

Investigating Households Attitude Toward Recycling of Solid Waste in Malaysia: A Case Study

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ABSTRACT: This paper investigates householders' attitudes to the recycling of solid wastes in one part of northern Malaysia, namely Alor Setar town, Kedah State. A postal questionnaire survey was administered to households in Alor Setar town in selected areas of high, middle and low incomes. 389 responses were obtained, a response rate of 86.4%. A personal interview with an official of the Municipal Council of Alor Setar was conducted in order to identify the current situation of solid waste recycling and household participation as well as obtaining views on the recycling campaigns carried out by the Malaysian government in 1993 and 2000. The paper indicates that participation in recycling of household waste relies on the level of awareness and understanding of recycling. Improved education and increasing the accessibility of recycling facilities are the best means of promoting positive attitudes to recycling attitude, partly because they help to remove barriers preventing households from recycling. Households in Alor Setar town have identified some of the effective strategies that can be initiated by the government to increase the rate of recycling in Malaysia which would also encourage them to participate in recycling. One of these strategies was providing recycling bins in every residential area.

Key words: Attitudes of Householders, Recycling, Solid Waste, Questionnaire Survey, Malaysia

INTRODUCTION

Solid waste management (SWM) is defined as the control of waste generation, storage, collection, transfer and transport, processing and disposal of solid wastes (SW) consistent with the best practice of public health, economics and financial, engineering, administrative, and legal and environmental considerations. Solid waste generation is one of the three major environmental problems faced by municipalities in the world. Generally, it is positively related to the level of income and urbanization, with higher income and more urbanized economies generating higher levels of solid wastes per capita (Table 1). Malaysia, with a population of over 26 million in 2007,

generates about 17,000 tones of domestic waste daily, which is sufficient to fill up the Kuala Lumpur Twin Towers in nine days (Sunday Mail, 2005). In 1998, Malaysia generated about 5.5 million tones of SW of which a quarter was produced in the Klang Valley alone, the most affluent area in Malaysia. In 1995, per-capita generation rates averaged 0.77 kg/person/day. These rates are expected to increase steadily as the Malaysian economy grows. Solid waste generation for 2000 was estimated at 3.9 million tones with 1 Kg per capita daily. Some urban areas in the country have already generated MSW as high as 1.2 kg per person per day – close to figures for the major high-income economies. In Malaysia,

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to date, there is not any single agency responsible for SWM. Legally, SWM is under the control of state governments – the State Local Government Division. The main agencies implementing SWM are the local authorities. The Local Government Department in the Ministry of Housing and Local Government provides policy and technical guidance to local authorities. Related agencies include the Department of Environment (DOE) and the Town and Country Planning Department. There is also no comprehensive legislation on SWM in Malaysia. Existing legal frameworks involving SWM are the Local Government Act, 1974; Environmental Quality Act, 1974; Streets, Drainage, and Building Act, 1974; and the Town and Country Planning Act, 1976. A Parliamentary Solid Waste Act has been formulated and it is proposed to amend all the above acts. Part of the proposal includes the transfer of responsibility of SWM from state to federal government. In Malaysia the local government authorities have been responsible for the SWM service. However, over the years, lack of infrastructure, inefficient institutional setup, and weakness in financial and technical resources, has led to an inadequate and inefficient level of provision at various stages. These contrast with the increasing waste

generation rates and rising environmental awareness among the general public. To reduce the burden facing the local governments, a privatization process was initiated in 1996 with the aim of attaining an integrated and efficient management system to enhance environmental quality through resource re-use and waste minimization. Privatizing MSW management became an integral part of the national privatizing program. Under the program, the government directly awards national infrastructural projects to business entities with long-term operating concessions. SWM was expected to be fully privatized in 2001 where four major private waste service providers would be given a 20 years concessionary period for MSW management. The current privatization mode is regarded as a transition period pending the approval of the proposed Parliamentary Solid Waste Act.

Recycling has gained increasing attention as a means of protecting the environment since it offers one of the most sensible solutions both economically and ecologically for managing waste. For this reason, the Malaysian Government through the Ministry of Housing and Local Government launched a national recycling campaign in 1993.

Table 1. 1995 and 2025 Urban Municipal Solid Waste Generation in Asia

Country	GNP per capita (1995 US\$)	GNP per capita in 2025 (1995 US\$)	Current Urban	2025 Urban	Current Urban MSW Generation (Kg/capita/day)	2025 Urban MSW Generation (Kg/capita/day)
Low income	490	1,050	27.8	48.8	0.64	0.6-1.0
Nepal	200	360	13.7	34.4	0.50	0.6
Vietnam	240	580	20.8	39.0	0.55	0.7
Mongolia	310	560	60.9	76.5	0.60	0.9
India	340	620	26.8	45.2	0.46	0.7
China	620	1,500	30.3	54.5	0.79	0.9
Sri Lanka	700	1,300	2.44	42.6	0.89	1.0
Middle income	1,410	3,390	37.6	61.1	0.73	0.1-1.5
Indonesia	980	2,400	35.4	60.7	0.76	1.0
Philippines	1,050	2,500	54.2	74.3	0.52	0.8
Thailand	2,740	6,650	20.0	39.1	1.10	1.5
Malaysia	3,890	9,400	53.7	72.7	0.81	1.4
High Income	30,990	41,140	79.5	88.2	1.64	1.4-4.5
Korea Republic	9,700	17,600	81.3	93.7	1.59	1.4
Hong Kong	22,990	31,000	95.0	97.3	5.07	4.5
Singapore	26,730	36,300	100.0	100.0	1.10	1.1
Japan	39,640	53,500	77.6	84.9	1.47	1.3

