

## RECYCLING POLICY AND PROGRAM STRATEGIES FROM HOUSEHOLDS' PERSPECTIVES: A CASE STUDY IN MUAR ROYAL CITY

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Received: 20 April 2015 Approved: 15 January 2016

**ABSTRACT** This paper provides an introspective insight about households' expectations on recycling policy and program strategies at local community level via questionnaire survey conducted based on stratified random selection. Households strongly support strategies that provide them monetary benefit such as rebates (53.66%) and incentives (67.39%); convenience such as recycling drop-off centres (77.67%), recycling bins in housing areas (86.91%), and recycling collection points (84.18%); and knowledge gain such as environmental education on recycling (80.47%) and awareness campaign (81.45%). Based on the ranking, households prefer to be offered with recycling convenience and proper facilities, besides provided with knowledge, rather than purely receiving monetary rewards. It is unavoidable that there are individuals who are not susceptible to changes, especially when majority are most likely to make their own decision on whether to recycle. The success of recycling strategies depends on how these approaches are carried out to pave the way for households towards recycling behaviour. Positive results of households' contributions should be reported to quantify their effort into perspective. When majority starts to notice the trend, they would eventually start to recycle themselves. Based on the findings, this study discusses possible recommendations for implementations in the local municipalities to extend the potentials in achieving recycling community.

**Keywords:** Household recycling; solid waste management; source separation; recycling strategies; recycling community

**ABSTRAK** Kajian ini membincangkan pandangan secara introspektif tentang jangkaan isi rumah terhadap dasar dan strategi program kitar semula di peringkat komuniti melalui soal selidik berdasarkan pemilihan rawak berstrata. Isi rumah memberi sokongan signifikan kepada polisi atau program strategi berdasarkan faedah kewangan seperti diskaun (53.66%) dan insentif (67.38%); kemudahan seperti pusat kitar semula (77.67%), tong kitar semula di kawasan perumahan (86.91%) dan pusat pengumpulan barangan kitar semula di lokasi berhampiran (84.18%); dan maklumat melalui pendidikan alam sekitar (80.97%) dan kempen kesedaran (81.45%). Isi rumah berpendapat bahawa kemudahan kitar semula adalah aspek paling utama dalam sesuatu polisi atau program kitar semula, selain pendedahan kepada maklumat yang berkaitan, dan bukan semata-matanya penyediaan faedah kewangan. Terdapat pelbagai pendekatan dalam mempengaruhi isi rumah untuk mengitar semula tetapi juga tidak dapat dielakkan bahawa terdapat segolongan individu yang tidak dapat dipengaruhi walau apa carapun, terutamanya apabila majoriti berpendapat mereka sendiri yang membuat keputusan untuk menjadi sebahagian daripada masyarakat kitar semula atau sebaliknya. Kejayaan sesuatu polisi dan program bergantung kepada cara pelaksanaan pendekatan dalam menyediakan peluang dan galakan kepada isi rumah untuk menjadi sebahagian daripada masyarakat kitar semula. Laporan kitar semula oleh isi rumah seharusnya dilaporkan untuk membolehkan mereka menaksir usaha mereka dalam perspektif. Apabila ramai melihat amalan kitar semula sebagai trend, mereka akan mula mengamalkan amalan tersebut. Berdasarkan dapatan kajian ini, kajian ini mencadangkan beberapa saranan pelaksanaan untuk memperluaskan potensi dalam mencapai masyarakat kitar semula.

**Kata kunci:** Kitar semula; pengurusan sisa pepejal; pengasingan sisa; strategi kitar semula; masyarakat kitar semula

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### INTRODUCTION

This paper aims to provide an introspective insight about households' expectations on recycling policy and

program strategies in a community. The paper presents a discussion on the case study conducted among households in Muar, the Royal City of Johor, Malaysia. Besides the

selected study area, there are other areas in Malaysia facing similar concerns that these disposal sites could be too close for comfort. Instead of being the final disposal option, landfilling or open dumping remains as the main disposal method for municipal solid waste in Malaysia. The amount of land presently available to cater the increasing solid waste generated from the growing population alone is becoming scarce.

Presently, Malaysians generate approximately 33,130 tons of solid waste per day, exceeding the projected production of 33,000 tons per day by 2020 (Mokhtar, I. L., 2013). Solid waste composition in Malaysia is dominated by recyclable materials but these materials are not fully recovered and recycled. The contribution of household waste is the highest among sources consisting of recyclable materials up to 80% of the total solid waste composition as found placed in these landfill sites (Sumiani et al, 2009). Despite the potential and opportunities in other sustainable disposal alternatives such as recycling, it seems that the approach of 'how to remove and dispose waste' or 'where else to dispose waste' is more favourable than looking at waste as resources. Once a landfill has reached its optimum operating capacity, another space is used to build more landfills.

The findings of this study extend our understanding on the perspectives of Malaysian households towards recycling and that this study comes up with appropriate recommendations of recycling policies and program strategies based on the current demands of these households, which are discussed later in this paper.

Muar is one of the most densely populated and rapidly growing settlements with its representative as a Royal Capital of the third largest state in Malaysia, Johor

state. It is the second biggest district of the southern state of Peninsular Malaysia. It occupies an area of 2,346.12 km<sup>2</sup> with a population of 437,163 people in 12 sub-districts. Located at the mouth of Muar River, on the coast of the Straits of Malacca, Muar is internationally known as the hub of the furniture industry of Malaysia, with industrial estates of notably big factories of multinational companies. It is robust with business and trading companies. As for family size, it is recorded that the average family size is approximately 4.17 members in Johor and 4.31 members in Malaysia (Department of Statistics Malaysia, 2010). Meanwhile, the average monthly household income in the state is RM4,658 (RM is Ringgit Malaysia) whereas national average monthly household income recorded RM5,000 (Department of Statistics Malaysia, 2012). Approximately less than 1% of Malaysians have no formal schooling (Ministry of Education Malaysia, 2012). The area is considered as a representative of urban areas in Malaysia.

The Southern Waste Management (SWM) Sdn Bhd is responsible in solid waste collection and transportation services while Muar Municipal Council (MPM) is in charge of supervision in solid waste management besides other public health and safety responsibilities. Uncollected solid waste, odour issue contributed by illegal dumping activities, insufficient funds and poor finance management for planning and management of the city were some of the highlighted issues by the local authorities during the site visit. The main issue that we want to highlight in this paper is the single operating landfill at Bakri for the city and its neighbouring areas. The Bakri landfill has long exceeded its maximum capacity and yet to be closed up to the time point of this study even though it was already expected for full closure in 2008 with another

proposed landfill site development in progress (Zulhisham, I. , 2012). With that, Muar and its neighbouring areas are facing critical problem of disposing solid waste despite the significant dominance of recyclable materials in the solid waste composition. Solid waste generation in Muar alone is very high and this disposal situation may become worse (Kalanatarifard, A. & Go, S. Y. , 2012), with the increasing solid waste generation and limited source separation and recycling practice.

