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HOUSEHOLDS' AWARENESS AND OPINIONS ON RECYCLING OF SOLID WASTE IN NORTH STATES OF MALAYSIA: CASE STUDY

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ABSTRACT
Landfill sites and incinerators are now reaching capacity levels and the need to build new ones is putting pressure on Malaysian's limited land resources. In the north states of Malaysia, the waste management approach being employed is landfill, but due to rapid development and lack of space for new landfills, the north states in Malaysia is looking for a success recycling of solid waste programmes. Households' awareness is considered for the success of recycling any recycling programmes. However, this paper attempts to identify households' awareness and opinion on recycling of solid wastes in Kangar town the capital town of Perils State which is located in the north part of Malaysia. The study focus on the respondents' awareness on recycling campaigns as well as the level of the perceptions on recycling campaign. Data were gathered using a mail-out questionnaire to households randomly chosen within the major towns. This study pointed out that the level of practice relies on the level of awareness of recycling. It is suggested that education would be the best means of encouraging recycling activities besides providing more facilities at residential areas. A lesson from this study is more legislation should be passed together with enforcement and there should be a target on what to achieve any program is launched.
Keywords:
Household awareness, Recycling of solid waste, North part, Major town.

1. INTRODUCTION

The need to recycle used materials has become a pressing issue over the last 50 years (Abdelnaser *et al.,* 2007). This increasing concern is clearly evidenced in the proliferation of federal, state and local legislation directed toward the implementation of recycling programme. Much of the efforts have been taken by the Malaysia government in the recent years to promote recycling of solid wastes amongst its population. Despite the increasing concern regarding conservation of natural resources, scant psychological research has been conducted on recycling or conservation behaviour as differentiated from attitudes, intention, and beliefs. Although reviews of varied pro-environmental behaviour have previously been published (Abdelnaser *et al.,* 2008), the topic of recycling behaviours has received relatively little attention. Given the recent explosion of community-wide recycling programmes in Malaysia and other countries, a review of the scientific research is needed.

2. A REVIEW OF RESEACH

Waste management practice varies markedly across the EU. Greece, Ireland, UK and Italy who dispose more than 75% of their Municipal solid waste (MSW) in landfill whereas Austria (62%), Belgium (40%) and Netherlands (46%) recycle or compost a significant

quantify of their waste (DEFRA, 2005). Numerous studies have been done on recycling by many different disciplines ranging from psychology to sociology to Economics to law. Regardless of the discipline, all had a common goal i.e. what factors affect recycling participation. There has been a large discrepancy in the overall proportion of recycling attitudes to recycling behaviour in people. In other words, there is more public talk and support for recycling but less 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 came up with several variables that might affect recycling behaviour. Tow basic types of variables were identified: incentives for the social behavior and facilitators (or barriers) for social behavior. These can be either internal or external to the individual. Hormuth *et al.,* (1993) analysis of apartment dwellers recycling suggested two inter-related strategies for facilitation day to 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 proposal 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 behaviours. He used an open-ended question to ascertain how participants organized their recycling to find out whether manageability contributes to behavioral maintenance. 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 (1989) found that feeling good about doing something for the environment had a strong influence on recycling. Recycling is a behaviour which requires 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. Curbside recycling is one way to overcome inconvenience and facilitate recycling. Bolder (1995) argues that recycling behaviour is likely to be influenced by situational factors such as the mount 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. McDonald and Oates (2003) probe the reasons for non-participation in kerbside 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 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. Tonglet *et al.,* (2004) suggested 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 the campaign relied upon improved understanding and higher participation by the public in the recycling services (Read, 1998, 1999). It was decided by Jaslo city officials that a similar approach could prove worthwhile in the polish context (Grodzinska-Jurczak *et al.,* 2006). The results do not parallel those that have previously suggested that the motivation of the householder is a function of socioeconomic factors. Researchers suggest that high rates of recycling participation appear mainly in largely educated, financially secure localities where the requirements of basic needs have been fulfilled (Tikka *et al.,* 1999). Previous research suggests that a positive relationship exists between less-specific environmental attitudes such as general environmental concern and recycling, but that the relationship is rather tenuous (Domina and Kock, 2002; Gamba and Oskamp, 1994; Vining and Ebreo, 1992). With respect to recycling-specific attitudes, Vining and Ebreo (1992) found that, in particular, attitudes regarding the importance and the inconvenience of recycling are significantly related to recycling, with the latter also being supported in research by Boldero (1995). Similarly,

