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CONTENTS

Source Waste Separation Behavior among Shah Alam Households

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ABSTRACT

One of the main contentious recycling issues in Malaysia is household solid waste management. With solid waste build up and bottlenecks reaching its limit at landfills, local councils face uphill tasks to manage. Solid source waste separation (SWS) for households was first officially enforced across eight states in Malaysia on 1 June 2016. However, Selangor has yet to enforce this system and has left it to be selected local councils to embark on pilot projects. It has been iterated that Selangor which has the largest population in Malaysia should adopt the law on mandatory SWS for households as it is already facing a garbage disposal crisis. Previous studies have been documented on recycling behaviour, but few delve into SWS. This paper examines household behaviour towards SWS intention in Shah Alam. Based on the Theory of Planned Behaviour, influences of attitude (ATT), subjective norms (SN) and perceived behaviour control (PBC) towards SWS were determined. Methodology utilized interviews with two local councils and observations on household recycling behaviour. Survey was administered on 150 households. Using PLS analysis, results indicate ATT and PBC have positive and significant influences on SWS intention while subjective norm was not significant. Findings had some implications on strategies for local councils in managing SWS system.

Keywords: *Recycling, source waste separation, attitude, subjective norm, perceived behavioural control*

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INTRODUCTION

One of the main issues in recycling that has proven to be contentious is household solid waste management. Waste management in Malaysia has always been a sore point. In 2016, the recycling rate in Malaysia stood at an appalling rate of only 17.5 percent, compared to Singapore, 59 percent, Hong Kong with 45 percent, in Germany, 47 percent and in South Korea with 49 percent (National Environmental Health Action Plan, NEHAP, 2016). The build-up of solid waste posed tremendous threats to the environment such as land and air pollution, health problems for communities and mounting bottlenecks at landfills. To date, the problem of waste management continues to loom as one of Malaysia's biggest issues. Rapid population growth notably in the urban areas has led to escalating consumption and disposal rates much more than what Malaysia's utilities can handle. This has hindered continuous efforts by the local authorities that have been trying to curb the flow of garbage onto sidewalks, landfills, through rivers and over hillsides. Malaysia's rapid change in urban development and the throwaway culture have added to problems of waste management. Among the generated waste, food waste forms 45 percent of the main component while more than 30 percent are potentially recyclable materials such as paper, plastic, aluminium, glass which are still directly disposed in landfills.

From 2005 to 2016, the generation of municipal solid waste doubled but disposable rate still stood at 95 percent to 82.5 percent respectively. Malaysia did not embark on SWS for households and business owners until 2015. On 1st September 2015, the Malaysian government started a new recycling program on Separation of Solid Waste at Source supported by the Solid Waste Management and Public Cleansing Corporation. The objective of this program is to get households to separate their waste remnants like leftover food, diapers and other organic wastes and other solid wastes produced at home such as paper, plastic, and other recyclable materials (Mahmud & Osman, 2010). The program was subsequently officially enforced across eight states in Malaysia on 1 June 2016. However, Selangor has yet to enforce this system and has left it to be selected local councils to embark on pilot projects. It has been iterated that Selangor which has the largest population in Malaysia should adopt the law on mandatory waste separation (WS) for households soonest possible as it is already facing a garbage disposal crisis.

SWS is defined as the practice of setting aside post-consumer materials and household goods so that they do not enter mixed waste streams (Zhang et al., 2010, p. 928). Under the waste segregation at source policy in Malaysia, residents have to separate solid wastes into recyclable, residual and bulky or garden wastes. The scheme follows a 2+1 collection system with recyclable waste collected once a week and residual waste twice a week. As for high-rise communities, the joint management bodies of the premise will handle the WS system. After more than one year of implementing of SWS, councils continue to face challenges in getting full participation from urban households. It was reported that urban households generate the most household waste and are also the worst when it comes to sorting waste at source. Among the excuses given for failing to abide by the compulsory SWS were lack of time and other commitments such as family and work. One of the major issues involved residents, especially those living in non-landed and high-rise properties who are ignorant about the new requirement. As the SWS policy is at the initial stage and not yet mandatory across the country, a study to understand household behaviour towards SWS to enable a more effective, faster and improved system to be implemented nationwide is warranted.

