clubs which educate and expose the students to various environmental concepts. Also, additional environmental issues were broadcasted in Tamil and Chinese such as "Edisi Siasat Mandarin" that will not reach the Malay audiences.

The public perception of the current waste management system among urbanization level is shown in Table 5.3. Respondents from sub-urban and rural areas are more content with the waste collection efficiency than those from urban areas. This is probably due to lower frequency of waste collection as reported by Irra (1999). In addition, the fact that urbanites normally demand for a flawless waste management system makes it more difficult to achieve their satisfaction.

Table 5.3: Perception of current waste management system (% of responses)

Efficiency of waste collection system	Likert scale			
	Very efficient	Efficient	Inefficient	Mean score
	(1)	(2)	(3)	(1-3)
Urban area	28.3	60.0	11.7	1.8
Sub-urban area	38.8	48.8	12.4	1.7
Rural area	41.4	46.6	12.0	1.7

Significant correlations were derived between gender and age of respondents with the satisfaction of waste management system. It was found that more of the females are satisfied with the current waste management system as compared to their males counterparts (0.152). This could be due to the high participation of females, particularly

housewives, in managing and disposing waste generated from a household that current system practiced by the waste manager was reckoned to be efficient. Increase in age was significantly correlated to the increase in satisfaction of waste management (0.110). It indicated that the older generation found the current waste management system satisfying while the younger ones think it is otherwise. Generally, with more exposure from campaigns and educational talks conducted in schools, the younger generation is more aware on environmental issues that they expect better service from the waste managers.

Pay as you throw (PAYT) system, a new concept for most Malaysians was surprisingly agreeable to most respondents from all areas. More than half of the total respondents supported the implementation of PAYT system in order to improve the existing waste management. A similar observation was also obtained from survey conducted among public in China (Zhang, 2000). This again proved that the public are getting more and more willing to face changes in their life including in their normal consumption pattern to improve the environmental quality (Graham *et al*., 2009; Refsgaard and Magnussen, 2009; Zhang, 2000; Lancaster *et al*., 2005, Lober, 1996; Al-Yaqout *et al*., 2002). PAYT was found to be more agreeable to the low income groups as compared to the high income group (0.097), probably due to the fact that the low income group feels that they generate lesser amount of waste and PAYT system will not be an issue.

On the other hand, not as many agreed that the PAYT system would reduce waste generation. Only less than half of the total respondents felt that the system would reduce waste accordingly as waste generators are charged in proportion to the quantity of waste

they produced. Again a significant correlation was derived (coefficient = 0.092) where more of the low income groups felt that PAYT system would help reduce waste generation. This could be attributed to the fact that the low income earned they would practically be more cautious in generating waste so that the fees paid could be minimized. This indicated the effect of 'carrot and stick' concept which might be effective in improving the current waste management system (Wada *et al*., 2009; Lancaster *et al*., 2005; Lober, 1996).

More than half of the total respondents felt that the PAYT system would be fair to all 'users'. The perception of PAYT system is shown in Table 5.4.

Table 5.4: Public consent on the PAYT system (% of responses)

	Likert scale			
	Totally agree (1)	agree (2)	disagree (3)	Mean score (1-3)
Implementation of PAYT system	53.7	13.7	32.1	1.6
PAYT system reduce waste generation	46.7	21.9	31.4	1.8

From the Likert scale, most of the respondents agreed with the implementation of PAYT system. A significant correlation (0.158) indicated that the younger generation was more positive towards the fairness of PAYT system. It is due to the high awareness among younger generation that they understood that PAYT system better than the older generation. The environmental campaigns launched by the government and NGOs at schools was found to be effective in increasing awareness among the younger generations

(Aziana, 2003; Irra, 1999). The majority of the respondents also agreed (Likert scale = 1.8) that PAYT system would reduce the generation of waste.

The survey indicates that more than 86% of the respondents understood the meaning of recycling with 46% agreed that waste separation can promote recycling activities (Table 5.5).

Table 5.5: Public perception on recycling issues in all areas (% of responses)

	Likert Scale		
	No (1)	Yes (2)	Mean score (1-2)
Understand the meaning of recycling	13.7	86.3	1.8
Waste separation promotes recycling	54.0	46.0	1.5

This is so as over the years, appropriate ministries in Malaysia had launched campaigns to promote awareness especially in recycling program (Saeed *et al.*, 2009). As a result significant correlation was derived where younger generation was found to be more aware on recycling as compared to the older generation. The high awareness among the respondents from this study corresponds with previous studies (Irra, 1999; Agamuthu *et al.*, 2004a). Unfortunately, the practice on recycling activities were quite low (Agamuthu *et al.*, 2009a; Irra, 1999; Irina and Chamuri, 2003; Agamuthu *et al.*, 2004). The public from sub-urban areas were less responsive than those of the urban and rural areas. It indicates that changes in the perception of recycling activities are generally slower among the sub-urbanite and more convincing efforts should be implemented. This observation was found to be similar to other studies that high awareness level among public will not

necessarily show a high rate of recycling activities (Refsgaard and Magnussen, 2009; Robinson and Read, 2005; Read, 2005). A significant correlation (0.124) was obtained from the survey indicating that more of the younger generation involved in recycling activity as compared to the older generation. This was generally due to the high awareness among the youngster on the recycling concept indicated earlier.