Ewing (2001) found that thinking recycling is inconvenient is significantly related with the intensity of participation in a recycling scheme. Werner and Makela (1998) found a significant correlation between a summative score of attitudes towards recycling and self-reported recycling both at the time which attitudes were assessed and 2 years after the assessment. The most important cognitive that have been found to influence recycling behavior are knowledge of where, what and how to recycle and the awareness of the benefits of recycling. When it comes to recycling, many environmentalists would agree that consumer ignorance plays a major role in why people do not recycle. This lack of awareness and knowledge ranges from ignorance on the types of recycling programmes is available to what can and cannot be recycled Vining and Ebreo (1990) found that the major difference between recyclers and non-recyclers was their knowledge of which materials to collect for recycling. Educating individuals about how, what, and where to recycle is important. However, individuals who are skeptic or have an external locus of control (Rotter, 1954) may believe that their participation in recycling would not make a difference. There individuals may need more persuasion to recycle (Abdelnaser *et al.,* 2008). Thus, it is vital that individuals are aware of the reasons for recycling and the positive impact that recycling has on the environment. The purpose of this study is to look at the households' awareness on the recycling of solid waste in the major towns of north states (Malaysia).

3. METHODOLOGY

A postal survey (questionnaire) was selected as this is the accepted standard for conducting social surveys. However, postal surveys are often hindered by having low response rates (Read *et al.,* 1997). The size of the sample was 500 questionnaires and was implemented. The approach used was to distribute the questionnaire at randomly selected areas as: high; middle and low incomes in Kangar the capital town of Perlis state. The response rate was respectable. Four hundred and forty six useable questionnaires (93.2%) were received and analyzed. The collected data were treated by means of analysis frequency and chi-square test was used as well. All data were analyzed using SPSS (version 11.5 for windows) software. Microsoft Excel version 2003 was also used to draw the Figures.

4. RESULTS AND DISCUSSION

4.1. Households' awareness on solid waste recycling

In order to determine the attitude of respondents to recycling solid wastes in Kangar, 466 participants were enrolled in the study. Based on the question "have you heard or read about recycling solid wastes", 93.1% of the participants in Kangar, responded "yes" that they had heard and read about the recycling of solid wastes. A chi-square test shows that there are some statistically significant differences between household awareness of the recycling of solid wastes and most demographic factors including race, age, gender, educational level, occupation and home type. It was significant with race and occupation in Kangar town (p-value < 0.05). More importantly, income level was significant in Kangar (p-value < 0.05). Regarding education level, it was significant only in Kangar. However, significance was shown with house type only in Kangar (p-value < 0.05). The details of the inferential analysis are shown in Table (1).

Table 1. Demographic factors versus awareness of solid waste recycling

Demographic	Chi-square results	
	Kangar	
	χ^2	*P*-value
Race	13.969	0.001(S)
Age	2.683	0.749(NS)
Gender	1.424	0.233(NS)
Education level	9.814	0.081(NS)
Occupation	11.241	0.047(S)
Income level	20.047	0.005(S)
House type	21.621	0.003(S)

NS = not significant; S = significant / α = 0.05 (level of significance)

In accordance with the participants who said "yes", it was found that most of them had heard or read about the recycling of solid wastes from different sources. Eight-two point eight percent in Kangar had read about it in newspapers. Television is also shown as a good source as the results show that 66.3% of the household heard about recycling from it. Figure (1) illustrates these results based on each source where they had heard or read about the recycling of solid wastes.

