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A Study on Consumer Recycling Behaviour on Solid Waste in Nilai

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Abstract

Solid Waste Management has been recognized as one of the challenges for Malaysia which the landfill method of waste disposal is no longer appropriate. Increase in waste generation, inadequately managed and uncontrolled dumpsites are all indicator of the poor waste management becoming one of the nation's biggest issues to date. Around the world, solid waste management reveals an environmental consciousness, which has risen among the societies of environmental of environmental awareness and advocacy of environmental issues and concerns among the public. This paper explores the factor influence the recycling intention behaviour in Nilai. The design of this study is quantitative research whereby a set of hypotheses are devised and data is collected from a sample using a self-administrated questionnaire to test the proposed model and data collected from 150 questionnaires were analyzed. The findings indicate the need for a different recycling strategy, creating environmental awareness, and improving educational systems to enhance the recycling rate in Nilai.

Keywords

Accessibility, Acceptability, Affordability, Availability, Awareness, Solid waste management, Recycling intention behaviour

Introduction

Solid waste is solid substance commonly known as trash or garbage (Ghafar, 2017). Poor environmental quality is an inescapable presence in many developing countries (Connell and Kozar, 2015). The inadequate solid waste management can delve into the prevalence of pollution in developing countries (Moh and Manaf, 2014). The inadequate solid waste management causes indiscriminate disposal and unsanitary environment, environmental deterioration, and eventually affects the quality of life (Samsudin and Don, 2013). Several articles (Saeed, Hassan and Mujeebu, 2009; Wright and Wright, 2011; Singh, 2013) unveil that the rapid increase in the number and intensity of environmental issues debilitate the human societies. The environmental degradation on ecological quality has been threatened the quality of life of modern societies (Budhiarta, Siwar and Basri, 2012). Furthermore, the methods and techniques for waste collection and disposal vary widely among different countries and regions (Moh and Abd Manaf, 2014).

According to Worldbank (2017) reported around 1.3 billion tonnes of solid waste are generated globally every year, with the current of 1.2 kilograms per person per day, is expected

to reach 2.2 billion tonnes by 2025. This all sounds so overwhelming. The waste generation rates are rising. The poor waste management places significant, and at times overwhelming, pressure on the capability of municipalities to manage waste.

Traditionally, the landfill is the solution for solid waste disposal in Malaysia with approximately 80-95% of the total collected waste sent to landfills (Ghafar, 2017). However, such an action can pose an obvious and impending risk to societies and eventually, the earth (Khalil, Abdullah and Manaf, 2017). The causes of environmental degradation are mainly due to anthropogenic activities, thus it is vital to shaping pro-environmental behaviour (Abdul, Omar and Bidin, 2018).

"In most developing countries, local governments have the authority and responsibility for planning and operating municipal solid waste management" (Badgie et al., 2012). In fact, Malaysia's government has been putting efforts to encourage household recycling activities since 1993 through the National Recycling Campaign, and subsequent effort of 2ND nationwide recycling and awareness campaign conducted in the year 2000 to discuss the matter of enhancing community-based participation among the local authorities, social-entrepreneur, and NGO (Wu, Zhang, Lu, et al., 2014). However, the waste management system in Malaysia still remains inadequate and costly (Badgie et al., 2012).

Waste Segregation Enforcement in Malaysia

In Malaysia, Ministry of Urban Wellbeing, Housing and Local Government (UHLG) enforces the law on waste segregation in several states such as Kuala Lumpur, Putrajaya, Pahang, Johor, Melaka, Negeri Sembilan, Perlis, and Kedah (Sheith, 2016). The minister mentioned that RM2 billion was spent annually on waste separation and public cleaning work in the nation to improve the current recycling programs. The rationale of launching on waste separation activity is to encourage proper disposal of waste and reduce consumption as parts of comprehensive waste management policy in Malaysia, which conceptualize the 3R (Reduce, Reuse, Recycle) approach, as mentioned by Clean Malaysia (2016). Furthermore, under the Solid Waste and Public Cleansing Management Act 2007 (Act 672), residents have to separate waste into categories such as plastic, cardboard, glass metal and food remains which sorts the garbage into different garbage bags. Household who fail to comply with the law will be held liable to a maximum fine of RM1000 (Clean Malaysia, 2016).