The Shah Alam City Council or known as Majlis Bandaraya Shah Alam (MBSA) is one of the local councils that has embarked on a pilot project as initiatives to conduct SWS at 5 selected housing areas from its 36 districts, although it is not yet mandatory. SWS in this study is measured by household intention to participate voluntarily in the pilot program that involved the distribution of biodegradable plastic bags and a green recycle bin to each participating household which required them to sort wastes using colour coded plastic bags: blue plastic bag for paper, orange for plastic, and brown for glass and aluminium.

Using the Theory of Planned Behaviour (TPB) by Ajzen (1991) as the theoretical framework, ATT, SN and PBC as factors influencing SWS intention among households at Shah Alam were investigated. Several past studies in Malaysia on recycling behaviour in general and solid waste recycling have been undertaken, however as SWS is a newly implemented scheme in Malaysia, there is still a dearth of study in this area. Hence this study is of significance to local authorities and policy makers on household waste management and to understand their waste generation and

separation at home to ensure full participation in this recycling initiative. The TPB revealed that behaviour is predicted by three main factors which are attitudinal, normative, and perceived behaviour control factors. This theory has been widely used to explain why a wide range of intentions and behaviour can gain satisfactory results towards recycling intentions. Several studies on recycling in Malaysia have confirmed relevant use of this theory to explain determining factors of recycling behaviour (for example Ramayah et al., 2012; Mahmud & Osman, 2010; Goh et al., 2012; Ab. Karim Ghani et al., 2010). Similarly, other studies across different countries have used TPB to show the influence of the three main factors towards recycling intention (for example Wan et al., 2012; Wang et al., 2016; White & Hyde, 2012; Nigbur et al., 2010; Ari & Yilmaz, 2016). This study specifically measures SWS intention which involves more effort, energy and time spent to sort household waste as well as perceived willingness to engage in this activity as a mandatory requirement.

Ajzen (1991) defines attitude as a psychological construct which represents an individual's readiness to act or react in a certain way. In this study, attitude means the extent to which households are aware of, care about and view household WS in their areas. Attitude in terms of affective and instrumental dimensions both play an important role in recycling intention formation process (Kraft et al., 2005). Attitude determines people willingness to engage in WS behaviour, evidencing a positive willingness which is based on a positive attitude, WS knowledge, and also moral obligation (Zhang et al., 2015). For attitude towards WS recycling, this study analysed the positive and negative evaluation made by the households in engaging in WS recycling. Attitude also involves individual knowledge and perception about WS recycling behaviour. Past studies found that willingness to sort household waste at home by householders is directly related to participation in the program (Momoh and Oladebeye, 2010). In the Malaysian context, household attitude had a significant impact in determining their participation in recycling that relies on the level of environmental awareness and understanding of recycling (Omran et al., 2009; Ramayah et al., 2012). Hence hypothesis 1 is postulated as H1: Attitude has a positive influence on SWS intention.

Subjective norm or social norm is defined as the perceived social pressure to perform or not to perform the behaviour in question (Ajzen, 1991,

p. 188). This study analysed the subjective norms in terms of households' expectation and motivation to participate in WS recycling. As subjective norm becomes more favourable, behaviour intention for recycling would increase especially among young adolescents whose behaviour is influenced by peers and when recycling is seen as public behaviour (Mahmud & Osman, 2010). However, SN also shows people could be pressured about what others would perceive about their reputation if they did not recycle and family upbringing based on moral norms (Wendt, 2017). Recent studies on WS recycling in other countries revealed that personal moral norms and peer influence did explain WS behaviour (Ekere et al., 2009; Nyugen et al., 2015). Based on the above evidence, hypothesis 2 is formulated as H2: Subjective norm has a positive influence on SWS intention.

PBC is the extent to which an individual feels able to enact the behaviour, which is a function of one's control belief and perceived control with belief. Control beliefs are a person's beliefs toward factors present which facilitate or prevent the performing of a behaviour (Han & Kim, 2010; Tonglet, Phillips & Read, 2004). PBC in recycling is when people consider that recycling is not an easy task, which is with constrains. Each of the selected household has been authorized to do the recycling but with time as a constraint, usually as the assumption is , it will take more time to sort waste but the matter is, if they can control, if and only if they want to recycle, due to the awareness for the goodness of recycling toward the country or the earth and if there are facilities that have been prepared to do so then they will do it. Zhang et al. (2015) claimed that PBC reflects an individual's experience and anticipates obstacles. In this manner, if the person has more resources and opportunities in performing a specific behaviour and fewer expected obstacles, the stronger will be the PBC, making the behaviour more significant. Recent studies have shown that PBC is a strong predictor of reducing plastic consumption (Syed Hasan et al., 2015), curb side household waste recycling (White & Hyde, 2013) and perceived convenience of WS (Zhang et al., 2017). Based on the above, Hypothesis 3 is developed as H3: PBC has significant positive influence on SWS intention.

