Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 85 (2013) 646 – 652

Procedia
Social and Behavioral Sciences

AcE-Bs 2013 Hanoi
ASEAN Conference on Environment-Behaviour Studies
Hanoi Architectural University, Hanoi, Vietnam, 19-22 March 2013
"Cultural Sustainability in the Built and Natural Environment"

Towards the Realization of Green Cities: The moderating role of the residents' education level

Saripah Abdul Latif[a*], Yeop Hussin Bidin, Zainudin Awang[b]

[a]*Faculty of Business Management*
[b]*Faculty of Mathematics and Science Computer*
Universiti Teknologi MARA Kelantan Campus, Kota Bharu 15050 Malaysia

Abstract

The design of a green city integrates with the intention of creating a habitat for people dedicated to the minimization of waste output and pollution. This research aims to determine the moderating effect of the residents' education level on their intention to recycle. Data collected from a survey on 255 residents in Kuala Lumpur city was analyzed using structural equation modeling. The findings indicate that the realization of green cities is affected by both attitudes towards recycling and subjective norms, which are then moderated by the level of education of the residents.

Selection and peer-review under responsibility of Centre for Environment-Behaviour Studies (cE-Bs), Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, Malaysia

Keywords: Green cities; intention to recycle; attitudes towards recycling; subjective norms; education level

1. Introduction

A green city is a city designed with the consideration of an environmental place inhabited by people, who are dedicated to the minimization of waste output and pollution, amongst other things. It is estimated that over 50 percent of the world's population now lives in cities and urban areas (Wikipedia, 2012). According to the United Nations Population Division, 82 percent of Americans and 81 percent of Canadians lived in cities in 2010, and this proportions are set to continue rising (Economist Intelligence Unit, ,2010). In Malaysia, Kuala Lumpur is the federal capital and most populous city. The city, covering an area of 243 km square, has a population estimate of 1.6 million, as of 2012. While the greater Kuala

* Corresponding author. Tel.: +6-012-929-4669; fax: +6-009-741-7741.
E-mail address: saripah@kelantan.uitm.edu.my.

Selection and peer-review under responsibility of Centre for Environment-Behaviour Studies (cE-Bs), Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, Malaysia
doi:10.1016/j.sbspro.2013.08.392

Lumpur, also known as the Klang Valley, is an urban agglomeration of 7.2 million. It is among the fastest growing metropolitan regions in the country, with the population growth rate of 6.1 percent (World Capital Institute, 2013). These large communities provide both challenges and opportunities for environmentally conscious city managers.

In assessing the environmental performance of United States and Canadian cities, the Economist Intelligence Unit (2010) found that 26 percent of waste is recycled in all cities in the index. While the best city, San Francisco, recycles 72 percent of its waste. In Kuala Lumpur, the municipal solid waste generated is 1.2 kilograms per person per day. However, only 5 percent of the generated waste is being recycled directly, while the rest is sent to the landfills (Budhiarta et al., 2012). In fact, some other urban areas in Malaysia are already generating more than a kilo of solid waste per person per day. This figure is similar to the levels found in high-income countries.

This rapid increase in solid waste, which all contemporary societies face, is considered to be a major environmental problem. And recycling is argued to be a better solution to the problem of post-purchase waste (Abdul Latif and Omar, 2012). In 2001, 80 percent of the 230 landfills in Malaysia have only two years of lifespan left (Abdul Latif et al., 2012). As more landfills close and communities are faced with the dilemma of what to do with the vast amount of waste produced, the need for increased recycling and other solid waste reduction measures is heightened (Simmons and Widmar, 1990). It is commonly accepted that recycling relies on individual participation and without adequate knowledge of the factors that lead people to participate it is very difficult to develop effective and sustainable policies (Schults et al, 1995 in Clay, 2005).