The landfill is used as dumping site for almost 25 years without official recorded data of types, quantity, composition, and quality of solid waste besides of not complying with the standards and safety requirements (Kalanatarifard, A. & Go, S. Y., 2012). Despite the risk to public health and safety, the groundwater and air quality via gas venting system in the landfilling area are not consistently monitored. Besides that, soil layers as cover materials to control vectors, fires, odours, blowing litter, and scavenging are not fully utilized due to financial restrictions.

In fact, it seems that the solution to the high solid waste generation from districts of Kluang, Batu Pahat, Yong Peng, Simpang Renggam, and Muar in Johor is to propose development of another two sanitary landfill sites at Bukit Payong, Batu Pahat and Jorak, Muar beginning in 2014 (Utusan Online , 2012). When a landfill site exceeded its operating capacity, the common approach to deal with it is to find another space for landfill site development, rather than sustainably manage and utilize the waste produced. Despite the potential and opportunities in recycling, the attempt to separate waste at source and practice recycling is minimal and almost non-existent among households.

## METHODOLOGY

This study is a descriptive research using a survey design. Before the distribution of questionnaires, we conducted a pilot study to verify that individuals with limited education are able to answer the questionnaire, as well as its wording, language, response formats and clarity of instructions. We made appropriate changes to the questionnaire based on the feedback. Considering a relatively large proportion of households within the study area were fluent in Malay language as it is the local native language besides English language, thus the questionnaire was constructed in both Malay and English.

We conducted the sampling via local primary schools in contact with household representatives, based on stratified random selection picking process. Similar method of selecting respondents through schools was also used in other studies, Chung, S. & Poon, C. S., (1999), Chung, S. & Poon, C. S. , (2001), Tang, Z., Chen, X. & Luo, J. (2011). Besides that, considering the time constraints and meagre resources, schools were utilized in this study as this institution provides reliable and secure notion to the respondents, leading to higher questionnaire return rate and completion. Database at the local registrar of Muar District Education Department (PPD Muar) was used as a starting point to identify schools within the study area. We divided the schools according to their respective locations to ensure representation of the study area and randomly selected available school with no regards of order. These selected schools were then contacted for their participation in this study.

Following that, 600 questionnaires were distributed to the selected available primary schools. The classes from each

school were randomly selected by the school principle. The questionnaires and instructions were passed to the students through their homeroom teachers. The students were asked to invite their parents as household representatives to complete the questionnaires. The household representatives are the ones who are most responsible for handling household waste.

## RESULTS AND DISCUSSION

Of the 524 completed questionnaires, this study manages to focus on eight sub-districts out of 12. The findings have a margin of error  $\pm 4.28\%$  at 95% confidence level. Majority of the respondents are between 45 to 54 years old (70%). With one to two dependent children per household, 72% reported household income of more than RM2,000. About 31% of them earn more than RM4,000 per month. Nearly 4% completed primary schools while the remaining completed higher education levels and the number of respondents who do not complete schooling is negligible. Family size, household income level, and education are considered rather consistent with the average figures mentioned.

### *Expectations on recycling policy and program strategies*

There are limited recycling policy and program strategies in Malaysia such as this study area. The most recent solid waste minimization and recycling policy strategy includes mandatory waste separation source for every household starting from September 1st, 2015 which was introduced since September 1st, 2012 in stages under the Act

672, in line with continuous awareness campaigns and activities in schools, governmental and private offices, and local communities. Households were required to indicate their level of agreement with the proposed recycling policy and program strategies in a community listed in the questionnaire according to 5-point Likert scale, ranging from 1 = strongly support to 5 = strongly oppose. These proposed strategies were adapted from related studies such as MORI Social Research, (2002), Corona Research, Omran, A. et al (2009), 15, Adams, R. (2011).

Generally, households show their support to all the proposed strategies. Summary of their responses could be referred to **Figure 1**. There are three clear aspects receiving significantly more feedback on 'strongly support', which are monetary benefit, convenience, and knowledge gain. Households strongly support strategies that provide them monetary benefit such as recycling rebates (53.66%) and incentives (67.39%); convenience such as establishment of more recycling drop-off centres (77.67%), provide recycling bins in housing areas (86.91%) and recycling collection points at more convenient and public locations (84.18%); and knowledge gain such as environmental education on recycling (80.47%) and awareness campaign (81.45%). A combination of various interventions increases the effectiveness of a program, Adams, R. (2011) , Werner, C. M. et. al (1995). Program would gain success when all the aspects of monetary benefit, convenience, and knowledge gain were to be considered.