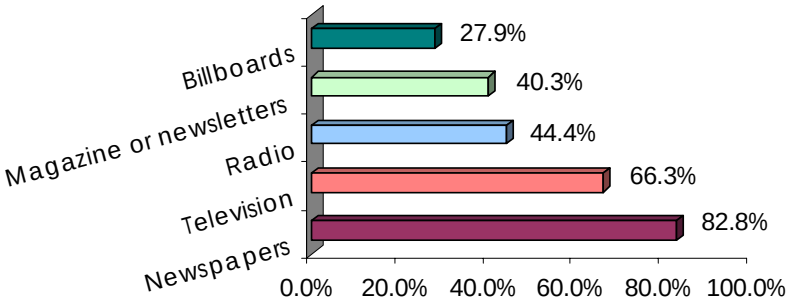

Figure 1. The respondents' information about the recycling of solid wastes

Concerning the importance of recycling, 100% of the participants in Kangar said that recycling is very important. Respondents were asked to give the best description of why they recycled. The survey provided 8 reasons in the questionnaire to give their description of recycling. The reasons were: Good facilities provided/ convenient, for the future environment / generation; saves landfill space; personal satisfaction/ habit; saves dustbin space; peer pressure; incentives/ monetary/ reward; my own awareness about the importance of recycling/duty. Respondents were asked to circle all the reason (s) why they recycled. (39.3%) in Kangar claimed that they recycled to save landfill space; (33.5%) of households in Kangar indicated that they recycled because of the future environment/generation as shown in Table (2).

Table 2: Description of reasons for the recycling of solid wastes in Kangar town

Description of recycling reasons	Percentage of respondents
	Kangar
1. Good facilities provided/ convenient	27.7%
2. For the future environment / generations	33.5%
3. Saves landfill space	39.3%
4. Personal satisfaction / habit	14.2%
5. Saves dustbin space	6.2%
6. Peer pressure	11.8%
7. Incentives/ monetary / reward	6%
8. Awareness about the importance of recycling/ duty	34.4%

Table 3: Recycled materials in Kangar

Materials recycled	Percentage of respondents
	Kangar
1. Newspapers	37.1%
2. Magazines	26.4%
3. Other paper or cardboard	27%
4. Textiles	10.7%
5. Glass Jars	24.2%
6. Drink Cans (aluminum or tin)	17.2%
7. Food cans	30.5%
8. Plastic Containers	22.7%
9. Plastic Bottles	29%
10. Plastic Carrier Bags	29%
11. Leaf / yard waste	13.5%
12. Other please specify	-
13. Never recycled	-

The survey results indicate that newspapers are the most recycled materials in Kangar followed by magazines. However, other paper or cardboard was also one of the most recycled materials in the town. Very few portions of the respondents stated that they recycled leaf and yard wastes. The distribution of each item recycled by respondents at Kangar, town is shown in Table (3).

Amongst those who did not participate in the recycling activities, 25.1 % in Kangar indicated that the reasons were inconvenience / no time and (34.5%) of the respondents in Kangar indicated that the facilities were too far away from their residential area and inadequate. Table (4) presents the household respondents reasons for not participating in recycling in Kangar town.

Table 4: The reasons for not recycling in Kangar town

Reasons for non-recycling	Percentage of respondents
	Kangar
1. Inconvenience / no time	25.1%
2. Facilities too far away / inadequate	34.5%
3. Not interested	21.9%
4. No reward / money	14.8%
5. Do not like the recycling bin	2.4%
6. Have to put the bin outside the pavement	1.7%
7. Forget to leave the bin out	0.2%
8. I do not understand what to do	1.3%
9. Lack of information or insufficient knowledge	21.2%
10. Storage / handling problems	18.9%
11. Never really thought about it	13.5%
12. Not enough materials to recycle	11.6%
12. Too much effort needed	14.8%
13. Waste time	2.8%
14. My bin is not always collected	2.1%
15. Do not bother	1.3%
16. Believe there are better ways to handle my garbage	2.8%
17. Other	-

