

Recycling Behaviour of Malaysian Urban Households and Upcycling Prospects

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Abstract — Households remain the main generator of municipal solid waste in Malaysia. Malaysians produce an average of 30,000 tons of waste per day and only 5 per cent of it is recycled. Malaysian urbanites throw away waste more than normal. The solid waste generated continues to be a costly affair with about two-thirds of the local councils' total collected annual assessment fees being spent to manage waste. Yet at the same time, Malaysia's waste recycling rate is way below the average levels. Hence the perennial question remains as to why Malaysian households are not recycling or recycling enough. This study investigates recycling behavior of urban households in a green city. Methodology utilized survey questionnaire approach to 100 households to determine residents' willingness to participate in recycling activities. Results revealed proactive and reactive behaviors indicating two distinct recycling groups. Analysis generated factors of convenience of recycling facilities and services, environmental involvement recycling benefits and habitual recycling in the two groups. Willingness to recycle differed across the two groups. Recycling benefits and convenience to recycling facilities significantly influenced the behavior of proactive group while only habitual recycling was significant for the reactive group. Findings had implications on policy making and implementation of recycling programs. Upcycling prospects highlighted proactive roles of households to convert useless wastes into quality and marketable products to benefit the environment.

Keywords - proactive, reactive, recycling, solid waste, upcycling, willingness

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I. Introduction

Solid waste is a major environmental problem in Malaysia. The rapid development of urban and suburban townships, population increase and changes in consumption pattern, both directly and indirectly have resulted in the generation of enormous amount of household wastes. Households remain the main generator of municipal solid waste in Malaysia. The average Malaysian produced 1.64kg of solid waste a day, which is above the average worldwide average at 1.2kg according to World Bank report (Khor, 2014). On average, Malaysians produce 30,000 tons of waste per day and only 5 per cent of it is recycled ("Waste Management in Malaysia", 2015). Urbanites also throw away waste more than normal averaging 1.25kg of waste discarded per day (Ismail, 2015). The solid waste generated continues to be a costly affair with about two-thirds of the local councils' total collected annual assessment fees being spent to manage solid waste. Yet at the same time, Malaysia's waste recycling rate is way below the average levels at a mere 11% of the total solid waste being produced compared to 57% and 66% in Singapore and Germany respectively ("Why aren't Malaysians recycling?", 2013).

Despite the massive amount and complexity of waste produced, the standards of waste management (SWM) in Malaysia are still relatively poor. These include outdated documentation of waste generation rates and its composition, inefficient storage and collection systems, disposal of municipal wastes with toxic and hazardous

waste, indiscriminate disposal or dumping of wastes and inefficient utilization of disposal site waste causing flash floods and drainage blockage thereby reducing sustainable environmental capacity. The problem has been exacerbated by the lack of awareness and knowledge among Malaysian community about SWM issues, and being ignorant about the effect that improper SWM has worsened the problem. Hence the perennial question remains as to why Malaysian households are not recycling or recycling enough.

The Malaysian Urban Wellbeing, Housing and Local Government has implemented mandatory solid waste separation at source at various stages covering Federal Territory of Kuala Lumpur, Putrajaya, Pahang, Johor, Melaka, Negeri Sembilan, Perlis and Kedah on September 1, however, law enforcement of the Solid Waste Management and Public Cleansing Act 2007 (Act 672), following the implementation would only begin from January 1, 2016 to give room to the people to be prepared and increase awareness on the importance of the separation of solid wastes. The implementation of the regulation was part of the government's efforts to reduce

transmission of solid wastes to landfills, and that dissemination of information and brochures pertaining solid waste separation at source with the objective that households would adopt the practice of recycling in their daily lives ("Implementation of solid waste separation at source to begin", 2015).

It was reported that urban households in Kuala Lumpur are the worst when it comes to sorting waste at source. In the first two weeks of its implementation, households in the city received the highest number of warning letters – almost 5,000, or more than a quarter, of the 18,752 warning letters issued in seven states ("KL full of excuses when it comes to waste separation", 2015). Among the excuses given for failing to abide by the compulsory waste separation at source were lack of time and other commitments such as family and work. Many residents, especially those living in non-landed and high-rise properties claim ignorance about the new requirement.

Past studies found that recycling behavior is multidimensional and comprises the undertaking of different roles with different socio-demographic and psychographic causal characteristics (Meneses and Palacio, 2005). Hence this warrants further understanding into recycling behavior to enable authorities and policy makers in the implementation of segmentation policies for recycling depending on the role and willingness of households. Given the evidence that Malaysia's waste recycling rate is way below the average levels, it is still unknown why Malaysian households are claiming ignorance and not recycling or recycling enough, this warrant a relook into urban household recycling behavior. Specifically, the objectives of this study are to examine the recycling behavior of urban households and to determine the factors that influence their willingness to recycle household wastes. Habitual recycling, convenience of recycling facilities and services and familiarity of recycling benefits and environmental involvement were evaluated as willingness factors. Responses in terms of proactive and reactive engagement towards recycling of household wastes were analyzed.