The question is – how can people act environmentally if they are not aware of the impacts of their actions. Maybe the answer is through education. That is the reason why it is quite common to hear phrases such as “We need to educate people about…….” From the perspective of social marketing, ‘educate” is used interchangeably with ”provide information”. In this research, the assumption is that, the higher the level of education of an individual, the more information he/she has about recycling.

This study aims to gauge the residents’ recycling intention by using the Theory of Reasoned Action (TRA) as the initial research framework. However, the study is only focused on the relationships between the two antecedents; attitudes towards recycling and subjective norms and the intention to recycle. Then, the residents’ education level is introduced as the moderator. The moderating effect of education level is emphasized to reflect the discriminating influence of this domain on city dwelling toward waste management and pollution control. Likewise, the study explores the variability of recycling intention among the city residents so as to gauge measures for effective environmental policy and administration. It is hoped that this study will be able to offer well-founded recommendations to city managers and policy makers, in the process of the realization of green cities.

2. Research framework and hypotheses development

In the quest for studying the intention to recycle of the residents, it is important to examine the theories of individual’s behaviour. The theory of reasoned action (TRA) is a parsimonious explanation of an action and has had a wide currency in psychology, as well as other basic and applied disciplines (Fishbein and Ajzen 1975; Ajzen and Fishbein 1980). This model developed by Fishbein and Ajzen (1975) defines the links between beliefs, attitudes, norms, intentions, and behaviours of individuals. Under TRA, action is hypothesized to be a direct function of a person’s intentions. This intention is itself determined by the person’s attitudes and his subjective norms towards the behaviour.

TRA posits that an individual’s behaviour is driven by behavioural intentions where behavioural intentions are a function of an individual’s attitude toward the behaviour and subjective norms surrounding the performance of the behaviour. Attitude toward the behaviour is defined as the

individual's positive or negative feelings about performing the behaviour. It is determined through an assessment of one's beliefs regarding the consequences arising from the behaviour and an evaluation of the desirability of these consequences. Subjective norm is defined as an individual's perception of whether people are important to the individual's thinking the behaviour should be performed. The contribution of the opinion of any given referent is weighted by the motivation that an individual has to comply with the wishes of those referents. It is the perceived social pressure to perform or not to perform the behaviour. For instance, the residents of housing areas practice source separation of waste and recycle their disposals because their neighbours are doing so. People feel ashamed if they litter around, when their friends or close people do not.

The TRA is largely rational accounts of decision making in that it appears to rest on the notion that consumers deliberate (for example process information, form beliefs, weigh pros and cons) before deciding to act. In the TRA (Ajzen & Fishbein, 1980), behaviour intention to perform the behaviour in question is the immediate antecedent of overt behaviour. Intention, in turn, is seen as a function of one's attitude towards performing a particular act and one's subjective norms (that is the perception of the expectations of relevant others). Based on the above said literature, this study proposed the following hypotheses;

Hypothesis 1: The residents' attitude towards recycling has a significant causal effect on intention to recycle

Hypothesis 2: The residents' subjective norm has a significant causal effect on intention to recycle

In later studies such as Baron and Kenny (1986) in Chen and Tung (2010), found that a moderator can affect the form or strength of a relationship between an independent variable and a dependent variable. A study by Abdul Latif et al (2013), found that intention to recycle is only a partial mediator for recycling behaviour. Therefore, further research is suggested to include moderating variables. A study done by Clay (2005) on students at Leeds University discovered that knowledge of recycling and social pressure are two factors that greatly influence recycling. Students indicate that financial incentives would not encourage recycling but more information and better recycling facilities would. Good knowledge of recycling and its benefits has a significant effect on recycling scheme participation. Even those who believe strongly in conservation and resource reduction are less likely to recycle if they do not have adequate knowledge of what and where to recycle (Simmons and Widmar, 1990).