Source: World Bank. What a Waste: Solid Waste Management in Asia. May 1999

Yet, despite significant efforts, recycling has not become a universal way of life in Malaysia. Over 100 million tones annually of solid waste could be recycled, but instead is discarded and land-filled. Malaysia spent RM37.4 million (8.11645 million Euros) to collect and dispose of its urban rubbish in 1990 (Ministry of Science, Technology and the Environment) with a total amount of 877 million pounds or an equivalent of 546 kg/person/year. The government decided to re-launch the recycling campaign again in 2001. This time more money was used for publicity and for educating the public. Several community groups and NGOs also took an active part by spearheading recycling programs and the collection of reusable materials. However, seven years after the re-launch, the result is comparatively still the same (Abdelnaser et al., 2006 a, b). So the question remains “why did the recycling campaigns fail?” Despite the high potential, only 5% of the total waste is being recycled (Department of Environment, 2005). In interview the head of the department of the recycling program in the Municipal Council of Alor Setar (MCAS) in the town of Alor Setar asserted that *‘the majority of households do not understand and respect the waste collection schedule of the private [waste collection]*

company and there is a lack of co-operation from the households to make the town clean’. Various activities have been implemented by the government (through the Department of Local Government, Ministry of Housing and Local Government) to increase awareness of the importance of household participation in recycling. Several advertisements and radio ‘jingles’ have been aired on television and radio channels as an effort to increase awareness of this issue. In addition, various NGO’s have also been involved in these recycling campaigns. For example, many ‘recycling days’ were organized at various levels involving the end users/general public. Programs were organized in housing estates, schools and shopping complexes. These programs were normally overseen by local politicians or Members of Parliament. However, despite the effort and money spent, the campaigns have failed to inspire the public due to a lack of support from householders and the need for longer term education and awareness campaigns that will change public attitudes (Ong, 2003). This paper investigates this need as part of an investigation into the attitude of householders towards the recycling of solid wastes in Alor Setar town in Kedah State (Fig.1).