High percentages of positive responses were obtained from the proposal to improve the recycling facilities, indicating that the majority of the public are willing to face changes. With the recycling facilities stationed at proper locations, more public would find it convenient for them to participate in the recycling activities (Li'ao *et al*., 2009). Significant correlations were derived between total income and education level of the respondents, and support for more recycling facilities. It indicated that the positive increase in income and educational level resulted with increase in the support to establish more recycling facilities. It indicates that more are willing to face changes in order to improve their living standard and to reduce impacts on the environment. Similar trends were observed among the public in Hong Kong and China (Li'ao *et al*., 2009; Zhang, 2005). More facilities for recycling will promote and encourage the recycling activities among the society (Refsgaard and Magnussen, 2009; Hazra and Goel, 2009; Lancaster *et al*., 2005; Agamuthu *et al.,* 2004a; Fauziah *et al.,* 2004; Zhang, 2000).

In general, more than 50% of the respondents from all areas are willing to pay more for environmental friendly products. This is so, as many felt that the step would promote better environment and in time curb the environmental degradation (Wada *et al*., 2009;

Bench *et al*., 2005; Zhang, 2000). A significant correlation (0.134) was obtained between age of the respondents and the willingness to pay more for environmental friendly products signify the increase in the willingness to pay more with the increase in age. However, from the Likert scale, the willingness to spend more money on environmental friendly products was very strong as it ranged between totally agreed and agreed. It could be contributed by the enthusiasm among the respondents to change and adopt a more environmental friendly way of living (Graham *et al*., 2009). The perception among the public concerning the improvement of the environmental quality, is shown in Table 5.6.

Table 5.6: Issues of the improvement of environmental quality (% of responses)

	Likert scale			
	totally agree (1)	agree (2)	disagree (3)	mean score (1-3)
Willingness to spend more for environmental friendly products	35.9	31.1	33	1.9
Plastic is non-degradable in landfills	74.9	11.4	13.7	1.3
Impose extra charges on plastic bags	31.5	28.3	40.1	2.1
Replace the use of non-degradable with degradable plastic bags	56.8	24.1	19.0	1.6
Implementation by government to make the use of degradable of plastic bags a mandatory	67.3	30.8	1.9	1.3

Most respondents knew that plastic is non-degradable in the landfills. A significant correlation (0.126) was obtained indicating that respondent knowledge on the non-

degradability of plastic increases with the increase in their education. Again, knowledge plays an important role as to create awareness to public in order to improve environmental consciousness (Refsgaard and Magnussen, 2009). As a counter-measure to reduce the usage of plastic and reduce plastic disposal into the landfill, most of the respondents moderately agreed that some charges should be imposed on plastic. Likert score of 2.1 indicated that even though majority agree with the scheme, it lack enthusiasm from the respondents. This was probably due to the fact that most Malaysians have other uses for plastic bags including as garbage bags, that extra charges means more money to spend to obtain plastic bags. Reluctance among the public was very evident when it involved their livelihood and economy (Liu and Kondo, 2008; Gutrich *et al*., 2005; Pavlikakis and Tsihrintzis, 2003; Myatt *et al*., 2003; Al-Yaqout *et al*., 2002).

The support to replace the conventional plastic bags with degradable plastics was quite strong where Likert score were 1.6 (moving towards total agreement). A correlation was observed from the study indicating that females are more supportive to replace non-degradable plastic with degradable plastics (0.128). This is possible because females are more aware of the abundance of plastic bags that the fact that it is non-degradable made it hazardous for the environment in the long run. The willingness to follow the regulation on degradable plastic bags imposed by the government was very strong indicating that more of the respondents would support the scheme if it is made compulsory (Slack *et al*., 2009). Studies had proven that the needs of stringent regulation and appropriate policy are very crucial in order to encourage and ensure public participation (Refsgaard and

Magnussen, 2009; Slack *et al.*, 2009; Malkow, 2004; Agamuthu *et al.*, 2004; Grodzińska-Jurczak, 2001; Subramanian, 2000; Rao *et al.*, 2000; Irra, 1999).

5.5. General Discussions

The survey has succeeded in investigating the level of environmental awareness among the public in Selangor, Malaysia. The awareness existed but more steps should be taken to increase it particularly on MSW related issues. The correlations of the socio-economic aspects of the population with the issues like waste separation and practice of recycling are significant indicating the public's positive perceptions on the matters.

From the survey, it is quite clear that most people are aware of related environmental issues. However, the roles they played were very limited. Most were found to be interested to participate in activities such as recycling if recycling facilities are available in their area. Nevertheless some were very adamant and prefer not to agree on certain obvious issues such as the disadvantage of plastic bag usage. This is to the extent of being un-corporative especially when it requires them to spend more money, indicating the presence of "not bothered" attitude.

The possibility of implementing waste separation for recycling purposes as a waste reduction strategy is available with good responses obtained from the survey. The current public participation in certain environmental activities such as recycling and waste separation normally is based on personal benefits rather than environmental concern.

5.6 Conclusion

In general, the public in Selangor has some knowledge of the environmental issues particularly on waste management. However, the involvement in waste separation, recycling and utilization of environmental friendly products were very low, (less than 50%). Basically economy influenced the involvement of the public in recycling. Participation in recycling activities was mainly to generate extra income for the household that the market price of recyclables determined the recycling rate. On the contrary, recycling can be promoted with the implementation of appropriate regulations. Survey indicated that the public are more willing to participate if recycling and others are made mandatory.