II. Literature Review

In the context of recycling, willingness to recycle has a perceived moral obligation component which leads to further understanding of environmentally relevant intentions and behaviors. Previous study shows eco-friendly behavior comprises dual process decision-making that is the intentional and reactive behaviors. Reactive process in behavior involves unintentional decision-making based on situational factors. It could serve as a guide to intentional decisions. Intentional process involves goal-oriented decision-making based on attitudinal factors (Ohtomo and Hirose, 2007). Hence reactive recycling could be undertaken due to outside elements that can influence willingness to recycle. Situational variables reviewed such as prompts, public commitment, normative influence, goal setting, removing barriers, providing rewards, and feedback were significant in encouraging recycling behavior (Schultz et al., 1995).

Proactive behavior is the process of creating or controlling a situation by causing something to happen rather than responding to it after it has happened. Hence in the context of recycling, the act is intentional with deliberate and conscious actions in advance based on attitudinal factors. Proactive recyclers tend to exhibit pro-environmentalist attitude. The value of proactive recycling lies in the benefits of environmental protection and to safeguard and ensure environmental sustainability. Proactive recyclers have a perceived moral obligation towards the environment which further improves intention to recycle (Chu and Chiu, 2006).

This study focuses on familiarity to recycling benefits, convenience of recycling facilities and services, habitual recycling and environmental involvement as attitudes, values and beliefs that could motivate

willingness to recycle. There have been calls to use other psycho-social constructs such as attitudes, beliefs and values, instead of socioeconomic variables as the latter have turned out to be more successful in predicting pro-environmental behaviors (Chan and Bishop, 2013; Lopez-Mosquera, 2014). Hence there is a need to quantify and include them in the willingness to recycle or environmental psychology model.

This paper seeks to contribute knowledge to the current environmental literature by analyzing how people think and feel about recycling and upcycling as an eco-friendly behavior and how these motivations could be a useful tool in formulating public policies for their willingness to recycle and upcycle. Willingness behavior is an extended version of Theory of Planned Behavior and understanding of reactive and proactive recycling behaviors in this study aims to enhance understanding of the psycho-social factors which determine the willingness and intention to recycle.

III.Methodology

The study utilized quantitative approach with survey questionnaire as the tool to garner feedback from selected 100 household residents living within the vicinity of the council of Shah Alam, a city rebranded as eco-green city in 2012 by the municipal council. Initial observations were made of households' waste disposal behavior including waste reduction practices. Samples of households were then selected using purposive sampling. This selective sampling was deemed fit for this study's methodology to restrain it to specific circumstances in recycling experience. Hence the purposive sampling criteria included urban, middle class, working and non-working residents living in Shah Alam with recycling experience. Self-administered questionnaires were subsequently distributed to one of the members of the household who had engaged in recycling activity to tap on their recycling habit and further willingness to separate wastes. Data was initially subjected to factor analysis to generate recycling groups and their distinctive recycling behaviors. Multiple regression analysis was further employed to determine the relationships between two proactive and reactive recycling groups and the determinants on willingness to recycle.

IV.Findings and Discussion

Analysis on respondents' willingness to recycle as the dependent variable was examined based on their level of involvement and engagement in recycling household wastes in the residential city of Shah Alam. Using factor analysis, dimensions of willingness to recycle revealed two distinct groups of recyclers. The two groups were subsequently labeled as proactive recycling and reactive recycling groups. Recycling behaviors yielded four factors. Factor analysis results showed all scores were above 0.5 and favorable and acceptable reliability scores at 0.7 and above. Refer to Table 1 on the summary of factor analysis results.

Proactive recycling behavior revealed characteristics of households that believe in taking care of the environment by recycling and enjoyment in doing recycling activity. They tended to have positive views of recycling as good for the environment as well as easy and fun. They felt social pressures from friends and families to recycle on how others view negatively if they did not recycle. This group can be regarded as the proactive recyclers whilst reactive recyclers were perceived as residents that generally do not care about recycling, lacked interest and responsibility to do recycling as they were too busy. As reactive recyclers, they were also less likely to engage in recycling and felt that local authorities should be responsible to manage and sort household waste.