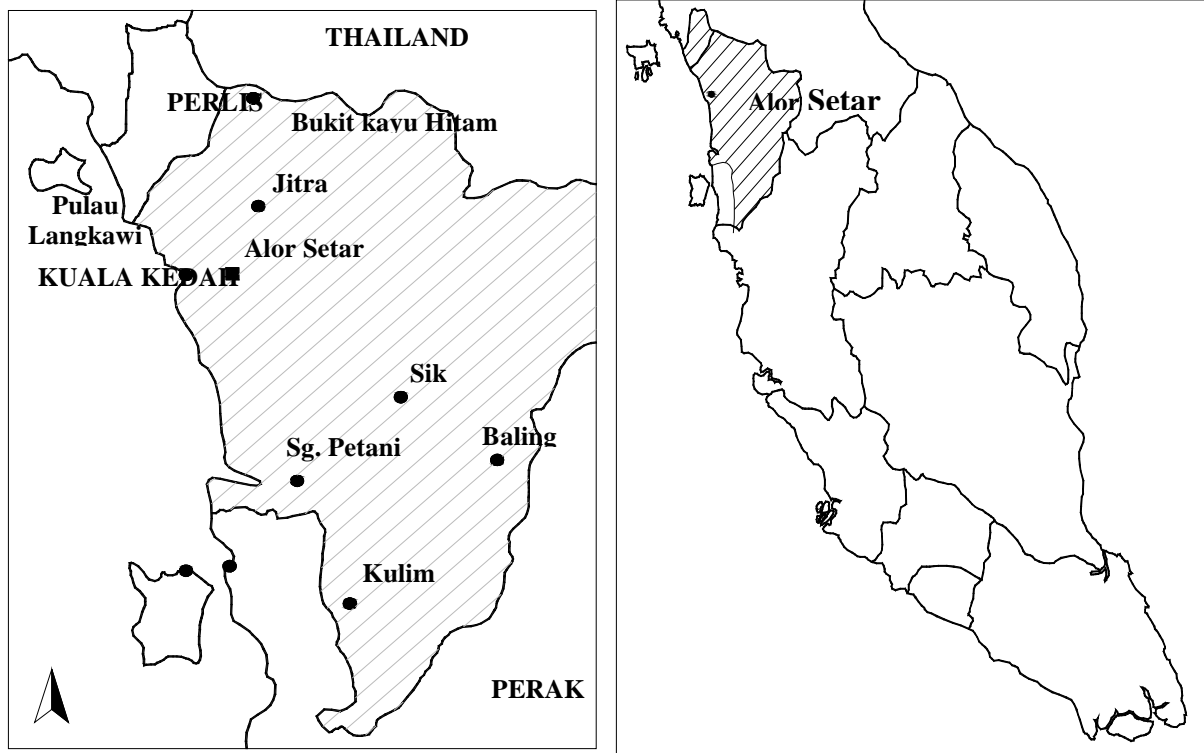


Fig.1. Alor Setar town and Kedah

Knowledge of the existence of recycling program and the knowledge required complying with the rules and regulations of this program are thought to be the basic issues that prevent individuals from participating. Salhofer and Isaac (2002) showed the importance of public relations in recycling strategies. They believed that public relations could be used as a tool to educate and motivate individuals into participating in recycling programs. As Salhofer and Isaac (2002) pointed out, public relations activities must aim at specific target groups in order to obtain promising results; therefore public relations projects must be planned carefully and professionally, and include an analysis of the target group and choice of media. In many cases there is plenty of government support and encouragement for recycling but limited public participation in recycling. Why does this discrepancy exist? Researchers have found a number of reasons. Hornik et al. (1995) did an extensive meta-analysis of 67 empirical studies on recycling and indicated several variables that might affect recycling behavior. Two basic types of variables were identified: incentives for social behavior and facilitators (or barriers) to social behavior. These can be either internal or external to the individual. Analysis by Hormuth et al. (1993) of recycling by apartment dwellers suggested two inter-related strategies for facilitating day-to-day recycling. One was to use conveniently located containers and the other was to embed recycling in the ongoing behavior stream of food preparation and clean-up. A similar idea, although from a different theoretical perspective, was proposed by Zimmerman (1989). In his examination of effective self-regulation, Zimmerman said that people need to figure out how to organize their environment so that it supports desired behaviors. He used an open-ended questionnaire to ascertain how participants organized their recycling to find out whether manageability contributes to desired behavior. Vining and Ebreo (1990) defined social influence as the concern over how friends and family might perceive one's recycling behavior including the presence or lack of support. This social influence can be powerful enough to sustain the recycling behavior. DeYoung (1986) found that feeling good about doing something good for the environment had a strong influence on recycling. Recycling is a behaviour which can require

considerable effort on the part of the individual as household waste must be sorted, prepared and stored (Boldero, 1995). Consequently the recycling decision is likely to be complex, and a number of factors may be taken into consideration. However, convenience is one of the factors that researchers have looked at. Nyamwange (1996) found that making recycling more convenient could be an effective motivator. Furthermore, the motivational factors behind recycling attitude and behavior have also been heavily researched in several studies, which have sought to isolate specific traits that can be attributed to recycling participation. Bratt (1999) emphasized the need to understand the influences of consumer environmental behavior and to identify variables that predicted such behavior. The study concluded that the social norm, which is the consistent behavioral patterns of a majority of individuals surrounding the individual, provided no link to behavior. It was striking, though, to note that in the findings of Oskamp et al. (1991), they identified peer pressure as an important predictor or motivational factor of recycling behavior. This means that when in the presence of others, the subjects were inclined to make more socially responsible decisions, especially when peers actually recycled. With respect to the factors that encourage selective collection, social influences and altruistic and regulatory factors are some of the reasons why certain communities develop strong recycling habits (Vining and Ebrero, 1992; Ewing, 2001). The major drawback, on the other hand, is the effort needed (Oskamp *et al.*, 1991), the space needed (Vining and Ebrero, 1990; Boldero, 1995) and cost (Ewing, 2001). Curbside recycling is one way to overcome inconvenience and facilitate recycling. Boldero (1995) argues that recycling behaviour is likely to be influenced by situational factors such as the amount of effort involved, inconvenience, storage space and access to recycling schemes. In view of the significance of these factors in Boldero's study, a measure incorporating situational factors was included within the model. Thomas (2001) emphasized the importance of public understanding in determining participation rates. Attention is correctly drawn to the success issues; not how many householders participate but how constantly and effectively they do it. Evison and Read (2001) reiterated the

importance of local authority awareness and promotion campaigns; poorly designed and implemented campaigns will mean that participation rates will continue to remain low. A survey by MORI (2002) reported that in the UK, although a very high proportion of householders (more than 60%) claimed that they recycled, the evidence suggested that this self-reported behavior was an exaggeration, the actual proportion being much lower. More concerning is the recognition that a significant minority (10–15%) never recycle in any circumstances. Tucker and Speirs (2002) have developed a model to forecast recycling participation rates as well as material capture rates. They point out that while recycling rates are low there is, however, a range of cost-effective ways to obtain and sustain high participation and capture rates; these include well designed information campaigns for convenient collection systems. They rightly point out that high convenience in recycling schemes is often associated with high information and operational costs and they stress that such high-cost schemes need to be underpinned by a range of activities to ensure cost-effectiveness. Parfitt (2002) concluded that there are a number of factors that drive increasing municipal waste arising. These include: demographics, increased consumer spending, behavioral changes and changes in waste management practice. Garcés et al. (2002) noted that environmental awareness and knowledge of the environmental impact of urban waste were factors that helped determine an individual's recycling behavior. McDonald and Oates (2003) probed the reasons for non-participation in curbside collection and produced sound guidelines on the need for in-depth audit of the given area before collection schemes are designed. The importance of socio-economic factors and their effect on recycling rates are emphasized by Emery et al. (2003). The authors demonstrate that it is vital to have accurate data on household purchasing trends and waste composition before effective local strategies can be produced. The problems with the recycling of green waste in MSW collection is explored by Williams and Kelly (2003). The lack of participation in this waste stream is a complex, multifaceted issue that requires much on-going research. Educating individuals about how, what, and where to recycle is important. However,