METHODOLOGY

Methodology entailed mixed methods. As part of the qualitative approach, personal interviews using semi-structured questionnaires were conducted with a local authority in Shah Alam and Subang Jaya in Selangor. The aim of the interview was mainly to identify the issues to establish the problem statement of the study. Personal interviews were done several times with an environmental officer at Shah Alam local council who oversees household waste separation program.

Observations were made on selected households in Shah Alam to view their sorting activities and behaviour. 4 houses were selected at the 5 housing sections namely Section 7, Section 32, Section U8, Section U13, and Section U16. Observation was made on the types of waste that households have been recycling and segregating. Findings from interviews and observations assisted in modifying items in the questionnaire.

Subsequently a quantitative study was undertaken using the survey approach on 150 households in 5 sections of the housing areas in Shah Alam where a pilot project had commenced in 1 October 2015. Quota sampling was employed in the sampling procedure with 50 households selected conveniently from each of the 5 sections of the housing areas under the pilot project. This ensures representation of households from the selected areas that have experienced segregating wastes and the collection system under the SWS scheme.

RESULTS AND DISCUSSION

Based on observations made on waste separation recycling program, it was found that the selected households for each area did understand how to separate their wastes according to the recycling items (plastic = orange, paper = blue, aluminium and glass = brown). Households were able to follow the procedures to separate and recycle their waste given by MBS indicating that they had no difficulties to separate and recycle waste since they are fully aware of the recycling program initiated by MBSA. Interviews with the MBSA officer revealed a poor recycling culture among the younger age group and scepticism on the participation from the high-rise non-landed

property owners such as flats, apartments and condominiums. Councils found that many plastic bags (blue, brown and orange) had to be distributed to households due to the high garbage disposed. Hence, the main challenge is how to educate households to reduce waste disposal. Poor collection system and inconsistent collection time are teething problems faced by the authorities in getting the full cooperation from the households. Findings from the interviews assisted in determining the problem statement and modifying the items in the survey questionnaire and in making policy recommendations for local authorities as discussed in the implications Section below.

In terms of the demographic profile, on average, each household comprise 3 to 4 members (42.7%) with wife (47.3%) and husband (31.3%) who had participated in the survey. Most of the households were Malays (69.3%) and in the age range 31 to 40 years old (36.7%). The profile is typical of an average household in Shah Alam. This was supported by a study by Chee and Narayanan (2006) on recycling behaviour among Malaysians, which found the average Malaysian, aged 25 to 35 to be more aware and had engaged in some form of recycling.

Table 2: Discriminant Validity (HTMT)

Variables	1	2	3	4
Attitude				
Perceived beh control	0.562			
Source waste separation intention	0.787	0.541		
Subjective norm	0.243	0.416	0.246	

With the use of Smart PLS (Ringle et al., 2005), data was analysed with path analysis involving partial least squares to evaluate the hypotheses. Both measurement and structural models were assessed for its reliability and validity as show in Table 1. One item from ATT and two from PBC were dropped from the analysis due to low factor loadings, below the threshold value of 0.5 (Hulland, 1999). Scales were reliable with a Cronbach Alpha above 0.7 (Nunnally, 1978), all items achieved composite reliability (CR) > 0.7 and Average Variance Estimated (AVE) above 0.5 (Hair et al., 2017). Table 2 presents HTMT values which are lower than 0.9 (Henseler et al., 2015) indicating that discriminant validity has been established. Path analysis was performed to determine beta coefficients to determine the

influence of ATT, SN and PBC on SWS intention. Further analysis using the bootstrapping procedure of 500 runs of construct-level changes was operated to obtain t statistics and p values of the path coefficients. No strong multicollinearity was detected (VIF<5) and an effect size (f2) of 0.6 was obtained.