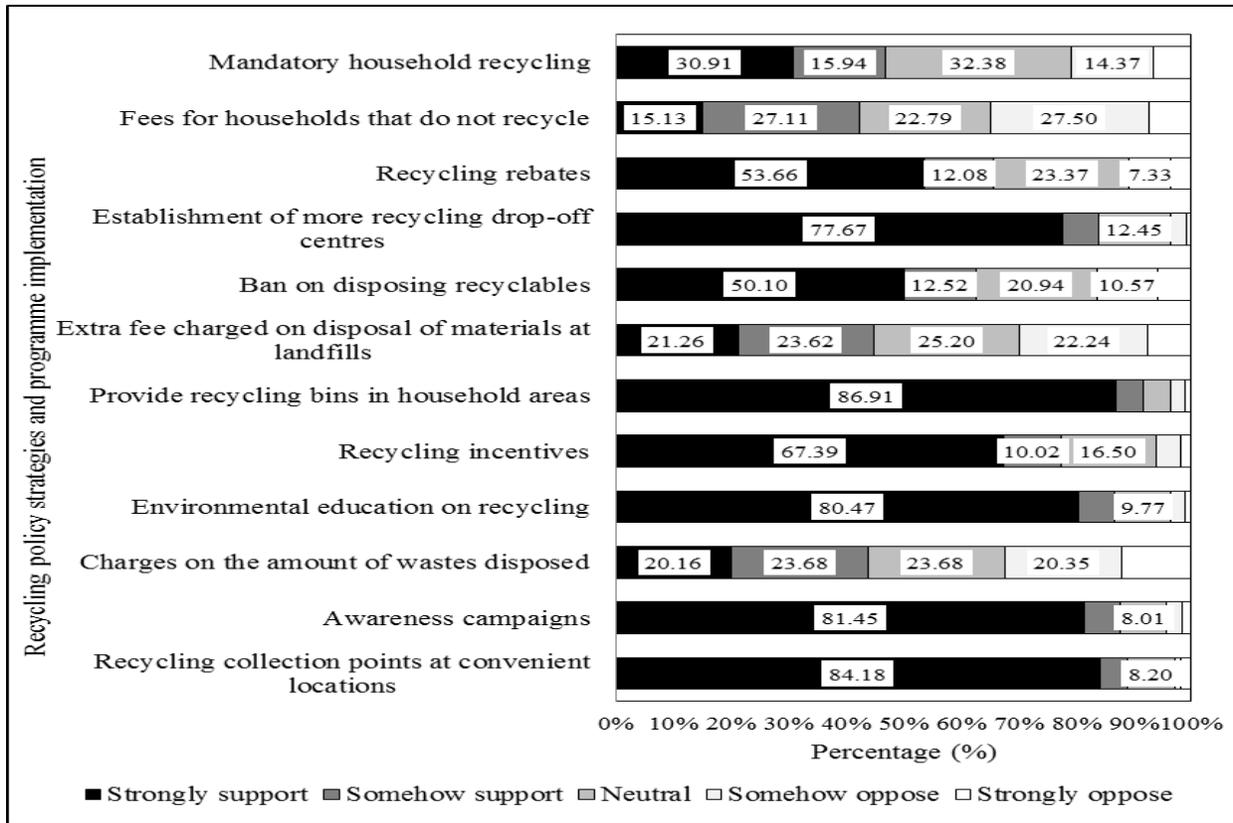


Figure 1. Feedbacks towards Recycling Policy and Program Strategies

Table 1. Ranking on how supportive towards recycling policy and program strategies

Items	Mean	Standard deviation
Provide recycling bins in household area	1.26	0.75
Recycling collection points are placed at more convenient locations	1.32	0.82
Awareness campaigns to let the community know about benefits of recycling	1.37	0.86
Environmental education on recycling	1.38	0.84
Establishment of more recycling drop-off centres	1.43	0.87
Incentives provided to individuals who practice recycling	1.63	1.02
Recycling rebates for households that recycle	1.95	1.18
Ban on throwing away recyclables	2.10	1.29
Mandatory recycling for every household	2.50	1.24
Extra fee charged on disposal of materials at landfills to make disposal more expensive and help pay for recycling efforts	2.71	1.24
Impose charges on the amount of waste thrown	2.81	1.30
Impose high fees for households that do not recycle	2.85	1.20

Note: Number of respondents equals to 524.

**Table 1** depicts the ranking in ascending order on how supportive households are towards recycling policy and program strategies provided in this study. These strategies are divided into aspects of convenience, awareness/knowledge, monetary rewards, law enforcement, and fees or charges. Strategy of 'provide recycling bins in household areas' was the most supported while imposing charges strategies were the least supported among households. Based on the ranking, surprisingly, households prefer to be offered with recycling convenience and proper facilities, besides provided with knowledge regarding on recycling rather than purely receiving monetary rewards in forms of rebates or incentives. Similar findings could also be found in study conducted on households' attitude towards recycling of solid waste in Alor Setar, Kedah, Omran, A. et al (2009). Both strategies of 'provide recycling bins in household area' and 'recycling collections points at more convenient locations' were ranked higher as compared to other strategies proposed, followed by environmental education and awareness campaigns. It is important that local authorities and other related institutions 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 households as a better option than recycling, Omran, A. et al (2009), Martin, M. et. al (2006).

On the contrary, households are less tolerating when it comes to imposing extra fees or charges. Referring to Figure 1, when it comes to fees or charges, the percentages of respondents that strongly support this are among the least compared to other aspects of the proposed strategies. Approximately 15.13% strongly support fees for households that do not recycle; 21.26% strongly support

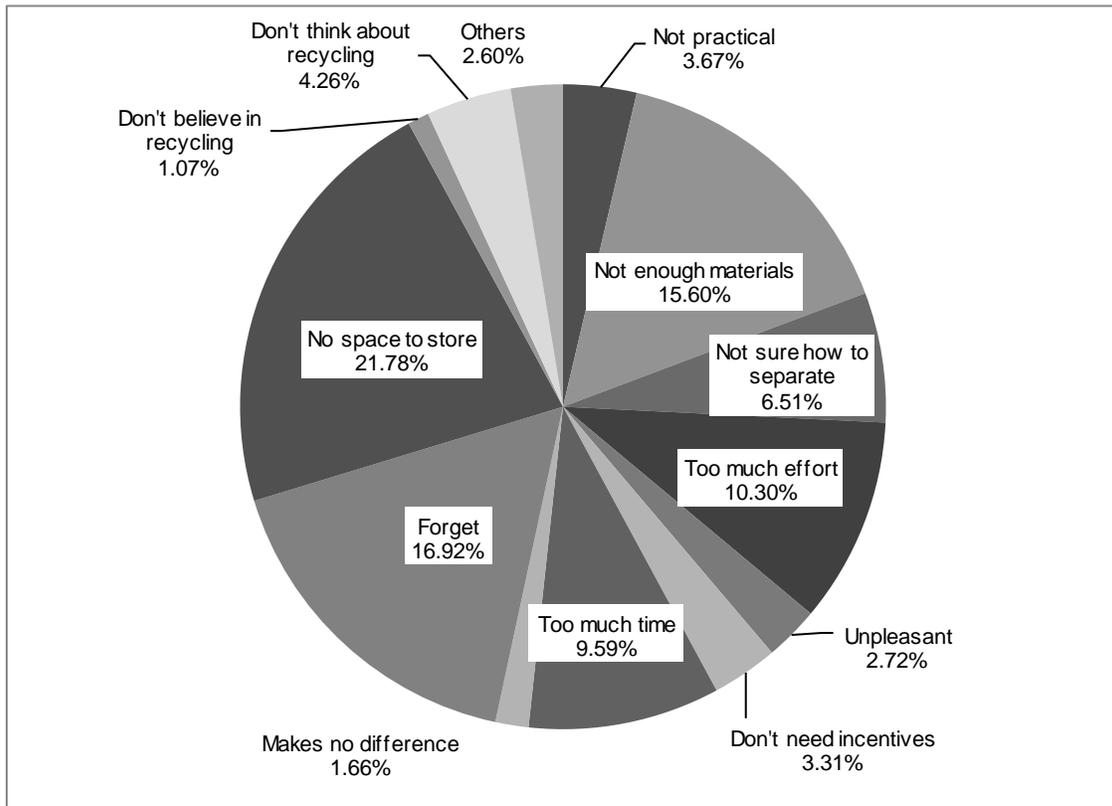
extra fee charged on disposal of materials at landfills; 20.16% strongly support charges on the amount of waste disposed. These strategies of imposing extra fees and charges are somehow regarded as 'punishment' to these households that do not recycle or comply with the strategy but such taxing strategies may pressure these households to separate their waste and recycle, which present us with quick results and increases the recycling rates indefinitely. When this occurs, the root of the issue that is the mindset of these households themselves towards recycling behaviour remains unsolved as well as the main purpose of educating the significance of recycling does no longer remain which makes sharing information and environmental education in future even tougher with the resistance of forced changes.