4.2. Households' awareness on the facilities provided

When asked whether the respondents knew the location of the nearest collection points in their areas or not, 60.5% in Kangar town indicated that they did (Fig. 2). However, 62% in Kangar had noticed that the location could not be easily accessed (Fig. 5.16). Undoubtedly, the further the location of the collection point, the more discouraged householders would be. While, Gonzalez-Torre and Adenso-Diaz (2005) commented that when citizens who are environmentally concerned have bins near to 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 than this type of waste usually occupies. It was concluded than distance and access to the bins was obviously an incentive to recycling. However, citizen's attitudes depend on knowledge about a facility (Rahardyan, 2004). In terms of distance, only 31.3% of respondents from Kangar indicated that it was within 1 kilometre of their houses. In Kangar, 26.8% indicated that it was further than 5 kilometre radius while 26.8% indicated that it was further than 5 kilometre radius. Furthermore, the results showed that a large proportion of 26.2% in Kangar did not have any idea of how far the locations were from their houses. These findings are shown in Table (5).

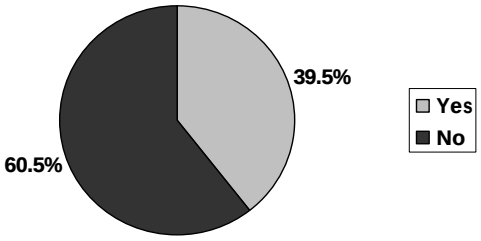

Figure 2. Respondents knowledge about distance of nearest recycling collection point from their houses in Kangar

Table 5: Responses to the closeness of recycling facilities in Kangar

Available distances	Percentage of respondents
	Kangar
Within 1 Km/radius	31.3%
Within 2-3 Km/radius	7.7%
Within 4-5 Km/radius	7.9%
More than 5 Km	26.8%
Don't know where is it	26.2%

In response to question "How often do you need to recycle solid waste", 20.8 % of respondenst in Kangar, 24.2% indicated that they preferred recycling to be weekly while about 33.3 % in Kangar showed that they would recycle when necessary (Table 6).

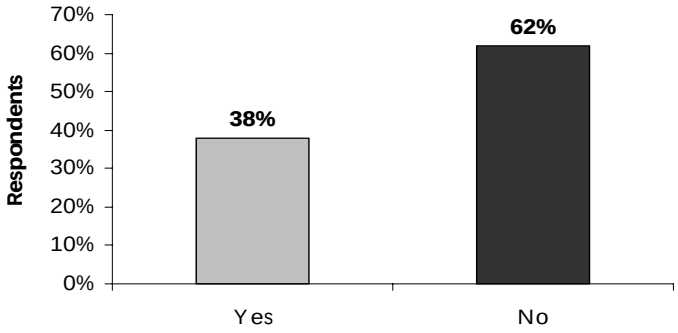

Figure 3. Accessibility of recycling facilities in Kangar

Table 6: Respondents opinions about the suitable periods for the recycling of solid wastes in Kangar town

Items	Percentage of respondents
	Kangar
1. Every day.	23.6%
2. Every tow days.	1.9%
3. Every 3 days	9%
4. Every week.	20.8%
5. Every 2 weeks	2.4%
6. Every month	6.9%
7. Every three months	2.1%
8. When it is necessary	33.3%

4.3. The level of awareness regarding the 2 recycling campaigns

A question was asked to find out whether the respondents of Kangar town in the northern part of Malaysia were aware of the solid waste recycling campaigns which were carried out by the government in 1993 and early 2001. Based on the answers from the respondents, a high proportion (81.1%) indicated their awareness while only 18.9% in Kangar were not aware of such campaigns. Asked for the reasons for not being effectiveness, their responses can be divided into the following 3 broad categories: (i) there 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 success or failure of recycling is difficult without this comprehensive structure (ii) not enough facilities provided. Many areas are not provided with the facility for recycling. Many people do not know the location of the nearest collection point. Location of collection points is either not good or too far; and (iii) present campaign on recycling is currently done to general public.