Table 3 presents the results of the path analysis. ATT and PBC on SWS intention yielded significant results with (β=0.64, t=11.721, p=0.001) and PBC (β=0.154, t=2.315, p=0.01) while SN was not significant. The model explains that 53% of variation in SWS intention is explained by the three factors. Only H1 and H2 are supported and statistically significant at the 5% level of significance. Hence there are other potential determinants that could explain SWS.

Table 3: Path Results

Relationship	M	SD	β	t	p	f2	VIF	R2
ATT -> SWS	0.632	0.055	0.64	11.721	0.001	0.679	1.295	
PBC -> SWS	0.158	0.066	0.154	2.315	0.011	0.034	1.47	
SN -> SWS	0.044	0.066	0.017	0.263	0.396	0.001	1.261	0.534

Fig 1 presents the structural model. The extent to which a household member at Shah Alam intends to engage in SWS is influenced by personal ATT and PBC. ATT had a stronger influence than PBC. Past studies by Mosler (2008) and Tonglet et al. (2004) indicated similar results that showed that ATT had the greatest impact and is a significant predictor on most recycling intention. Households at Shah Alam had positive feelings towards SWS and were interested and perceived it as good, hygienic, interested and could create a better community environment. These were mainly on the affective attitude components. The strong attitude could be attributed to recyclers who are fully aware and understand SWS when the MBSA implemented the pilot project. This could be explained by their feelings towards social benefits of recycling which may have motivated their recycling intention as proposed by Goh et al. (2013). Results were further corroborated by other studies by Omran et al. (2009); Karim Ghani et al. (2013) and Wan et al. (2012). However, findings from these past studies were focused on recycling behaviour in general and not particularly on SWS as very few studies on SWS have been documented especially in Malaysia.

Many studies have found PBC to have a significant influence on recycling intention (Ramayah et al., 2012; Kraft et al., 2005; Ittiravivongs, 2012), although few other studies showed to be not significant (Cheung et al., 1999; Boldero, 1995). When there is ascription of responsibility by others such as local authorities and support from the community can turn intentions to positive actions towards SWS. Hence local governments play an important role to provide sufficient facilities with ease and convenience to successfully plan and execute the SWS scheme. Another specific study revealed the neccesity of a corresponding household waste management system that involves all stakeholders to support and ensure effective SWS (Zhuang, 2008).

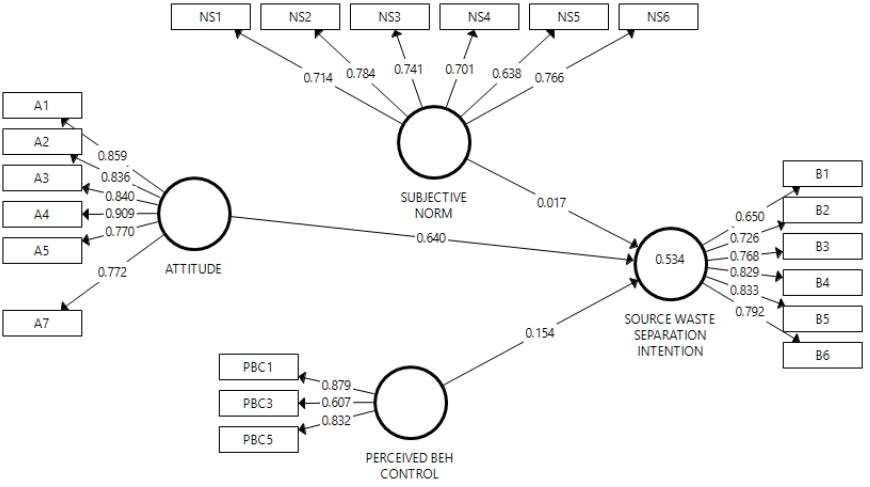

Figure 1: Structural Model

SN was not found to be a significant predictor in SWS among Shah Alam households. SN could not fully explain household's intention to separate waste. Generally, SN as a factor influencing recycling has shown mixed results. It has proven to be a significant factor in some studies (Ramayah et al., 2012; Mahmud & Osman, 2010) while some studies have found otherwise (Schwab, 2014; Bratt, 1999). It has been argued that social norms do account for human behaviour but could be weak in SWS recycling as it requires more effort and hence need incentives and other external support to get households to participate. It was revealed that Malaysians have a positive intention to separate food waste only with

provided opportunities, facilities and knowledge to be made available by respective local authorities. Also important are situational factors such as storage convenience and collection times (Karim Ghani et al., 2013). The influence of SN alone many not motivate intention to separate waste. It must be coupled with active support and investments from housing developers and property management bodies together with community residential committees in enhancing public participation and awareness of the importance of SWS. This could apply for the case of high rise buildings in Malaysia where joint management bodies are responsible for SWS in their premises.