individuals who are skeptical or have an external locus of control (Rotter, 1954) may believe that their participation in recycling would not make a difference. These individuals may need more persuasion to recycle. Thus it is vital that individuals are aware of the reasons for recycling and the positive impact that recycling has on the environment. Tonglet et al. (2004) suggest that pro-recycling attitudes are the major contributor to recycling behaviour, and that these attitudes are influenced firstly, by having the appropriate opportunities, facilities and knowledge to recycle, and secondly by not being deterred by the issues of physically recycling (for example time, space and inconvenience). The effectiveness of awareness-raising campaigns relies upon improved understanding and higher participation by the public in the recycling services (Read, 1998, 1999). In their study, Garcés et al. (2002) concluded that when a recycling programme is thought to be supported by sound environmental policies and is felt to be organized and controlled by good management, it has a positive influence on individual recycling behavior. The study also proposed the idea that the amount of effort required to participate in a program was a major barrier for those wishing to diminish their environmental impact but unwilling to go to any extra lengths to comply with governmental initiatives. Therefore responsibility is placed on the government to implement effective program that consider the needs of individuals and the environment. As a side note, Guerin et al. (2001) also studied the reaction of citizens after gauging the effectiveness of the government in managing environmental problems. People who believed that their government was making a reasonable effort to protect the environment were more inclined to adopt environmentally friendly behavior. If individuals perceive that recycling is an important issue, perhaps because of their knowledge of proactive decisions taken by the government, they will invest their time and effort in a recycling program (Guerin *et al.*, 2001). It was decided by Jaslo City officials in Poland that a similar approach could prove worthwhile in the Polish context. However, the results do not parallel those that have been previously suggested (that the motivation of the householder is a function of socioeconomic factors) (Grodzińska-Jurczak *et*

al., 2006). Researchers suggest that high rates of recycling participation appear mainly in areas where householders are better educated and financially secure and where the requirements of basic needs have been fulfilled (Tikka *et al.*, 1999).

A recent study by Perry and Williams (2006) highlighted that it is essential to understand the recycling profile of ethnic minorities and to ensure that their participation in recycling schemes is encouraged. Their results have indicated that this can be achieved by providing written information in ethnic minority languages and conducting presentations and focus-groups at religious or cultural centers in ethnic minority languages. Bolaane (2006) highlights the potential constraints to promoting people-centered approaches in recycling and recommends some strategies that could mitigate these constraints. His study is based on a case study of Gaborone, Botswana, and used household and key-informant interviews. The study found that, even though municipal officials in Gaborone are aware of the potential benefits of recycling, they appear not to embrace waste management reforms such as municipally organized recycling schemes. Williams (2005) has argued that local authorities should be required to produce municipal waste management strategies via a two-stages process that focuses on operational issues and is based upon the strategies and aims already developed and published by central government, and that central government should develop tools to assist local authorities to evaluate and select their strategic waste management options and produce implementation plans. A recent review by Imam *et al.* (2008) has examined in detail the attitude of the people in Abuja City. They found that people in Abuja have a poor attitude towards waste management. People who handle waste are regarded as dirty, poor and inferior, and carrying household waste to bins is often regarded as a duty only for children. Efforts have been made by both the government and the private sector in Abuja to increase public awareness of solid waste management issues, and there have been televised discussions on waste management. The side effects of improper waste disposal have also been well publicized. However, most people still do not appreciate that improving environmental quality is not just the responsibility of the government and that the individual also has an important role.

Alor Setar is the major and capital town of Kedah State with population about 400,000 in 2006 according to the Department of Statistics. It is located in the north-western part of Peninsular Malaysia in Kedah state. At the local government level, the town has one local authority, namely the Municipal Council of Alor Setar (MCAS). The per capita solid waste generation in Alor Setar town is roughly estimated at 0.85 kg/day in 2006, and the generation rate of solid waste is estimated at between 200-250 tonnes/day (MCAS, 2007). Currently, three types of collection system are employed: the first is house-to-house collection by push cart. The households leave their bins on the roadside in advance of the specified collection time. After collection, the owners take the empty bins back inside the house. Curbside collection is common in low-rise housing areas, which include terraced, semi-detached and detached houses, and single and double storey houses. The second way is to collect the waste at communal bin centers, especially at public markets and food centres. However, in this system, the householder takes the waste material from the household to the collection point. The collectors will collect the waste from the communal storage.

This system is commonly used in high-rise apartments and condominiums and also flats. The third way which is more applicable for high-rise apartments or flats in Malaysia (Razman, 1995) is Roll-to-Roll-off bins (RORO) or Reel-End Loaders (REL) which is also provided in Alor setar as an alternative way to collect the waste. The Municipal Council of Alor Setar use compactor Lorries and open Lorries (RORO) whereas 75% is own collection (by the Municipal Council of Alor Setar) and 25% is done by the appointed contractor. Even though Alor Setar town provides a free service for the collection of household waste, there are still many illegal dumps (MCAS, 2007). Solid wastes stored in containers are collected and transported to the sole sanitary landfill (level 3), which is the only option that is undertaken for the management of solid wastes. In fact, level 3, means Sanitary landfill with leachates recirculation system. The local authority has started to build another one (MCAS, 2007). Details about the landfill site are shown in (Table 2).