### *Influences on household recycling practice*

In order to understand how these households are influenced whether to recycle, the following question was included in the questionnaire to draw necessary approaches to promote recycling. Majority of these households (42%) claimed that they make their own decision on whether they recycle. This implies that there could distinctively be two possibilities, which are these respondents could either be a group of committed recyclers or a group of non-recyclers. Recycling is an intrinsically stable behaviour in which there are those who consistently maintain their recycling efforts and continue to recycle, and there are those who do not recycle and may never be convinced to recycle, Tucker, P., (2001). Still, there are individuals who are susceptible to changing their behaviour, which explains the role of other factors that motivate recycling including the awareness and education program is fundamental. How

these factors pave the way for these households towards recycling behaviour should not be underestimated as most of the reasons for these households for not recycling are typically ruled out as inconvenient, time- and effort-consuming, and impractical, as displayed in **Figure 2**. Households are generally aware on the morality on which is good or bad for the environment and regarded recycling as a

socially accepted behaviour. However their perceptions of environmental problems tend to revolve around global issues of global warming, climate change, ozone depletion, or loss of rainforests while the issue of solid waste management including recycling tend to be considered less of concern and more of a local problem of hygiene issues and aesthetic value.



**Figure 2.** Reasons for not recycling among households

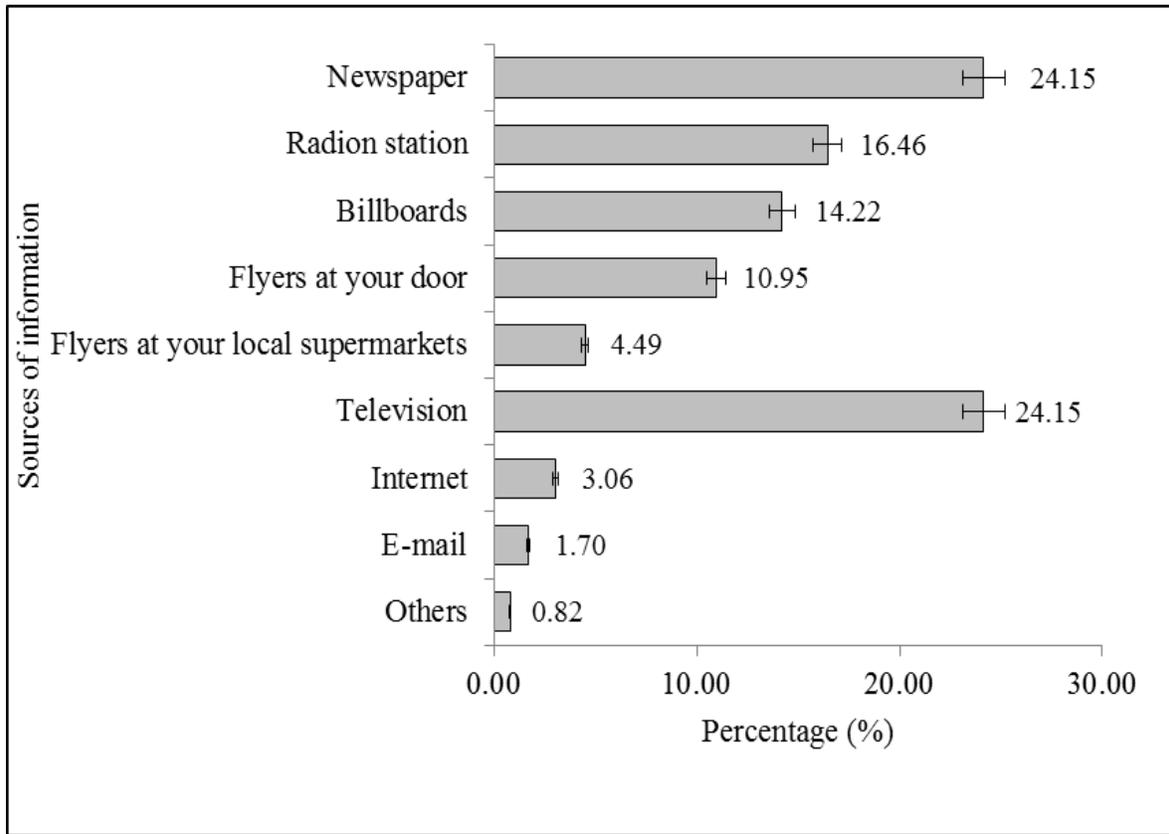
About 28% of these households claimed that the role of family and friends influences their decision to recycle. In fact, children could be a positive influence on parents and other members of family or community, and make them more pro-environment, Adams, R. (2011). Such personal contact gives the impression these children actually take their time and effort to make contribution despite

of their young age compared to capable adults. A 10-year-old boy inspired recycling in his neighbourhood by writing personal notes to each household, Adams, R. (2011), Keller, J. J. (1991). Sometimes, soliciting people of authority or environmentalists does not really have significant impacts on motivating individuals to participate in recycling and it is better to use indigenous

role models such as children from school honour societies or science clubs as ambassadors for recycling program, Adams, R. (2011). When majority starts to notice that recycling is popular among friends, they would start to recycle themselves; so that they would not feel embarrassed not to recycle (Tucker, P., 2001).

The influence of government, media, and promotions refers to the promotional and educational program promoted by government and media. About 27% are influenced with this approach, which in other words, these households probably begin their recycling efforts from the influence of these efforts. In this context, media which are television, radio, newspaper, and relevant internet sources, are used as main media of choice to obtain information and knowledge regarding current solid waste management and recycling. With this, it could be highly successful to maintain this group of households as committed recyclers when the necessary approach is properly initiated. In accordance with the influence of government, media and promotions, the sources of information for households about recycling were identified. From the

perspectives of households, it was found that they prefer to be informed through different sources. Information through newspaper and television were most preferred for 24.15% of households for each. **Figure 3** illustrates the findings of various sources deemed convenient for households to receive recycling information. Radio station ranked second (16.46%), followed by billboards (14.22%) and distribution of flyers door-to-door approach (10.95%). However, integrated uses of all media prove to increase public participation, Omran, A. et al (2009), Abdelnaser, O., Mahmood, A. & Aziz, H. A. (2006a), Abdelnaser, O., Mahmood, A. and Aziz, H. A. (2006b). Without appropriate information and increasing household participation, new plans would fail to be implemented and new systems would not be effectively utilized, Omran, A. et al (2009), Read, A. D. (1999). In order to maintain good responses from households, it is important that programs such as campaigns are conducted regularly and adequately communicated, Omran, A. et al (2009), Evison, T. and Read, A. D. (2001). Not only it does maintain good responses, it helps to maintain public awareness, interest, and understanding from households, Omran, A. et al (2009).