Factor analysis on willingness of residents towards recycling activity yielded four factors with acceptable reliability scores above 0.8. Familiarity with recycling benefits showed respondents who are aware and knowledgeable about recycling and its benefits and facilities. There was participation and support for recycling programs organized by city council. Factor two on recycling habit showed characteristics of awareness and care for the environment but only do so only if there was enough time and accessibility to recycling facilities in encouraging them to recycle. Factor three focused on willingness to recycle based on convenience. Elements of recycling services and facility inconvenience in terms of time, space, ease of storage and sorting out wastes were identified. Factor four indicated willingness in environmental involvement with recycling activity done only if households had enough time and if their neighbors, friends and family are also involved in recycling activity.

Table 1: Summary of Factor Analysis

Variable	No of Scale items	Label	% Variance explained	Reliability Score
Dependent 1	7	Proactive Group	4.515	.91
Dependent 2	3	Reactive Group	1.815	.70
Independent 1	12	Familiarity with recycling benefits	5.545	.88
Independent 2	6	Habitual recycling	3.123	.83
Independent 3	2	Convenience of recycling facilities and services	1.679	.7
Independent 4	2	Low environmental involvement	1.443	.7

Next stepwise regression analysis was employed to determine the relationship between the factors of willingness to recycle to proactive and reactive behaviors. Results are shown in Table 2 and 3. Analysis shows that familiarity with recycling benefits ($\beta=0.55$, $t=-2.16$, $p<0.05$) and convenience with recycling services and facilities ($\beta=-0.55$, $t=7.89$, $p<0.05$) were statistically significant in predicting proactive recycling behavior. Both factors also explained a significant proportion of proactive recycling ($R^2 = .65$). Findings explained that proactive recycling behavior among households in Shah Alam is influenced by residents who are pro-environmental who are aware and have knowledge of the benefits of recycling. They were more regular recyclers that exhibit environmentally-friendly behaviors supporting and participating recycling efforts and activities organized by councils and organizations. Such proactive behaviors can be explained by internal and external locus of control based on individual recycling efforts, economic motivation and benefits of recycling as well as personality characteristics such as altruism. Results are corroborated by previous studies by Cleveland et al., (2005); Kollmus and Agyeman (2002). Past research by D'Souza (2005) has labeled this group as a green consumer segment called The Living Greens.

Table 2: Relationship between Factors on Willingness to Recycle and Proactive Group

INDEPENDENT VARIABLE	β	F	t	p-value
Familiarity of Recycling benefits	.551	.070	7.899	.001**
Habitual recycling	.109	.127	.859	.392
Convenience of recycling facilities and services	-.545	.253	-2.157	.034*
Environmental involvement	-.023	.258	-.088	.930

Dependent variable: Proactive Recycling

$R^2=0.645$

**Significant level at $p \leq 0.05$

Subsequent regression on reactive recycling behavior generated results with only one predictor namely habitual recycling ($\beta=0.21$, $t=3.59$, $p<0.05$) statistically significant in explaining reactive recycling behavior. 42.7% of the variance in reactive recycling was explained by recycling habit. In comparison with proactive recycling, individuals that exhibit reactive recycling behavior tended to perceive recycling willingness as socially undesirable behavior, hence they were more reluctant recyclers. Recycling habit was affected by situational factors and together with ambivalent attitude towards the benefits, convenience and awareness of recycling. These could explain their eco-unfriendly behavior.

Further study by Ojala (2008) confirms that there exists an ambivalent attitude in recycling on whether it is something beneficial for the environment and is a civic duty. Negative emotions (worry) and positive emotions (hope and joy) on environmental problems were positively related to recycling. Hence reluctance and low involvement in environmentalism were attributed to lack of information, inability to integrate ideals about living in an environmentally friendly way with the everyday life and low self-efficacy. Related study on e-waste recycling shows that having strong moral norms help explain household willingness to recycle followed by recycling convenience, knowledge of the potential toxicity of e-waste, prior e-waste recycling experience (Saphores et al., 2012).

Table 3: Relationship between Factors on Willingness to Recycle and Reactive Group

INDEPENDENT VARIABLE	β	F	t	P-value
Familiarity of Recycling benefits	.025	.031	.804	.424
Habitual recycling	.206	.057	3.594	.001**
Convenience of recycling facilities and services	.172	.114	1.516	.133
Environmental involvement	.220	.116	1.897	.061

Dependent variable: Reactive Recycling

$R^2=0.427$

**Significant level at $p \leq 0.05$

V. Implications and Upcycling Prospects

The two distinct recycling groups namely the proactive and reactive groups in their willingness to recycle have implications for public policy makers. Understanding factors that motivate proactive and reactive recycling allows government notably the municipal councils and business initiatives to target the recyclers with appropriate campaigns and measures. As the Malaysian government acknowledges the acute problem of household waste and recycling as a crucial activity in ensuring sustainable environmental protection, the key challenge is how best municipal councils and businesses can take appropriate and effective initiatives to assist in mitigating this problem.