Table 2. Details on landfill site in Alor Setar town, Kedah State

Service area	666 KM ²
Disposal amount	200-250 tonnes/day
Subject solid waste	Domestic, industrial, garden building and commercial waste.
Landfill area	74 acres (29.94 ha)
Service period	25 years old
Former land use	Rubber plantation
Future land use	Recreational area
Land owner	State government

However, the estimated percentage of solid waste for domestic, commercial, municipal (garden waste, cleaning, markets), institutional, and industrial (non-hazardous) uses vary, as can be seen in (Table 3). The list of details on the operating landfill site in Alor Setar is summarized in (Table 2). The MCAS collected a total of 250 tones of MSW. In the new landfill area, wastes are disposed, spread and compacted in an uncontrolled manner and cover material is not applied regularly. Recycling practices are limited to those carried out by the scavengers. There is no data on the number of scavengers or on the amount of materials they salvage. Scavengers salvage glass, plastics, metals, papers and cardboard, but have no facilities or equipment for sorting valuable materials from the solid waste. Unfortunately, they suffer health problems and injuries due to dust, and the presence of broken glass and sharps. The local authority in Alor Setar is currently preparing some activities to operate a recycling campaign relating to solid wastes. Initially this will begin through local schools by distributing approximately 80-90 recycling bins in different areas in Alor Setar. These facilities are actually provided by the Federal Government through the Ministry of Housing and Local Government. There is only one private company in Alor Setar town which was appointed by the Municipal Council of Alor Setar (MCAS) to collect and manage the wastes/recyclables and only one NGO to practice recycling of solid waste. These two sectors are not so effective to promote real recycling of solid wastes. This could be attributed to the fact that they have not been actively raising awareness on

recycling through print media and the radio and among the households in general.

Table 3. Waste disposed (by type) in Alor Setar town, Kedah State

Type of the waste	% of waste disposed
Domestic waste	40%
Commercial waste	25%
Municipal waste	10%
Institutional waste	5%
Industrial waste	20%

Source: MCAS (2007)

MATERIALS & METHODS

A postal survey (questionnaire) was used in the study to gather information as this is the accepted standard for conducting social surveys, though postal surveys are often hindered by having low response rates (Read *et al.*, 1997). Respondents were given a list of questions ranging from personal and social background information to level of income and educational achievements. 450 questionnaires were distributed within a five-month period from 1st of August to 31st of December 2006. The strategy used was to distribute the questionnaire in randomly selected areas in Alor Setar town to represent high, middle and low incomes areas. The response rate was very good, with 389 useable questionnaires (86.4%) received and analyzed. Attributes recorded in the study included gender, age, race, education, income, family size and living area unit (Table 4).

The survey contained three sections. Data obtained included information on households' awareness of recycling activities and campaigns, participation in recycling, facilities provided, perception as to success of the recycling campaigns and how to improve this issue. All data were analyzed using SPSS (version 11.5 for Windows) software. Additionally, Microsoft Excel version 2003 was also used to draw the Figures. An interview was carried out during January 2007 with the Head of the Department of Recycling and Waste Management in Alor Setar, focusing on problems in collecting solid wastes from the streets and in the gardens of the town. This examined whether there are enough facilities

Table 4. Distribution of respondents based on race, age, gender, educational level, occupation, income level and house type

Demographic	Respondents no. and percentage
Race	
Malay	(210) 54%
Chinese	(178) 45.8%
Indian	(1) 0.3%
Age	
Under 26 years old	(163) 41.9%
26-34 years old	(37) 9.5%
35-44 years old	(112) 26.8%
45-44 years old	(16.2) 6.3%
55-59 years old	(14) 3.6%
Gender	
Male	(318) 81.7%
Female	(71) 18.3%
Educational level	
Primary School	(18) 4.6%
SRP/PMR/LCE	(48) 12.3%
SPM/MCE	(118) 30.3%
STPM/STP/HSC	(61) 15.7%
College	(4) 1%
University	(140) 36%
Occupation	
Government	(85) 21.9%
Private	(55) 14.1%
Own bossiness	(54) 13.9%
Housewife	(29) 7.5%
Student	(166) 42.7%
Income level	
Less than RM 499	(45) 12.6%
RM 500 to RM 999	(115) 29.6%
RM1000 to RM 1999	(20) 5.1%
RM2000 to RM 2999	(31) 8%
RM3000 to RM 3999	(27) 6.9%
RM4000 to RM 4999	(147) 37.8%
No income	-
House type	
Semi-Detached	(31) 8%
Bungalow	(27) 5.9%
Single-Storey Terrace	(150) 38.6%
Double-Storey Terrace	(80) 20.6%
Flat	(60) 15.4%
Village	(45) 11.6%

provided for solid waste recycling, such as bins, so that households can recycle their waste. If they exist how far are they away from places that people congregate and spend time? How much did it cost? Whereabouts did the promotion campaign take place? Who were the NGOs

involved? And whereabouts did they operate? How long did the campaign operate?

Research hypotheses

(H1) Households' attitudes toward recycling of solid waste recycling are positively related to their awareness. Respondents who have a more positive awareness toward recycling of solid waste will be more likely to participate in recycling campaigns.

(H2): Households' attitudes toward recycling of solid waste recycling are positively related to the facilities provided for recycling such as distance/ location of facilities. There is a positive significant relationship between facilities provided and attitudes toward recycling solid waste.