IMPLICATION, CONCLUSION AND FUTURE STUDIES

In this study, attitude remains the strong predictor of SWS as with most other forms of recycling. Findings have some implications for council's household waste management program. Awareness and knowledge of WS at source and understanding of recycling and its impact on the environment are vital to ensure full participation by households. It appears as the main reason for acceptance and participation of this new form of recycling. Hence local authorities such as MBSA and other local councils planning to implement WS for the first time must organize well designed public information and education campaigns with clear, understandable and easily accessible written information to first time and would-be participants in the program, be it pilot or at the initial stage of implementation of WS program.

As Malaysia is a multi-ethnic society, multiple language information in newspapers, flyers, and brochures are necessary. It must also be iterated that these local councils capitalize on the use of social media via web pages to waste generators notably to inspire young Millennials to reduce and separate waste, emphasizing on the benefits of recycling. This should support and enhance word-of-mouth (WOM) and e-WOM to increase participation in SWS. It was documented that environmental knowledge and attitude of young people is crucial as their point of view ultimately plays an important role in providing solutions to future environmental problems (Ehrampoush & Moghadam, 2005). Teo (2016) proposes ways to tackle recycling behaviour of proactive and reactive recyclers based on their different attitudes. Policy makers when implementing the pilot SWS programs should devote efforts

to provide collection service and improve household waste management by combining government financial budget and incentivizing households for voluntary WS. Zeng et al. (2017) showed that the main barrier to WS was lack of awareness and inconvenience followed by insufficient separation facility. It has been suggested that a compatible fee charging system, higher levels of subsidies, and well-designed public information and education campaigns are required to promote voluntary SWS and reduction (Han et al., 2016). However, these incentives and fee measures need to be carefully studied and properly executed to prevent negative counter and crowding-out effects.

Findings in this study found SN is not a significant predictor of SWS. This has theoretical implications on the adequacy of TPB in explaining intention to separate waste. Several studies have investigated moral norms as extension of TPB to predict recycling behaviour (Chan & Bishop, 2013; Poskus, 2015). Personal norms and psychological values were found to be directly and positively influencing recycling behaviour **(**Oom Do Valle et al., 2005, Bratt, 1999). Authors have suggested that the TPB model could be measured by additional observed variables to explain recycling. Future studies could assess how well respondents are informed about the economic benefits of SWS and about the recycling process itself to encourage proactive and actual participation and ultimately the success of the program. A more recent study by Wendt (2017) discovered that Millennials form recycling intention but it does not necessarily lead to action as SWS behaviour could be influenced by past habit, facilitating conditions, and affective evaluation. Recycling intention tends to be driven more by self-interest and long-term concern for communities and the environment, upbringing and pressure from others.

The main limitation of this study is it was confined to one location and one district local council with a small number of selected households being sampled and observed at the pilot stage. However, the focus of the study was on SWS, a new recycling program initiated in 2016 and hence the findings are new contributions to recycling behaviour knowledge. It is suggested future studies be extended to include larger and wider household groups on the 8 local councils that have already implemented this program to measure on actual SWS, impact and challenges, problems encountered and success of the policies. Results indicated that only 53% of SWS is explained by

PBC, SN and ATT. There could be other potential determinants that could explain SWS. Future studies can explore further into internal and external facilitating conditions, past recycling habits and affective values. Further analysis into intention and actual recycling actions of the Millennials should be investigated. Additionally, since the SWS scheme has yet to be made mandatory nationwide, studies can probe further on household and market engagement in SWS 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. Malaysia aims to achieve a recycling rate of 22 percent by 2020 (National Environmental Health Action Plan, 2016). Whether policies of advocacy rather than punishment should form the main criteria to households to engage in proactive SWS, could be probed further by extending the TPB model or other environmental behaviour models with new variables to determine pro-environmental behaviour as well as on low recycling rate and the slow uptake of SWS initiatives in Malaysia.

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