It has been two years since Malaysia started enforcing waste separation on 1 June 2016. This enforcement also is known as Solid Waste Management and Public Cleansing Management Act 2007 (Act 672). Well, not the whole of Malaysia, only KL, Putrajaya, Pahang, Johor, Melaka, Negeri Sembilan, Perlis, and Kedah implemented it. With Malaysia's current recycling rate of 17.9% is still far from the target of 22% by 2020 set by the government. According to the government (Urban Wellbeing, Housing and Local Government), it has become a crucial issue to solve. Meanwhile, this study focused on Nilai, a town located in Seremban District, Negeri Sembilan. Nilai is a rapidly growing town surrounded by many industrial areas and development projects with the majority population being Chinese. With such traits, the waste management in Nilai become a major challenge for the Negeri Sembilan government.

Theory of Planned Behaviour

Theory of Planned Behaviour (TPB) is a theory that link one's belief and behaviour, developed by Ajzen in 1991 (Sheith, 2016) that underpinning in this study. The behaviour determined by intentions, attitude, and subjective norms which can lead to a person in displaying the behaviour or act. The TPB provides a theoretical framework for systematically investigating the factors that influence the recycling intention behaviour. This study uses the TPB as the foundation to identify the factors (availability, accessibility, affordability, acceptability, awareness) towards the recycling intention behaviour in Nilai. To date, TPB has been widely used to determine the environmental intention related behaviour (Garces *et al.*, 2002; Omran *et al.*, 2009; Connell and Kozar, 2015; Brian, 2016; Ghafar, 2017).

Availability

Availability refers to the availability of the recycling program, including the facilities, infrastructure, information, technology, method, service provided by local authorities (Zen, Noor and Yusuf, 2014). Besides, availability denotes to collection options, audience or geographic restriction, and restriction of materials (Jaouda Hamad, Hanafiah and Abdullah, 2017) become constraints in implementing an effective solid waste management.

H1: There is a significant relationship between availability and recycling intention behaviour.

Accessibility

Accessibility indicates to the geographic distance between the location of resident and the location of the recycling infrastructure vary considerably from place to place and local recycling levels (Omran *et al.*, 2009). The travel distance from home to recycling facilities or recycling centre, garbage collection times, environmental knowledge and awareness of recycling present the crucial element for managing solid waste disposal (Zen, Noor and Yusuf, 2014).

H2: There is a significant relationship between accessibility and recycling intention behaviour.

Affordability

Affordability is associated with the waste collection and disposal of each individual, which fits the income level of the households has the direct impact on recycling intention behaviour (Samsudin and Don, 2013). The garbage collection fee, the different type of material recycling fee (recycling centre), and method of recycling can vary from the pricing options of providers who provide waste management service (Ghafar, 2017; Jaouda Hamad, Hanafiah and Abdullah, 2017).

H3: There is a significant relationship between affordability and recycling intention behaviour.

Acceptability

Acceptability from the public acceptance regarding the waste management program is crucial when implementing the project, such as space limitation, cost of recycling (effort), and morale of residents to maximize the public acceptance (Azahar, 2014). The public acceptance often views as the principal of "obstacle" (Moh and Abd Manaf, 2014) to implement any recycling projects.

H4: There is a significant relationship between acceptability and recycling intention behaviour.

Awareness

Awareness of recycling is important to raise the environmental awareness. According to Connell and Kozar (2015), mentioned that a lack of awareness about recycling remains one of the biggest barriers to increasing recycling participation. The educated household tends to have a better understanding about the proper waste management. On the other hand, lack of environmental knowledge may prevent the formation of environmental attitudes and engage in environmentally preferred behaviour (Zen, Noor and Yusuf, 2014; Jaouda Hamad, Hanafiah and Abdullah, 2017).