(H3): Generally, householders have a positive attitude toward recycling. The failure of the recycling campaigns in Alor Setar is due to limitations in the approach taken by the authorities.

(H4): Participation in recycling activity can be encouraged if the weaknesses in the current approach are addressed.

RESULTS & DISCUSSION

Based on the question 'have you heard or read about recycling solid wastes?', 354 (91%) of the participants responded "yes" that they have heard and read about recycling of solid wastes. A chi-square test was used to show if there is any statistically significant difference between household awareness towards recycling of solid wastes and demographics factors including race, age, gender, educational level, occupation and home type. However, significance was shown with race (p -value < 0.004) and also with occupation and house type (p -value < 0.001). The details of the inferential analysis are presented in (Table 5).

Table 5. Households' awareness in Alor Setar town on recycling of solid wastes

Demographics	Alor Setar town	
	χ^2	P -value
Race	10.872	0.004(S)
Age	7.456	0.114(NS)
Gender	1.435	0.231(NS)
Education Level	6.387	0.270(NS)
Occupation	26.077	< 0.001(S)
Income	4.129	0.531(NS)
House type	33.318	< 0.001(S)

In accordance with the participants that said “yes”, it was found that most of them heard or read about recycling of solid wastes from different sources. Newspapers were the sources of information for 82.3% of respondents. (Table 6) illustrates the results of various sources through which households obtained information about recycling.

Table 6. Sources of information for households about recycling

Information sources	Alor Setar town
	Respondents percentage
Newspaper	82.3%
Television	65.3%
Radio	43.2%
Magazine or newsletters	41.4%
Billboards	29.6%
Buses / Train station / LRT	23.4%

A majority (91 %) of the respondents claimed that they are aware of the ongoing campaign. Most knew it through advertisements in the newspapers. Television and radio advertising ranked second followed by newsletters and billboards. However, integrated use of all media can increase public participation (Abdelnaser *et al.*, 2006 a,b), whereas traditional methods of promotion (including media campaigns, leaflet drops, newsletters, newspaper adverts, etc.) can only achieve a limited level of success in shifting public perception, behavior and attitude (Grodzińska-Jurczak *et al.*, 2006). Read (1998) proved that the success of a recycling scheme depends largely on the public's participation. Increasing household participation must be carried out using all available media, such as television and radio networks, as well as newspapers, to increase public awareness. Without appropriate information and rising of public awareness, new plans will fail to be implemented and new systems not effectively utilized (Read, 1999). Additionally, the study by Evison and Read (2001) stated that using a regular leafleting campaign to help to maintain public awareness, interest and understanding was vital for maintaining good responses. In order to increase household participation, the message of recycling and other forms of appropriate waste management need to be adequately communicated

to the public, so that residents' habits, behavior and traditions can be changed for the better, enabling local authorities to achieve government goals of recycling and recovery (Robinson and Read, 2005). In contrast, adverts in the local press intended to raise awareness of a scheme in Glasgow, Scotland, appear to have made little impression on the public and the visual impact of the sites themselves seemed to have been the best advert. A similar conclusion was reached by Belton *et al.* (1994) concerning the futility of newspaper adverts for a 'bring' scheme in Glasgow, where 84% of users had learnt of the bring sites' existence simply by seeing sites.

Respondents were asked to give the best description of why they recycled. The survey provided eight possibilities in the questionnaire to describe their views of recycling (see Table 7). Respondents were asked to circle the reason (s) why they recycled. Only 38% claimed that they recycled to save landfill spaces, whereas 31.1% of households indicated that they recycled for the future environment/generations, respectively. Details are shown in (Table 7).

Table 7. Description of reasons for recycling of solid wastes

Reasons for recycling of solid waste	Frequency (%)
1. Good facilities provided/ convenient	106 (27.2%)
2. For the future environment / generations	121 (31.1%)
3. Saves landfill space	148 (38%)
4. Personal satisfaction / habit	54 (13.9%)
5. Saves dustbin space	22 (5.7%)
6. Peer pressure	42 (10.8%)
7. Incentives/ monetary / reward	22 (5.7%)
8. My own awareness about the importance recycling/ duty	127 (32.6%)

The study found that 59.9 % of households did not participate in the recycling activity. Amongst the non-participants, 25.7% indicated inconvenience or lack of time as the reason for their non-participation. Additionally, 32.6% of respondents agreed that the recycling facilities were too far away or inadequate. It is also interesting to note that a smaller percentage of the non-participating respondents (2.6%) indicated that they believed that recycling was only wasting their time. Table 8 presents in detail the respondents' reasons for not participating in recycling.