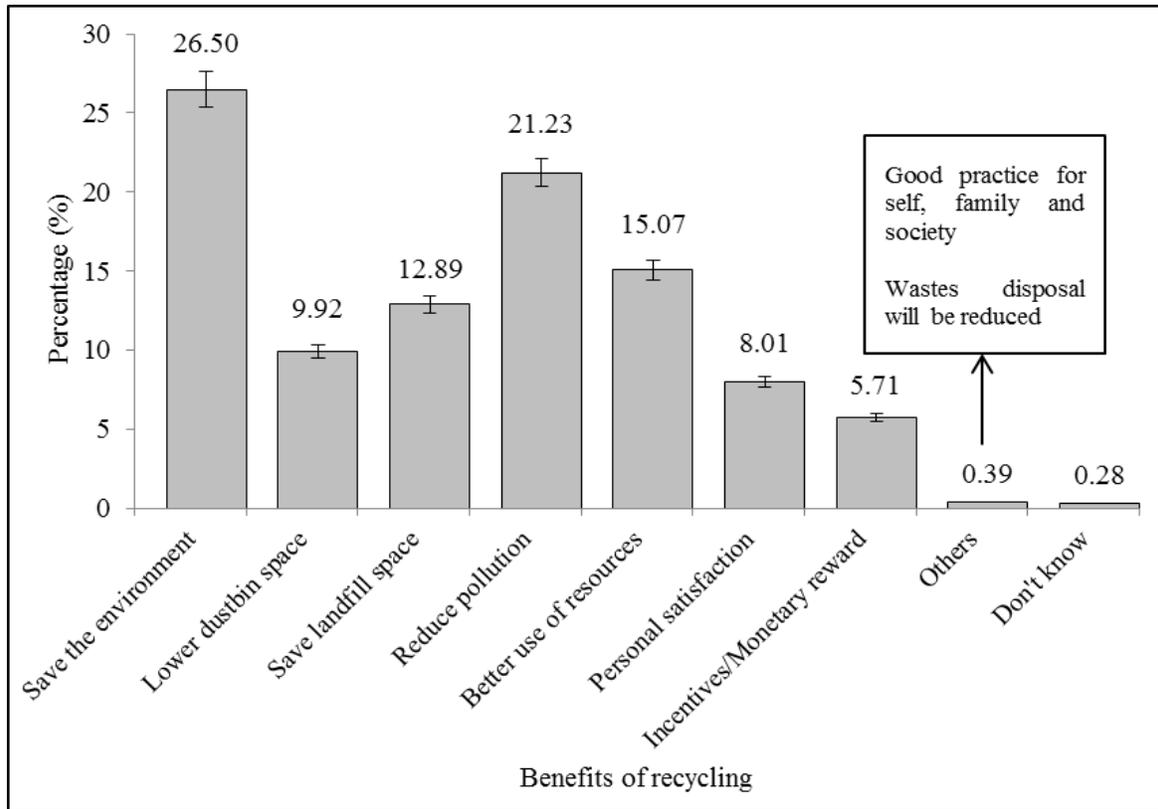


**Figure 3.** Sources of Recycling Information from Households' Perspectives

***Perception towards implications and other aspects of recycling***

Households provided their opinions on the benefits of recycling and possible negative implications of recycling. As illustrated in **Figure 4**, findings revealed that these households are generally aware that recycling saves the environment (26.50%) and reduces pollution (21.23%).

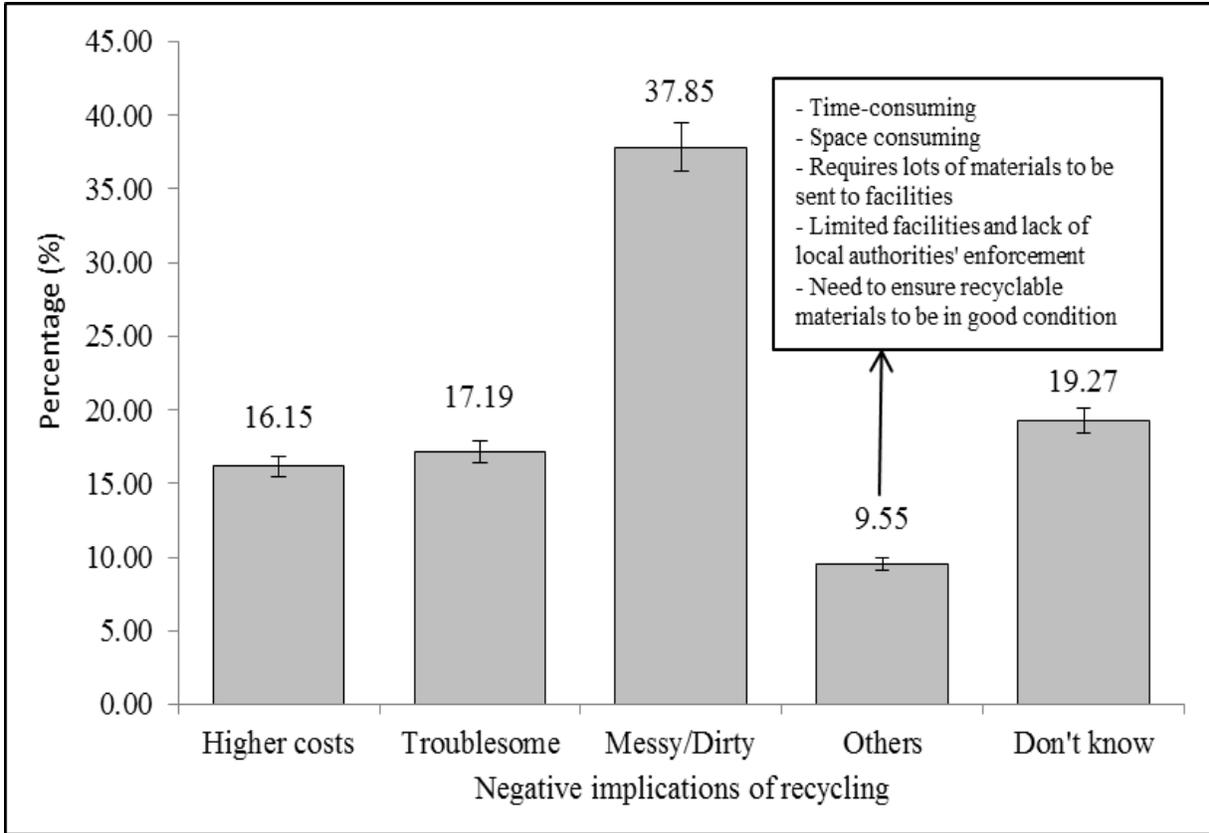
The next benefits identified included better use of resources (15.07%), saving landfill space (12.89%), use less dustbin space (9.92%), personal satisfaction (8.01%), and incentives or monetary reward (5.71%). Typically, households relate pro-environmental behaviours and environmental benefits such as energy conservation and pollution.