H5: There is a significant relationship between awareness and recycling intention behaviour

Materials and Methods

A cross-sectional study was applied to a sample of 150 consumers (M=40, F=60), who were invited to participate in this study. We investigated the availability, accessibility, affordability, acceptability, awareness, and recycling intention behaviour in Nilai. Sample size calculated was 381 with a confidence level of 95% and 5% margin of error based on 38,000 populations (Department of Statistics Malaysia, 2017) in Nilai by using the Raosoft calculator. However, in this study, 200 samples were taken from a normal distribution and resulting in 150 samples were deemed valid after data collection. The respondents selected among the individuals who age 18 and above, female and male respondents, the income level of less than RM3000 and above, level of education from high school and below to PhD and ethnicity (race) to understand the factors influence the recycling intention behaviours.

In this study, the operation structure used for data collections was through the questionnaire. The questionnaire was designed into seven sections; each section consisted of three to four questions, and questions were classified to Likert 5 point scale from Strongly Disagree to Strongly Agree, except section G was demographic questions and Section F was respondent's information. Section G included demographic data namely respondent's age, gender, income level, ethnicity (race) and level of education. All data have been entered into a computer, data were compiled and interpreted with the aid of the Statistical Package for Social Sciences (SPSS), version 22. The descriptive statistics were used to analyse quantitative data and results presented using charts and percentages.

The inferential statistics such as ANOVA, regression and factor analysis were used to answer cause-and-effect questions, it is ideal with drawing conclusions in this study and, in some cases, making a prediction of broader statements about the relationship between data. In this study, a small pilot test of 30 sample size was used to test validity and reliability of the data, to estimate of the correlation and multiple regression analysis also take into account to interpret to useful information, refer to Table 1.

Results and Discussion

The demographic characteristics of 150 people living in Nilai, (city in Negeri Sembilan, Malaysia) were presented in Table 2. The sample consisted of 150 respondents, from the data analysis shown the majority of respondents are younger generations and female respondents have the commitment toward the environment rather than male respondents.

The results of this study were present in the matrix table. It focused on a few main elements extracted from the data interpretation in Table 3, were reckoned as a good factor. KMO values for all variables were more than 0.5 and therefore, an exploratory factor analysis can be performed on the construct. According to Zen, Noor and Yusuf (2014), when KMO was greater than 0.5 indicated the factors were strongly correlated and hence acceptable in this study. This statement was supported by the minimum requirement for the KMO should be closer than 0.5 for a satisfactory factor analysis to proceed, it recommends the KMO value of 0.5 (barely accepted), values between 0.7-0.8 acceptable, and values above 0.9 were excellent. By looking at Table 3, the KMO for all independent variables were greater than 0.5 as required. which were greater than 0.7 indicating that the data were highly reliable. Besides, most of the Cronbach's Alpha greater than 0.7, also posited the reliable data and considered acceptable. This also indicated that all variables deemed as interrelated and reliable for further analyses.

The five independent variables (Availability, Accessibility, Affordability, Acceptability, and Awareness) tested on a dependent variable (Recycling Intention Behaviour). Consequently, the regression equation for this study can be formed as:

$$\mathbf{RIB=\beta_1+\beta_{AV}+\beta_{AC1}+\beta_{AF}+\beta_{AC2}+\beta_{AW}}$$

Note: RIB: Recycling Intention Behaviour, AV: Availability, AC1: Accessibility, AF: Affordability, AC2: Acceptability, AW: Awareness

Furthermore, the proposed hypotheses are shown the normal distribution of variables satisfied in this study, as per the regression equation formed. In addition, the VIF value for all variables must be lower than 10 indicate no multicollinearity, refer to Table 6.

The R represented as the correlation value of 0.89 indicated under the moderate positive linear regression. While the R^2 value of 0.475 shown the 47.5 per cent of the variation in a rating of recycling intention behaviour explained by the regression. According to the principle of regression, the rating above 0.50 shown the model indicating a good fit (Khalil *et al.*, 2017). However, recent study has shown that any field that attempts to predict human behaviour typically has R-squared values lower than 50 per cent (Azahar, 2014), and low R square value does not show that the model is not fit because F value and level of significance shows that the effect is significant predictor, thus conclusion is drawn based on significant coefficient regardless of the adjusted R square value. Hence, Table 4 shown that the R^2 result posited the regression model indicating a good fit. In addition, the Durbin Watson has shown the value of 2.110 (between 1.5 and 2.5) indicating variables are independent, according to Chatterjee and Hadi (2015).