Table 8. Description of reasons for non-recycling of solid wastes

Reasons for non-recycling of solid waste	Frequency (%)
Inconvenience / no time	100 (25.7%)
Facilities too far away / inadequate	127 (32.6%)
Not interested	82 (21.1%)
No reward / money	58 (14.9%)
Do not like the recycling bin	7 (1.8%)
Have to put the bin outside the pavement	5 (1.3%)
Forget to leave the bin out	-
I do not understand what to do	4 (1%)
Lack of information or insufficient	78 (20.1%)
Storage / handling problems	61 (15.7%)
Never really thought about it	47 (12.1%)
Not enough materials to recycle	42 (10.8%)
Too much effort needed	56 (14.4%)
Waste time	10 (2.6%)
My bin is not always collected	8 (2.1%)
Don't bother	4 (1%)
Believe there are better ways to handle my garbage	9 (2.3%)
Other (specify)	-

When asked whether they knew the location of the nearest collection point for their area, 61.7% indicated that they knew the location. However, more than 60% complained that the collection point could not be easily located. In term of distance, only 33.7% indicated that it was within one kilometer from their house, 6.4% said it was within the radius of 2 – 3 kilometers, 7.5% indicated that it was more than 4-5 kilometers radius while 25.2% indicated that they had no idea how far these facilities were from their houses. Without doubt, the farther the location of the collection point, the more discouraged will the householders be. (Fig. 2) shows the frequency of this result. Robinson and Read (2005) found that a contributing factor for those who were not recycling was a high lack of awareness of the location of the nearest facility. While González-Torre and Adenso-Díaz (2005) commented that when citizens who are environmentally concerned have bins near to their home, they appear to be willing to recycle more fractions than when they have to walk for a longer time to drop off the waste, due to the inconvenience of carrying the large volumes that this type of waste usually occupies. Limitations and conditions of the physical environment have also been shown to be a critical factor in recycling behavior. In a study in Sheffield, UK, a main reason

for non-participation in recycling was given by survey respondents as lack of space for the recycling bin (McDonald and Oates, 2003). There can be many physical barriers to recycling, making it inconvenient or unpleasant to recycle. Depending on where one lives, recycling can be easy or difficult. For instance, those living in New York City housing authority buildings (low-income housing) must typically go outside the building some distance away to deposit recyclables, and others may need to go to down to dark, vermin-ridden, garbage strewn basements. In more affluent multi-family dwellings, recycling areas are generally conveniently located on each floor and are well tended by the building superintendent. It was concluded that short distances and ready access to the bins were obviously incentives to recycling. The results relating to demographic factors were equivocal, but it was interesting to note that the types of housing in the case study were found to contribute heavily to recycling participation. This clearly showed that householders who lived in single-storey terraced houses (40.7%) and double-storey terraced houses (26%) are more likely to recycle compare to those who lived in villages (2.5%). However, the single and double storey terraced houses are always ranked as high income areas in Malaysia while villages are always ranked as low income areas. Therefore, this can be clear proof to indicate that waste is usually collected from the high and middle income areas of the town but not in the lower-income areas because lower incomes areas sometimes have poor roads making it difficult for waste collection vehicles to access the area, and they generate fewer recyclables making it less profitable to recover materials from the waste stream.

The respondents were asked to give their opinion on the current recycling campaign hosted by the Ministry of Housing and Local Government through the Municipal Council in Alor Setar. On the question of whether the campaigns have succeeded or failed, a large proportion (83%) indicated that it had failed. Asked for the reasons for the failure, their responses can be divided into the following three broad categories: (i) there is no structured recycling mechanism being implemented to households at the moment. Recycling is done voluntarily with no incentives given. Some just do not bother to do it since there is no immediate return expected. On the part of government, measurement of the

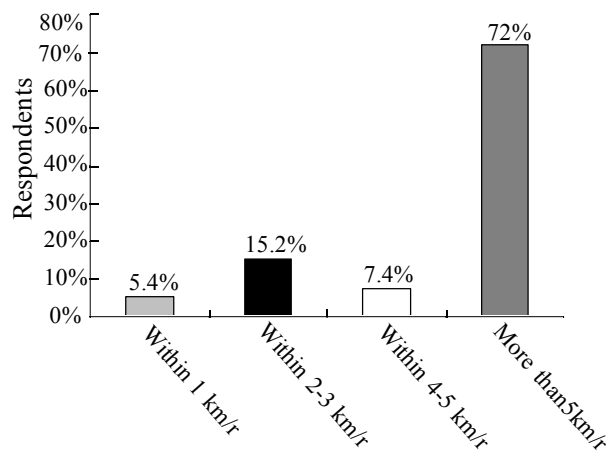


Fig. 2. Distance of recycling bins from the houses in Alor Setar town, Kedah State

success or failure of recycling is difficult without this comprehensive structure; (ii) not enough facilities provided. Many areas are not provided with the facilities for recycling. Many people do not know the location of the nearest collection point. Location of collection points is poor or too far away, and so it is easier to throw the recyclables into the street than to bring them to a collection point; (iii) the present campaign on recycling is currently applied to the general public. The dedicated target is very broad and the success rate is quite difficult to measure. It would be better if the campaign is targeted to a specific group of people such as school children, various income groups and the most producers of wastes. Respondents were asked to rank the reasons for recycling of solid wastes. The ranking level was measured on a 5-point Likert scale (1= strongly disagree; 2= disagree; 3= neither disagree nor agree; 4= agree and 5= strongly agree). From the results presented in (Table 9) it was found that 'conserving resources for future generations and saving space in landfills' was the most important reason for recycling followed by 'saving costs'.

Other respondents ranked 'information about the recycling improved' as the third important factor to increase recycling in Alor Setar town.