In this study, it is hypothesized that education level moderates the way in which attitudes toward recycling and subjective norms influence intention to recycle. In other words, if an individual has a low education level, then the positive relationship between his/her positive attitude towards recycling and the intention to recycle will be weakened. Similarly, if an individual has a low education level, then the positive relationship between his/her subjective norms towards recycling and the intention to recycle will be weakened. The hypotheses are stated below;

Hypothesis 3: The residents' education level moderates the causal effect of attitude toward recycling on intention to recycle

Hypothesis 4: The residents' education level moderates the causal effect of subjective norm on intention to recycle

3. Methodology

To determine the moderating effect of Kuala Lumpur residents' education level on their intention to recycle, a survey was undertaken. The tool used to gather the information from the residents was self-

administered questionnaire. Questions asked to the respondents are related to their intention to recycle, attitude toward recycling, subjective norms and their demographic characteristics. The respondents were Kuala Lumpur city dwellers who have recycling facilities in their residential areas. From the sampling frame of Alam Flora Sdn. Bhd., (the service provider for waste management in Kuala Lumpur), the respondents were selected randomly so that an equal chance of residents in the city of Kuala Lumpur is kept to ensure reliability and validity of the questionnaire being administered

A total of 300 sets of questionnaires were distributed in this study. However, only 255 residents completed the questions, comprising of 45.5 percent male and 54.5 percent female. Majority (75.3 percent) is from 20 to 40 years of age; and 58.8 percent are Malays, 26.3 percent Chinese, 13.3 percent Indians and the remaining comprises of other ethnic groups. In this study, 64.3 percent of the sample lives in medium-cost housing area, with 31.8 percent living in low-cost housing area and only 3.9 percent lives in high-cost housing area. In addition, 70.6 percent of the residents is earning between RM 1,000 to RM 2, 999.

In terms of education level, 34.1 percent has low education and 65.9 percent has high education. For the purpose of this study, low education is defined as those who only have up to secondary school education. It consists of six years of primary schooling and another five years of secondary schooling. This is considered as compulsory number of years of schooling for Malaysian children. As for those who have post secondary school education (such as certificate, diploma, degree and post graduate), they are considered as having high education level. This sample represents residents of Kuala Lumpur from different socio-demographic backgrounds.

The measurement model for each construct is analyzed for its validity and reliability prior to modeling the structural model. Initially, data mining and descriptive analysis are carried out. Data is then analyzed by using the Structural Equation Modeling (SEM). The statistical package Analysis of Moment structures (AMOS) is used to analyze for model fit (Goodness of Fit Index), predictive power (regression) and significance of paths. Finally, the test for moderation effect is undertaken.

4. Results and discussion

In the data mining process, all skewness values lie between -1.0 and 1.0. Thus, data is considered as normally distributed and therefore, acceptable to proceed with the parametric analysis procedure. The Kaiser-Meyer-Oikin (KMO) measure of sampling adequacy for intention to recycle, attitudes towards recycling and subjective norms are close to 1.0, which exceed the recommended value of 0.6 (Kaiser, 1974). Adding to that, the Bartlett's test's significance value is close to zero. Therefore, the confirmatory factor analysis procedure (CFA) is appropriate to be undertaken.

Awang (2012) stated that after CFA procedure is carried out, those items with factor loading less than 0.6 should be deleted. After removing the items with factor loading less than 0.6, there are four items usable to measure the intention to recycle, four items to measure attitudes towards recycling and four usable items for subjective norms. These items were then tested for internal consistency. The Cronbach's alpha values for intention to recycle, attitudes towards recycling and subjective norms are 0.618, 0.782 and 0.720 respectively. This is a reflection that the measuring items have internal consistency.

Path analysis was carried out to check for model fitness and to determine the significance of the paths. The overall fit statistics of the measurement model are as follows: the model's fit function is lower than 3.0 (Chi-Square/Chi-Square degree of freedom = 1.700), CFI = 0.947 and RMSEA = 0.052. According to Awang (2012), with the above stated path analysis findings, the goodness-of-fit model and the overall statistics were both achieved.