As the result of multiple regression analysis, the F-test stood at 26.059 (sig. =0.000) indicating overall regression was significant and valid to use for regression analysis. From the regression analysis, the regression model reached statistical significance (ANOVA Table, $p < 0.05$), refer to Table 5.

As the data attained in Table 6 from the regression analysis, the significant value of 0.000 (Availability), 0.001 (Affordability), and 0.000 (Awareness) included in the model

exhibited that those three factors are the significant factors of recycling intention behaviour in Nilai. The research outcome did not fully support as expected (refer to Table 7), the H2 and H4 rejected as insufficient evidence to support the "there is a relationship between accessibility and recycling intention behaviour" and " there is a relationship between acceptability and recycling intention behaviour".

Studies have shown that intention of recycling is an intervening variable between several personal characteristics, such as attitude, subjective norm and perceived behaviour control (Beugelsdijk, Kostova and Roth, 2017; Khalil et al., 2017; Jaouda Hamad, Hanafiah and Abdullah, 2017). However, the findings in this study show that the intention act as a partial mediator between the availability, affordability, and awareness. Meanwhile, the external factors have found to be a strong influence on recycling intention behaviour. Indeed, five hypotheses in this study only three supported (availability, affordability, and awareness); while, the other two rejected (accessibility and acceptability). Awareness was a significant and direct effect on recycling intention behaviour. This finding highlighted very important information for all related bodies. From the data interpretation, it can be concluded that the current waste management in Malaysia is still in the infant phase. Nevertheless, in terms of awareness dimension such as education, campaign, and government policies as pushing forces to participate in recycling programs. This study also highlighted significant policy implications concerned to engage in waste management. Indeed, proper enforcement of the law can engage the consumer in a positive attitude and keep the alert of the impact of their action on the environment.

In addition, awareness links to the availability of the recycling facilities. This study also has shown that consumers will actively engage in recycling when more facilities are provided. Thus, authorities further recommended to ensuring the recycling facilities, collection options, and recycling programs are available for the consumers. Furthermore, consumers' perceived lack of facilities and lack of information by the private sector have impacts on intention to recycle. Hence, more recycling centers are recommended to create and more accessible to consumers.

Nonetheless, the education has a significant influence on consumers to participate in recycling programs. Education institutions are recommended to pay attention to increasing the awareness of recycling program through various campaigns, program and early education. From the findings of the results, the respondents with lower levels of education tend to have lower levels of environmental knowledge. Environmental education plays an important role in raising the social consciousness on the environment. It is recommended that environmental education, such as outdoor activities (beach cleaning activities) be made a compulsory part of the school curriculum for early education.

Despite the proliferation of curbside collection bins (availability) and public awareness campaigns (awareness), recycling programs around the Nilai concerned and the cost involved in recycling (affordability) was another origin of recycling intention behaviour. Furthermore, authorities and private waste management companies are recommended to provide more pricing options for corporate companies to effectively minimize problems pertaining to waste management. Private waste management companies encouraged to provide more pricing options to corporate for various events. The amount of trash, recycling, and waste that even a small event able to generate enormous amounts of waste. Hence, final cleanup is an important aspect of event planning, with sufficient recycling and waste storage options able to help to ensure corporate and participant can be kept neat, tidy and well organized.

Conclusions

The study presents some current scenario of solid waste management, which will be useful for future planning and make effective strategies of solid waste management in Malaysia. The study presents the awareness as the most important factor influence the recycling intention behaviour. Authorities have to ensure the recycling facilities, collection options, and recycling program are available for consumers. The private companies should provide more pricing options for consumers. Education institution should pay attention to increase the awareness of recycling program through various, campaign, program and early education. As the waste separation law was started in 2016, therefore it is meaningful to invest time and effort in this study.