About 99.5% of respondents ranked 'Collection points / station placed in more convenient locations' as the first approach to be considered by the government to increase the recycling activities and 99% ranked 'provide recycling bins in every residential area' in second place, followed with 'To educate the people on the importance of recycling through activities such as: forum, exhibitions'. 'Numerous campaigns should be launched/ started through the media (TV, internet, etc)' was item number four to be considered by the government as one of the effective ways of increasing recycling. Surprisingly, householders placed 'more benefits to areas with better recycling' and 'to organize more promotional functions' as number six. Table 10 presents all the respondents' rankings in terms of their effectiveness in increasing the recycling activities. The respondents were also asked of their views on how the situation could be improved. The majority of respondents suggested, "More facilities be provided". There should be "local collection centers", which are within easy reach for each community or housing areas. Community or group recycling should be encouraged and more effort is needed to educate the people of the need and importance of recycling. Monetary incentives may also be considered, for example by improving the community facilities in an area as a reward, based on the quantity of recyclables collected. In this regard, it is observed that the high rate of newspaper recycling might be due to the ready market for it. When asked whether they will recycle in the future, if all facilities are provided, 98 % of the respondents said that they would participate.

Table 9. Ranking importance reasons for recycling of solid wastes

Reasons for recycling of solid waste	Mean ^a (SD)
Saving costs	4.6 (0.70)
Conserving resources for future generations and saving space in landfills	4.7 (0.50)
Create jobs in local communities	4.1 (0.70)
If feedback about the recycling campaigns was provided	4.0 (0.69)
A financial reward for taking part was offered	3.6 (0.83)
If the recycling is made mandatory	3.8 (0.79)
If any profit made from the scheme was donated to local charities	4.1 (0.69)
A private company operated the scheme	3.5 (0.75)
If collections were more frequent	4.0 (0.79)
If a bag/ box was used to store the materials and not a bin	2.7 (0.94)
Nothing would encourage me to participate in the recycling campaigns	2.0 (0.05)
If information about the recycling improved	4.2 (0.49)

^a 5- point scale, 5= strongly agree, 1= strongly disagree

Table 10. Effective strategies to increase recycling of solid wastes in Alor Setar

Effective ways	Frequencies (%)	Ranking
1. Provide recycling bins in every residential area	385 (99%)	2
2. To impose charges on the amount of waste thrown (the heavier waste, the higher to charge).	125 (32.1%)	10
3. Collection points / station placed at more convenient	387 (99.5%)	1
4. To educate the people on the importance of recycling through activities such as: forum, exhibitions.	377 (96.9%)	3
5. Let the people know about more affirmative benefit in terms of health, cost minimization and risk minimization of social life.	338 (86.9%)	7
6. Numerous campaigns should be launched/ started through media (TV, internet, etc)	368 (94.6%)	4
7. More benefits to areas with better recycling	361 (92.8%)	6
8. To organize more promotional functions	361 (92.8%)	6
9. Involvement of groups/ people in recycling campaign	366 (94.1%)	5
10. To produce a law enforcing recycling activities	139 (35.7%)	9
11. Give out incentives to individuals who practice recycling (incentives given at recycling centre).	287 (73.8%)	8
12. Other (please specify)	-	-

CONCLUSION

The survey and interview generated a number of valuable findings and it can be concluded that, even though householders were generally aware of recycling, this awareness appears not to necessarily translate into practicing recycling. This could indicate that there were other factors that hinder households' participation in recycling, such as absence of 'visible' recycling centres and/or lack of incentives to do so. It is important to educate households on the possible benefits of recycling and create practical knowledge and experience in organizing a successful recycling campaign. This study was successful in identifying some reasons for the householders' attitudes towards recycling. More specifically, it was identified many reasons given by recyclers and non-recyclers for their participation and non-participation. However, non-recyclers identified a number of factors that discouraged them from participating in recycling. It was clear that "lack of facilities" and "distance of facilities - being too far from homes" were the major factors. In addition, these reasons were also clear proofs that most households were not aware that they can do their bit in recycling by simply putting the recyclables and non-recyclables materials in separate bags and placing them in the ordinary rubbish bins available at house which will then be collected by the council or appointed private company or agent. Barriers to accessing solutions, such as lack of facilities or poorly designed facilities (for example, no recycling bins), inconvenience or lack of knowledge (for example,

does not know the location of the nearest point to recycle) were the most commonly mentioned barriers related to facilities or infrastructure. The location of the recycling station is very important and the public attitudes towards knowledge about source separation in general and recycling stations in particular are of interest for the performance of the whole system. The study suggested more than a few strategies for the government to achieve sustained success in its recycling campaign. Firstly, to improve the operational aspects of recycling facilities by improving convenience by placing recycling bins in more accessible and visible location. Local authorities need to make their recycling services reliable, convenient and easy to use because the conventional dustbin, a convenient and reliable single point of disposal, is seen by many householders as a better option than recycling (Martin *et al.*, 2006). Secondly, local authorities need to work closely with private sector companies and NGOs to design a range of waste containers that are suitable for a given locality. Clear instructions should be provided as to how the schemes operate and they must communicate the benefits of recycling, and emphasize that recycling does not have to be inconvenient, or take up too much time or space in the home (Read, 1999; Thomas, 2001). Thirdly, awareness of recycling and concern for the environment should be inculcated from an early age. Unfortunately, there is no formal subject dedicated to achieving this purpose in the present education system at primary and secondary level in Malaysia.

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