Table 1 shows that both the first hypothesis, the residents' attitudes towards recycling have a significant causal effect on intention to recycle and the second hypothesis, the residents' subjective

norms have a significant causal effect on intention to recycle are supported. The residents' attitude towards recycling has a highly significant effect on intention to recycle ($p < 0.001$). While the residents' subjective norms also have a significant effect on intention to recycle ($p = 0.004$). Since both relationships are significant, it is appropriate to test for the moderation effect of the residents' education level.

Table 1. Path analysis

Variable	Path	Variable	Estimate	S.E.	C.R.	P-value
Attitude toward Recycling	→	Intention to Recycle	0.398	0.098	4.079	***
Subjective Norm	→	Intention to Recycle	0.248	0.087	2.852	0.004

Key: *** represents a highly significant p-value (<0.001)

To determine the moderation effects of education level on attitude toward recycling – intention to recycle, and subjective norm – intention to recycle relationships, the data was first split into two groups, namely low education level and high education level. Each data set was then tested under constrained and unconstrained conditions to determine the chi-square value difference. If the difference is > 3.84, then moderation effect exists (Awang, 2012).

Table 2. The moderation effect of education level

	Level of Education		Model Constrained	Unconstrained	Chi-square difference	Result on Hypothesis
Attitude - Intention	Low	Chi-square	78.304	72.174	6.13	Supported
		Degree of freedom	52	51		
	High	Chi-square	89.292	73.635	15.657	Supported
		Degree of freedom	52	51		
Subjective Norm- Intention	Low	Chi-square	96.210	72.174	24.036	Supported
		Degree of freedom	52	51		
	High	Chi-square	90.116	73.635	16.481	Supported
		Degree of freedom	52	51		

Table 2 shows the moderation effect of education level on attitude toward recycling – intention to recycle, and subjective norm – intention to recycle relationships. All four differences in chi-square values are higher than the value of chi-square with one degree of freedom (which is 3.84). The values are 6.13, 15.657. 24.036 16.481. Therefore, all four hypotheses in Table 2 are supported and the tests are significant. Both low and high education level have moderation effect in the respective relationships. Meaning that education level has moderation effect on both attitude toward recycling – intention to recycle, and subjective norm – intention to recycle relationships.

Next step is to check for the type of moderating effect for both relationships. If the tests for low education group and high education group are both significant (refer to p-values), then the moderation

effect is a partial moderation. However, if the test for one group is significant and another one is non-significant, then it is a full moderator.

Table 3. Types of moderation effect of education level

Relationship	Attitude-intention		Subjective norm-intention	
Education level	Low	High	Low	High
P-value	0.002	0.004	0.034	0.091
Significance result	significance	significance	significance	Not significance
Result on moderation testing	Partial Moderator		Full Moderator	

Referring to the findings in Table 3, it is shown that in the attitude toward recycling - intention to recycle relationship the p-value for both groups (low and high) are significant. The causal effect of attitude toward recycling (independent variable), on intention to recycle (dependent variable) is reduced, but still remains significant. Therefore, education level has a partial moderating effect on the attitude toward recycling - intention to recycle relationship. Hypothesis number three, stating that the residents' education level moderates the causal effect of attitude toward recycling on intention to recycle is supported.

On the other hand, in the subjective norm-intention to recycle relationship, the p-value for low education is significant and for high education is not significant. A complete moderation is said to occur and therefore, hypothesis number four is also supported. This is when the causal effect of subjective norm on intention to recycle changed from "significant" to 'non-significant" when the moderator education level comes into the model.

The standardized estimate or slope measurement for attitude toward recycling - intention to recycle relationship is steeper than subjective norm – intention to recycle relationships, which means that the effect of the low education level group is more pronounced as compared to the high education level group. In other words, low education has more effect on both the relationships. Residents with low education level, and therefore have less information about the environment, may tend to view waste management and pollution control as not important. Hence, there is a need to emphasize environmental education.