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APPENDICES

Appendix 1: SPSS output

Table 1
Methodology of the study

Methodology

Method:	Quantitative (Deductive Approach)
Time Horizon:	Cross-sectional
Unit of Analysis:	Individuals
Research Instrument:	Questionnaire (English, Malay)
Method of Data Collection:	Self-administrative
Population:	Malaysian, Nilai Consumers
Sampling Method:	Non-Probability, Convenient
Sample Size:	200
Analyses:	Validity and Reliability, Correlation, ANOVA, and Regression Analysis

Source: Own creation

Table 2
Demographic profile of respondents

Demographic Characteristics	Frequency (n)	Valid Percent (%)	Cumulative Percent (%)
Gender			
Male	60.0	40.0	40.0
Female	90.0	60.0	100.0
Age			
18-25 years old	80.0	53.3	53.3
26-33 years old	50.0	33.3	86.7
34-41 years old	8.0	5.3	92.0
42-49 years old	5.0	3.3	95.3
50 years old and above	7.0	4.7	100.00
Ethnicity (Race)			
Malay	58.0	38.7	38.7
Chinese	59.0	39.3	78.0
Indian	16.0	10.7	88.7
Other	17.0	11.3	100.00
Education Level			
High School and below	37.0	24.7	24.7
Diploma	39.0	26.0	50.7
Degree	27.0	18.0	68.7
Postgraduate	47.0	31.3	100.0
Household Income			
Below RM2,000	40.0	26.7	26.7
RM2,001-RM3,000	39.0	26.0	52.7
RM3,001-RM4,000	28.0	18.7	71.3
RM4,001-RM5,000	8.0	5.3	76.7
RM5,000 and above	35.0	23.3	100.0

Source: Own creation

Table 3
Result from SPSS Software

Variables	KMO	Barlett Test of Sphericity	Cronbach Alpha	Items
Availability	0.636	P<0.005	0.774	3
Accessibility	0.598	P<0.005	0.698	3
Affordability	0.662	P<0.005	0.704	3
Acceptability	0.516	P<0.005	0.720	3
Awareness	0.662	P<0.005	0.705	3
Recycling Intention Behaviour	0.622	P<0.005	0.730	4

Source: SPSS Software

Table 4
Model summary of regression analysis

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.689[a]	.475	.457	.51356	2.110

a. Predictors: (Constant), AwarenessMean, AcceptabilityMean, AccessibilityMean, AvailabilityMean, AffordabilityMean

b. Dependent Variable: IntentionMean

Source: SPSS Software

Table 5
ANOVA analysis of the variables

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.365	5	6.873	26.059	.000[b]
	Residual	37.979	144	.264		
	Total	72.343	149			

a. Dependent Variable: IntentionMean

b. Predictors: (Constant), AwarenessMean, AcceptabilityMean, AccessibilityMean, AvailabilityMean, AffordabilityMean

Source: SPSS Software

Table 6

Coefficient table of multiple regression analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-.084	.342		-.246	.806	-.761	.592		
	AvailabilityMean	.182	.041	.272	4.425	.000	.101	.263	.965	1.036
	AccessibilityMean	.041	.036	.068	1.125	.262	-.031	.112	.989	1.011
	AffordabilityMean	.191	.055	.216	3.468	.001	.082	.300	.938	1.066
	AcceptabilityMean	.046	.025	.113	1.843	.067	-.003	.095	.976	1.025
	AwarenessMean	.536	.068	.491	7.839	.000	.401	.671	.931	1.074

a. Dependent Variable: IntentionMean

Source: SPSS Software

Table 7
Result of proposed hypotheses

Hypothesis	Relationship	Conclusion
H1	There is a relationship between availability and recycling intention behaviour.	Accepted
H2	There is a relationship between accessibility and recycling intention behaviour	Rejected
H3	There is a relationship between affordability and recycling intention behaviour.	Accepted
H4	There is a relationship between acceptability and recycling intention behaviour.	Rejected
H5	There is a relationship between awareness and recycling intention behaviour.	Accepted

Source: Own creation