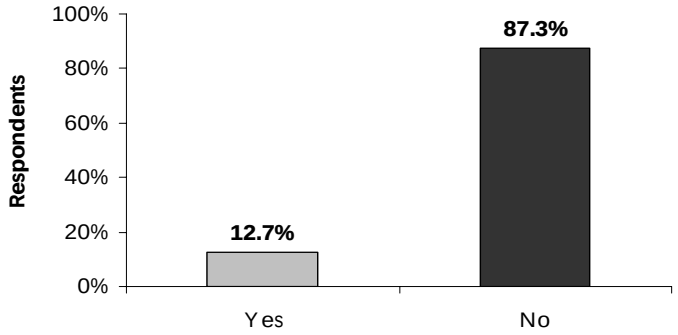

Figure 4. Respondents perception on the success rate of the national recycling campaigns

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 waste. This question was asked to determine whether the recycling campaigns carried out by the government or other organizations were effective or not. From Figure 4, it can be seen that 87.3 % of interviewees in Kangar, felt that the campaigns were not effective and merely 12.7 % felt that the campaigns were effective.

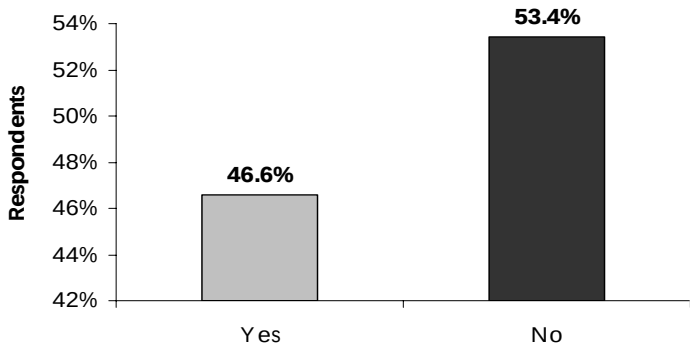

Figure 5. Responses to enforcing law on recycling

The respondents in Kangar town were asked to give their views on the enforcement of laws on recycling. Based on Figure (5), 46.6% of respondents in Kangar and agreed to the idea of enforcing a law on recycling whilst 35.4% the mentioned town disagreed.

4.4. Opinion on effective methods the government can adopt to increase recycling activities

99.1% in Kangar ranked 'Collection points / station placed in more convenient locations' as the first approach to be considered by the government to increase the recycling activities. However, the households in the town agree in ranking 'numerous campaigns should be launched/ started through the media (TV, internet, etc)' as item number five to be considered by the government as one of the effective ways of increasing recycling, with 94.6% in Kangar. Table 7 presents all the respondents' ranking in terms of their effectiveness in increasing the recycling activities in Kangar town.

Table 7. The ranking of reasons for recycling in Kangar town

List of some effective ways	Kangar	Ranking
1. Provide recycling bins in every residential area.	99.1%	2
2. To impose charges on the amount of waste thrown.	30.7%	11
3. Collection points / station placed at more convenient.	99.6%	1
4. To educate the people on the importance of recycling activities.	97.4%	3
5. Let the people know about more affirmative benefit in term of health, cost minimization and risk minimization of social life.	89.1%	8
6. Numerous campaigns should be launched/ started through media (TV, internet, etc).	94.6%	5
7. More benefits to areas with better recycling.	93.6%	6
8. To organize more promotional functions.	93.1%	7
9. Involvement of group/ people in recycling campaign.	95.1%	4
10. To come up with a law enforcing recycling activities.	33%	10
11. Give out incentives to individuals who practice recycling.	77.7%	9
12. Other	-	12

5. CONCLUSION

It can be concluded that even though they 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 recycling successful campaign. In summary, this study suggested several strategies for Malaysian government to have sustained success in its recycling campaign. Firstly, to improve the operational aspects of recycling facilities by improving convenience like placing recycling bins in more accessible and visible location. Whereas, Local authorities need to make their recycling services reliable, convenient and easy to use because the traditional dustbin, a convenient and reliable single point of disposal, is seen by many households as a better option than recycling (Martin *et al.*, 2006). Secondly, awareness of recycling and concern to environment should be inculcated from early ages. Unfortunately, there is no formal subject dedicated to achieve this purpose in the present education system at primary and secondary level.

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