5. Conclusion

The findings of this research indicate that TRA with education level as a moderator is a useful study in explaining city residents' recycling intentions. In conclusion, both the residents' attitudes toward recycling and the residents' subjective norms have significant causal effects on the residents' intention to recycle.

The study also indicates that education level is a moderator for both the attitude toward recycling-intention to recycle relationship and subjective norm-intention to recycle relationship. If an individual has a low education level, then the positive relationship between his/her positive attitude towards recycling and the intention to recycle will be weakened. Similarly, if an individual has a low education level, then the positive relationship between his/her subjective norms towards recycling and the intention to recycle will be weakened.

However, education level is only a partial moderator for the relationship between attitude toward recycling and intention to recycle. While for the subjective norm-intention to recycle relationship, education level has a complete moderating effect. Somehow, the effect of the low education level group is more pronounced as compared to the high education level group. In this study, low education has more

effect on both the attitude toward recycling - intention to recycle relationship and subjective norm – intention to recycle relationships.

In view of the above findings, environmental education effort aimed at both the public and at students should be emphasized by the city managers and the government. Environmental education could be embedded in the school syllabus, from as early as pre-school level. Whilst city managers may organize periodical anti-littering campaigns for the public. This is to increase the awareness toward the environment among the residents. Simultaneously, the provision of information to the public is undertaken. Correct concepts and knowledge must be inculcated in young people, especially. Education and the provision of information are thought to have the potential of changing the behaviour of people (Dietz and Stern, 2002). Education could really be a change agent in any society. A further study could be implemented to analyze the effect of education as a new tool in the realization of green cities.

References

Abdul Latif, S. & Omar, M.S. (2012). Determinants of recycling behaviour in Tioman Island. *Journal of ASIAN Behavioral Studies*, 2(5), 39- 50.

Abdul Latif, S., Omar, M.S., Bidin,Y. H. & Awang, Z. (2012). Environmental values as a predictor of recycling behaviour in urban areas: A comparative study. *Procedia-Social and Behavioral Sciences*, *50*, 989-996.

Abdul Latif, S., Omar, M.S., Bidin,Y. H. & Awang, Z. (2013). Effect of situational factor on recycling behaviour in determining the quality of life. *Journal of ASIAN Behavioral Studies*, *3*(8), 37-46.

Ajzen, I. and Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behavior, Englewood Cliffs, NJ: Prentice-Hall.

Awang, Z. (2012). Structural equation modeling using AMOS graphic, UiTM Press.

Budhiarta, I., Siwar, C. & Basri, H. (2012). Current status of municipal solid waste generation in Malaysia, *International Journal on Advanced Science Engineering Information Technology*, 2(2).

Chen, M & Tung, P. (2010). The moderating effect of perceived lack of facilities on consumers' recycling intentions, *Environment and Behavior*, *42*(6), 824-844.

Clay, S. (2005). Increasing university recycling: Factors influencing recycling behaviour among students at Leeds University, *Earth & E-nvironment*, *1*, 186-228.

Dietz, T. & Stern, P.C. (Eds.) (2002). *New tools for environmental protection: Education, information, and voluntary measures,* Committee on the Human Dimensions of Global Change, National Research Council. Retrieved January 20, 2013 from http://www.nap.edu/catalog/10401.html

Economist Intelligenc Unit (2011). *US and Canada green city index: Assesing the environmental performance of 27 major US and Canadians cities.* Retrieved November 27, 2012, from http://www.siemens.com/greencityindex

Fishbein, M. and Ajzen, I. (1975). Beliefs, Attitude, Intention, and Behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*, 31-36.

Simmons, D. & Widmar, R. (1990). Motivations and barriers to recycling: Toward a strategy for public education. *The Journal of Environmental Education, 22*(1), 13-18.

Wikipedia (2012)

World Capital Institute (2012). Kuala Lumpur, Malaysia. Retrieved January 20, 2013 from http://www.worldcapitalinstitute.org/makcikplatform/2012-kuala-lumpur-malaysia