**Figure 4.** Benefits of Recycling from Households' Perspectives

Problems that are commonly associated with waste are aesthetic value and hygiene issues. Despite their awareness on the benefits of recycling, majority still assume recycling makes a mess and dirty. Comparing both of these questions regarding the benefits and negative implications of recycling, the latter received more feedbacks from these households. These opinions were provided before the complete distribution of 120 litres waste bin and full implementation of collection system of 2+1 under the Act 672 in the study area. Some of the comments included messy/dirty (37.85%), troublesome (17.19%), and higher

costs (16.15%), as displayed in **Figure 5**. Terms such as 'inconvenience', 'nuisance', and 'troublesome' are commonly mentioned in household recycling. Additionally, the issue of cost outweighs benefits of recycling has always been a debate. For this, the costs refer to costs that they are required to pay for the practice of recycling such as leisure time to undertake recycling activities particularly sorting and transporting recyclable materials. With limited number of facilities, recycling becomes time- and energy-consuming.



**Figure 5.** Negative Implications of Recycling from Households' Perspectives

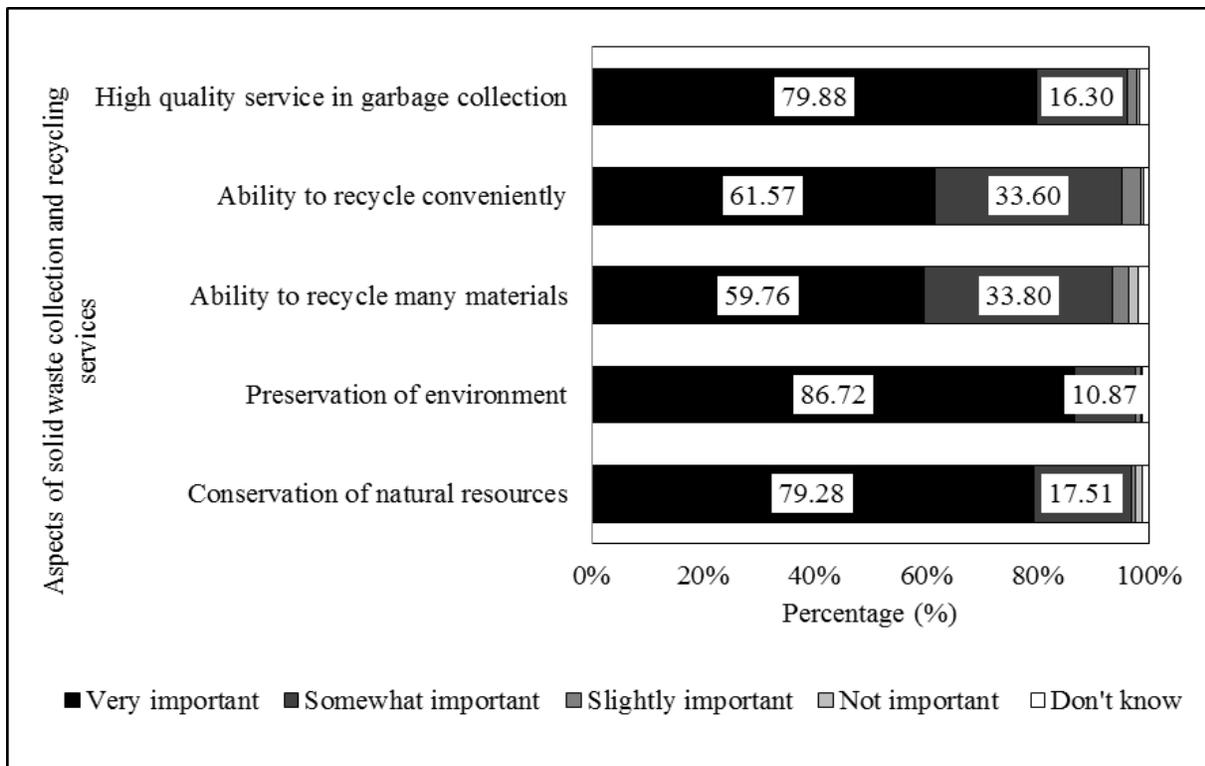
Based on the 5-point Likert scale, from 1 = very important, 2 = somewhat important, 3 = slightly important, 4 = not important and 5 = don't know, findings showed that 'preservation of environment' was regarded as the most important compared to other aspects in solid waste collection and recycling services shown in **Table 2.** **Figure 6** illustrates the proportion of each aspect cited by these households. Environmental preservation and conservation are considered important

besides receiving high quality service in solid waste collection, which explains environmental grounds do exist as to why households recycle at the first place. Concern on the quality of waste collection service outweighs the ability to recycle among households. There is no expectation of behaviour when it comes to recycling, Evison, T. & Read, A. D. (2001), McDonald, S. & Oates, C. (2003), which explains why it receives higher proposition as compared to the ability to recycle.

**Table 2.** Ranking importance aspects of solid waste collection and recycling services

Aspects of solid waste collection and recycling services	Mean	Standard deviation
High quality service in garbage collection	1.27	0.67
Ability to recycle conveniently	1.47	0.69
Ability to recycle many materials	1.53	0.79
Preservation of environment	1.18	0.58
Conservation of natural resources	1.28	0.66

Note: Number of respondents equals to 524.



**Figure 6.** Importance of Aspects of Solid Waste Collection and Recycling

In this stage, educating these households formally about good solid waste management and recycling is almost impossible in terms of coverage, costs, and energy. However, spreading awareness relating their actions with relatable concerns of hygiene and aesthetic issues such as

pollution, preservation, and conservation in simple terms creates the platform needed to educate them to be aware of the consequences of their actions. Economic and political instruments tend to be politicised in the issue of solid waste management but lack of understanding in knowledge,

awareness, and perception towards this issue would not lead to successful results as planned. Policy and program strategies that focus on the aspects of convenience, knowledge gain, and monetary benefit are more likely to increase households' participation in recycling. Households in fact prefer to be first offered with recycling convenience and proper recycling facilities, followed by exposure to knowledge regarding on what, how and where to recycle. It is important to gain these households' participation in recycling practice by winning their hearts and minds. Incentives might work in short term but unless the incentives are clearly beneficial and of significant personal value to these households, the enthusiasm of these households to commit to recycling is likely to wane after the initial success. When households feel recycling is unnecessarily taking up their time, an efficient recycling condition should be provided to increase their accessibility and convenience in recycling. Increasing convenience and accessibility to recycling facilities offer an opportunity to households to recycle. Basically, it is of significance that the policy and program implementation should emphasize on the long term gains by providing convenience and proper facilities which are easy for them combined with consistent and continual widespread of encouragement and education.