Based on the findings of this study, proactive environmentalism measures are recommended to tackle the management of household waste. For example, in Thailand, it was found that both economic incentive and perceived recycling facility condition do directly influence household recycle intention however higher responsibility level tends to weaken the impacts of economic incentive and perceived facility condition on willingness to recycle of household (Ittiravivongs, 2012). The Shah Alam City Council provides eight recycling centers for residents to earn income out of recycle household used items such as curbside recycling for charity, recycle for cash and voucher redemption. Although economic incentives are important, however it is not the only driving force to recycle willingly. Studies have shown that provision of a proper infrastructure that supports recycling is more effective in encouraging recycling (Saphores et al., 2012). Findings in this study found that reactive recyclers were more reluctant to recycle due to inconvenience of recycling caused by inaccessibility to

recycling facilities, difficulty of sorting waste and lack of storage space for waste. The current systems could be lacking in terms of curbside delivery as well as lack of moral obligation and awareness to recycling facilities.

Findings from this study have impactful implications on the current system of mandatory garbage separation for households in several states which were implemented effective 1 September 2015. Local authorities must ensure that households are prepared for the mandatory practice of the 2+1 system, how to use bins and consequences of compounds for noncompliance. For example, in the case of high-rise residences in urban cities in Malaysia, it is the responsibility of the joint management bodies (JMB) to ensure that the residents separate their waste accordingly, failing which the JMB will be penalized if the waste is not separated.

Malaysia is still lacking in terms of full scale household waste management. Initiatives to handle e-waste and food waste management are still at planning stage. It was found that in Japan, the introduction of household food waste separate collection and recycling systems by municipalities has been considered difficult. The success of such initiative depends highly on how actors such as the states, corporations, municipal authorities, and ordinary citizens interacted with one another and can accommodate each other's interests. However, several countries such as Taiwan and Sweden, most municipalities have successfully introduced full scale closing-the-loop sustainable measures in household waste management, even in populated urban areas. In other examples, Denmark's resource strategy treats all waste as a resource that should either be recycled or reused with a target of recycling 50 percent of all household waste by 2022. Similarly, in the Netherlands, there are stringent reuse legislation on the collection of household waste, e-waste, and regulated car demolition. Sweden legislated electronics recycling by passing a law that requires retailers selling electronic goods to accept the same quantity for reuse or recycling. Malaysia has yet to embark on a full-scale plan on managing other household wastes such as food waste and e-wastes.

Measures should not be just creating awareness, encouragement and improving education of recycling but mandatory measures for households to throw away less, recycle more and separate waste at its source. For the proactive group of recyclers with pro-environmental attitudes, they are more obligated and concerned for environmental protection, initiatives by local authorities should aim at getting these households to engage and support upcycling activities besides recycling. Upcycling is a relatively new concept and is known as the process of converting useless products into valuable products that are of higher quality and benefit to the environment. Upcycling is like recycling in that it helps create less garbage, thus minimizing environmental impact, yet it differs in that it involves giving something old a new use. For example, Terracycle asks people to recycle their old food wrappers and pays them for doing it which they then upcycle into new, usable goods, such as a backpack or notebook. This type of production highlights the idea of "cradle to cradle," or the eradication of the idea of waste.

Upcycling contributes environmental benefits by lessening the amount of waste going into landfills and reduce carbon emissions. For example, in Ecofashion, upcycling is the new wave of sustainable fashion. It saves money, as it allows one to find new uses for old clothes, promotes sustainable innovation and creativity, and can provide fun crafting time as well as preserve precious resources (www.pachamama.org/). There are social and personal benefits for both the designer/producer and the consumers too. This new production and material sourcing method has formed an entirely new industry both in small rural village communities in craftsmanship and among as well as boutique niche businesses around the western world. Ultimately the biggest benefit for the end consumer aside from knowing that they have contributed positively to saving the planet is that they walk away with a unique, quality and marketable one of a kind designer product that is often made by hand culminating into a win-win situation for the users and the environment (www.upcyclestudio.com.au).

VI. Conclusion

Findings of the study had implications for environmental policies for government and local authorities. Both proactive and reactive groups of recycling exhibit different behaviors towards their willingness to recycle, hence requiring customized incentives and programs. However, the main challenge is to increase the recycling rate among Malaysians notably among urban households. As the main limitation of this study was confined to only one local council and selected households and general recycling behavior, hence future study could be further extended to include larger and wider household groups in other local councils. As the waste separation scheme has yet to be made mandatory nationwide, studies can probe on household and market engagement in waste separation scheme which forms a major initiative in the management of household wastes of the remaining local

authorities in Malaysia that have yet to embark on this scheme. Policies of advocacy rather than punishment should form the main criteria to households to engage in proactive recycling.

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