## **RECOMMENDATIONS**

Several recommendations for possible implementations in local municipalities are proposed to extend the potentials in achieving recycling community. Concerted efforts must be implemented to achieve meaningful results and a combination of various interventions

increases the effectiveness of recycling strategies. Based on this study, these include the following interventions in aspects of providing convenience, information, feedback, and monetary rewards.

For start, we should offer reliable and continuous recycling services and facilities to provide convenience such as establishing more recycling drop-off centres at public and convenient locations with effective and efficient collection services. For example, at family shopping malls. Similarly, we should provide recycling bins and place them in locations that are easily accessed even for children such as in household areas. Recreational site in household areas are common locations for people of all age groups, which is why this is a good place to begin with. To ensure disposal of recyclable materials into recycling bins as a habit, recycling practice has to be made as easy as disposing waste into conventional dustbins. Providing recycling bins at strategic locations within the household areas is a good start. The main idea is to provide easy access for the public especially when it could be impractical in most locations. However, although such strategy has been implemented to encourage recycling, we still fail to achieve our goal to encourage the public to recycle. One of the factors, and possibly the most significant factor, that leads to this failure is that these services and facilities are not continuously managed and mostly are abandoned, which is why local authorities and relevant organizations should demonstrate their commitment to the public such as patrolling as well as collaboration

with known retailers and companies to come up with creative programs for the public to be part of.

Following that, effective and creative dissemination of information on what, where, and how to separate waste for recycling in nonprofessional terms educates households to be aware of the basic source separation and recycling etiquette. The public is often lackadaisical about separating waste and recycle but with the appropriate dissemination of information could send the message across. In addition, effective communication and ingenious use of media improve the chances of information absorbed and acted upon among households. Besides that, emphasizing the urgency and information about the negative implications of not recycling and how it could affect the public and at the same time, present the public with simple steps that the public could accomplish increases the likelihood of them to participate, beginning from easy, intermediate, and challenging level based on the public response and their participation in recycling. Also, providing simple and clear information clarifies misconceptions of households towards recycling, allows them to identify materials that could be recycled; the container or space in which the recyclable materials should be deposited; and making reference to materials that are less frequently used or that cannot be accepted for recycling. This enables households to recycle more competently, benefitting the provided recycling system. Introducing source separation and recycling in schools and implement interesting programs through school societies or clubs

is also another good approach in creating awareness from early age.

There is no clear standard in source separation and recycling and thus, households are generally not convinced to contribute their time and effort for a task that provides no clear results. Irrespective of whether households feel responsible to be able to make any difference in recycling, feedback on how their efforts are making a difference is regarded as a significant enabler to encourage them to continue recycling, MORI Social Research, (2002). Keeping track of the statistics and publicising the effort and outcomes enable us to quantify and put the public contributions and effort in separating waste and recycling into perspective. Positive results of households' contributions should be reported for them to understand and aware that their single contribution pays and encourage them to continue their effort of separating waste for recycling. When majority starts to notice the trend, they would eventually start to recycle themselves. Regardless of any policies or programs, communication is the key to launch towards the goal and ensuring its continuation and success.

Policy makers should not overplay the role of monetary reward in the implementation of recycling policy and program strategies. Such initiative should be managed delicately as rewards for recycling in long term could actually encourage the public to generate more waste. Anyhow, we should not undermine other driving factors of recycling among households. Monetary

rewards including rebates and incentives could be employed to initiate new recyclers until they are able to sustain the habit of recycling, the role of monetary rewards should be less depended on. We should focus on assisting the public to be part of the solution, by conveying appropriate understanding and raising awareness on the importance of recycling and taking steps to reduce the amount of waste produced and disposed in stages. Monetary reward does have substantial effects in encouraging recycling and individuals who never recycle could be encouraged to recycle but only until it sustains the new behaviour of novice recyclers in which recycling become the norm, Evison, T. & Read, A. D. (2001), McDonald, S. & Oates, C. (2003), Vining, J. and Ebreo, A. (1990), Foxall, G. R. (1995), Noehammer, H. C. & Byer, P. H. (1997), Barr, S., Ford, N. J. & Gilg, A. W. (2003). Monetary rewards could be highly considered in policy and program strategies but not outweighing other strengths of all the factors involved.

Managing solid waste could be possibly one of the most costly ventures on any government and local municipality as it not only requires high capital investment for its development and maintenance. It greatly relies on the public participation especially households to sustain its efforts.

## CONCLUSION

Recycling policy and program strategies combining various aspects especially providing convenience and

information increase the likelihood of households to participate. It is unavoidable that there are individuals who are not susceptible to changes in a community; however these strategies have to be critically designed and implemented in order to pave the way for these households towards recycling behaviour. Reasons for households to not participate in recycling should not be overlooked and properly addressed. A baseline study on the local expectations on solid waste recycling strategies and various approaches in encouraging household source separation and recycling from the perspectives of households were presented in this study.

Effective measures and appropriate recommendations to address the current solid waste recycling issues and challenges should be taken accordingly. When it comes to managing solid waste, public cleanliness management seems to be the focus in most policy and program implementations. Thus, it does not directly address immediate concerns of solid waste management and this enforces the existing impression of the problems associated to solid waste, which are limited to aesthetic value and hygiene issues. There is no specific measure and continuous commitment in the aspects of solid waste minimization and recycling besides lack of required knowledge and technical expertise. We tend to focus on 'how to remove and dispose solid waste' when we should be focusing on 'how to utilize these waste materials as resources' which is why there have always been ongoing debates between incineration and landfilling as one of the disposal methods in

Malaysia to address the increasing solid waste generation issue. With the concerns of emission of dioxin and other carcinogenic pollutants, the question of relying on incineration remains

However, the sustainable option that recycling offers other than composting is certainly underestimated considering the dominance of recyclable materials in the solid waste composition. The point of recycling emphasizes the significance of reducing waste, which are in fact our resources, being disposed at landfills. Considering the potential and opportunities in recycling, it certainly offers a more sustainable and effective solution to our increasing solid waste generation.

#### ACKNOWLEDGEMENT

We would like to thank residents of Muar City who were involved in the study and provided valuable insights.

#### DECLARATION OF CONFLICTING INTEREST

The authors do not have any potential conflicts of interest to declare.

#### FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

#### REFERENCES

- Abdelnaser, O., Mahmood, A. and Aziz, H. A. (2006a). A brief case on the attitude of households toward recycling of solid waste on Terengganu state, Malaysia. In: *International Conference on Infrastructure Development and Environment*. Abuja City, Nigeria.
- Abdelnaser, O., Mahmood, A. and Aziz, H. A. (2006b). Study on households attitude toward solid waste recycling in Perlis state, Malaysia. In: *International Conference on Environmental Engineering and Management (ICEEM/03)*. Iasi City, Romania.
- Adams, R. (2011). *Residential recycling study*. University of Texas at El Paso.
- Badgie
- Barr, S., Ford, N. J. and Gilg, A. W. (2003). Attitudes towards recycling household waste in Exeter, Devon: quantitative and qualitative approaches. *Local Environment*8(4): 407–421.
- Chung, S. and Poon, C. S. (1999). The attitudes of Guangzhou citizens on waste reduction and environmental issues. *Resources, Conservation and Recycling*25:35–59.
- Chung, S. and Poon, C. S. (2001). A comparison of waste-reduction practices and new environmental paradigm of rural and urban Chinese citizens. *Journal of Environmental Management*62: 3–19.
- Corona Research

- Dahab, J. D., Gentry, J. W. and Su, W. (1995). New ways to reach non-recyclers: an extension of the model of reasoned action to recycling behaviors. *Advances in Consumer Research*22: 251–256.
- Department of Statistics Malaysia. (2010). *Preliminary count report: population and housing Census of Malaysia* (pp. 1–55). Malaysia. Retrieved from [http://www.statistics.gov.my/mycensus2010/images/stories/files/Laporan\\_Kiraan\\_Permulaan2010.pdf](http://www.statistics.gov.my/mycensus2010/images/stories/files/Laporan_Kiraan_Permulaan2010.pdf)
- Department of Statistics Malaysia. (2012). *Household income and basic amenities survey report*. Malaysia. Retrieved from
- Evison, T. and Read, A. D. (2001). Local authority recycling and waste - awareness publicity/promotion. *Resources, Conservation & Recycling*32: 275–291.
- Foxall, G. R. (1995). Environment-impacting consumer behaviour. *Association for Consumer Research*22: 262–268.
- [http://emisportal.moe.gov.my/emis/emis2/emisportal2/doc/fckeditor/File/Quickfacts\\_2012/quickfacts2012.pdf](http://emisportal.moe.gov.my/emis/emis2/emisportal2/doc/fckeditor/File/Quickfacts_2012/quickfacts2012.pdf)
- [http://www.statistics.gov.my/portal/index.php?option=com\\_content&view=article&id=1640%3Ahousehold-income-and-basic-amenities-survey-report-2009](http://www.statistics.gov.my/portal/index.php?option=com_content&view=article&id=1640%3Ahousehold-income-and-basic-amenities-survey-report-2009)
- [http://www.utusan.com.my/utusan/info.asp?y=2012&dt=0202&pub=Utusan\\_Malaysia&sec=Johor&pg=wj\\_01.htm](http://www.utusan.com.my/utusan/info.asp?y=2012&dt=0202&pub=Utusan_Malaysia&sec=Johor&pg=wj_01.htm)
- [http://www.utusan.com.my/utusan/Johor/20130814/wj\\_05/Tapak-pelupusan-sampah-baharu-di-Bukit-Payong-Jorak](http://www.utusan.com.my/utusan/Johor/20130814/wj_05/Tapak-pelupusan-sampah-baharu-di-Bukit-Payong-Jorak)
- Kalanatarifard, A. and Go, S. Y. (2012). Identification of the municipal solid waste characteristics and potential of plastic recovery at Bakri Landfill, Muar, Malaysia. *Journal of Sustainable Development*5(7): 11–17.
- Keller, J. J. (1991). The recycling solution: how I increased recycling on Dilworth Road. *Journal of Applied Behavior Analysis*24: 617–619.
- Martin, M., Williams, I. D. and Clark, M. (2006). Social, cultural and structural influences on household waste recycling: a case study. *Resources, Conservation and Recycling*48(4): 357–395.
- McDonald, S. and Oates, C. (2003). Reasons for non-participation in a kerbside recycling scheme. *Resources, Conservation and Recycling*39: 369–385.
- Ministry of Education Malaysia. (2012). *Quick Facts 2012: Malaysia Educational Statistics* (pp. 1–51). Malaysia. Retrieved from
- Mokhtar, I. L. (2013, August 27). Need to act on rubbish now. *New Straits Times*, pp. 4.
- MORI Social Research. (2002). *Public attitudes towards recycling and waste management: quantitative and qualitative review*. Strategy Unit, London.
- Noehammer, H. C. and Byer, P. H. (1997). Effect of design variables on participation in residential curbside recycling programs. *Waste Management & Research*15: 407–427.

- Omran, A., Mahmood, A., Abdul Aziz, H. and Robinson, G. M. (2009). Investigating households attitude toward recycling of solid waste in Malaysia: a case study. *International Journal of Environmental Research*3(2): 275–288.
- Read, A. D. (1999). Making waste work: making UK national solid waste strategy work at the local scale. *Resources, Conservation and Recycling*26:259–285.
- Sumiani, Y., Onn, C. C. Mohd Din, M. A. And Wan Jaafar, W. Z. (2009). Environmental planning strategies for optimum solid waste landfill siting. *Journal of Sains Malaysiana* 38(4): 457-462.
- Tang, Z., Chen, X. and Luo, J. (2011). Determining socio-psychological drivers for rural household recycling behavior in developing countries: a case study from Wugan, Hunan, China. *Environment and Behavior*43(6): 848–877.
- Tucker, P. (2001). *Understanding recycling behaviour*. Paisley, Scotland.
- Utusan Online. (2013, August 14). Tapak pelupusan sampah baharu di Bukit Payong, Jorak. *Utusan Online*. Retrieved from
- Vining, J. and Ebreo, A. (1990). What makes a recycler? A comparison of recyclers and non-recyclers. *Environment & Behavior*22(1): 55–73.
- Werner, C. M., Turner, J., Shipman, K., Shawn Twitchell, F., Dickson, B. R., Brusckke, G. V. and von Bismarck, W. B. (1995). Commitment, behavior, and attitude change: an analysis of voluntary recycling. *Journal of Environmental Psychology* 15: 197–208.
- Zulhisham, I. (2012, February 2). Isu sampah Bukit Bakri selesai. *Utusan Online*. Retrieved from [http://www.utusan.com.my/utusan/info.asp?y=2012&dt=0202&pub=Utusan\\_Malaysia&sec=Johor&pg=wj\\_01.htm](http://www.utusan.com.my/utusan/info.asp?y=2012&dt=0202&pub=Utusan_Malaysia&sec=Johor&pg=wj_01.htm)