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# The determinants of recycling intention behavior among the Malaysian school students: an application of theory of planned behaviour

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## Abstract

In Malaysia, recycling program has been widely initiated since 1993. However, to date the recycling rate in Malaysia is only five percent. In this study, the Theory of Planned Behaviour (TPB) was used to investigate the antecedents of recycling intention behaviour among secondary school students. TPB hypothesizes that the immediate determinant is the individual's intention to perform or not to perform that behaviour. Hypothetically, there are three factors that influenced the intention behaviour namely specific attitude, subjective norms and perceived behaviour control. The sample consists of 400 randomly selected Form Four students. A two-step modeling approach including confirmatory factor analysis and structural equation modeling were performed to assess measurement model fit and causal relationship between factors. The structural model was tested using AMOS. The proposed model was evaluated but demonstrated poor model fit which lead to subsequent modification of the model. The result shows that perceived behaviour control was the strongest predictor of intention behaviour ( $\beta = 0.687$ ). Subjective norms, to a lesser degree, was also an important predictor of intention behaviour ( $\beta = 0.593$ ). Meanwhile, the analysis also shows that specific attitudes were indirect predictor of intention behaviour, via the mediation of subjective norms and perceived behaviour control.

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*Keywords:* Theory of Planned Behavior, recycling, structural equation modelling;

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## 1. Introduction

Urban areas in Malaysia produce 15 000 tons of solid waste per day, compared to the year 1991 when the rate of solid waste generated was 12,467.6 tons per day (Seow 2003). It is expected that the amount of solid waste generated in Kuala Lumpur to reach double in the next twenty years; from 3.2 million tons a year today, to 7.7 million tons a year in 2030 (Seow 2003). According to Chamhuri Siwar et al. (2000), recycling is the most important strategy to overcome the problem of overloaded landfills. In 2006, the recycling rate in Malaysia was less than 5%

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(8<sup>th</sup> Malaysia Plan). Compared to other developed countries, where recycling rate is about 30% to 47 %, Malaysia is falling behind.

Environmental education (EE) plays a major role in encouraging recycling awareness among Malaysians. Recycling awareness should be inculcated from childhood. EE was introduced within the Malaysia school system through the infusion and integration approach, in relevant subjects such as English Language, Malay Language, Geography and Science. In Science subject, EE elements are included in many topics such as, The Air around Us, Interdependence among Living Organism and the Environment, and Preservation and Conservation of the Environment. EE elements that are included in Science subjects, are mostly cognitive and knowledge elements. Previous Theory of Planned Behavior (TPB) studies (East, 1993) suggest that attitudes are composed of two components, instrumental (based on knowledge) and experiential (related to feelings). However, recent environmental education research shows that while Malaysians in general, have knowledge about the environment and realize that the environment needs to be taken care of, most of them are not oriented to translating their knowledge into behavior. (Daniel & Mohd Shafiee 2006). This raises the question, is EE in Malaysia school system efficient enough to generate an environmentally literate student?

The TPB provides a theoretical framework for systematically investigating the factors which influenced behavioural choices. This study uses TPB as the theoretical basis to identify the factors, which are the antecedent of recycling behaviour among students. The theory assumes that people behave rationally, when they consider the implications of their actions. The TPB hypothesizes that the immediate determinant of behaviour is the individual's intention to perform, or not to perform that behaviour. Definition of intention is; the immediate determinant of behaviour, and when an appropriate measure of intention is obtained, it will provide the most accurate prediction of behaviour (Ajzen & Fishbein, 1980). Intention is influenced by three factors; i) Specific attitude (SA), the individual's favourable or unfavourable evaluation of performing the behaviour, ii) Subjective norm (SN), based on individual's perception of whether important people in their lives would want them to perform the behaviour, iii) Perceived behaviour control (PBC), reflect the extent to which individuals perceived the behaviour to be under volitional control.

According to TPB, individual's who hold positive attitudes towards environmental activism, think that there is normative support for engaging in activism, and perceive that they can easily engage in activism, should they have strong intention to perform the behaviour (Fielding et al., 2008). To date, the TPB has been used widely and successfully to understand a range of environmentally responsible behaviour such as recycling (Davis et al. 2005), composting (Taylor & Todd, 1995) and the adoption of sustainable agriculture practices ( Beedle & Rehman, 2000).

## **2. Research Objectives & Research Hypotheses**

The purpose of this research was to determine the antecedents of intention to recycle among Malaysian school students using TPB. The specific research objectives are: i) To study the relationship between SA and behaviour intention; ii) To study the relationship between SN and behaviour intention; and iii) to study the relationship between PBC and behaviour intention. Subsequently, the research hypotheses are: i) As SA become more favourable to recycle, intention for recycling would increase; ii) As SN become more favourable to recycling, intention for recycling would increase; and iii) As PBC increase, behaviour intention for recycling would increase.

## **3. Methodology**

### *3.1. Research design*

This research is a quantitative study using a survey design. The questionnaire was designed based on previous researches related to recycling behaviour and application of TPB.

### 3.2. Research sample

The population in this study is form four secondary school students from one state in Malaysia. According to Kline (2005) a desirable goal is to have the ratio of the number of cases to the number of free parameters which is 20:1; a 10:1 ratio. In order to meet the desirable number of samples, 400 samples were randomly taken from three secondary schools. This is because the free parameter in this study is 19 parameters. Form four students were chosen as the samples in this study because the objective of this research is to evaluate the effectiveness of EE that is being integrated in Science subject for lower secondary forms.

### 3.3 Research instrument

In structural equation modeling, a distinction is made between single item variable and variables computed from multiple items. Single item variables are referred to as observed variables, while multi item variables are called latent variables. In this study there were four independent variables consisting of four latent variables. They are; specific attitudes, subjective norms, perceived behaviour control and behaviour intention. Nine indicator items were designed for SA variable, three indicator items for SN variable, five indicator items for PBC variable and two indicator items for behaviour intention variable. All together, there are 19 items in the research instrument. The items were designed based on previous researches related to recycling behaviour and application of TPB. The reliability of the instrument is based on Cronbach Alpha value which is 0.810.

### 3.4. Data Analysis

To evaluate the measurement and structural model, the data were analyzed using Structural Equation Modelling (SEM) software Amos. This method is suitable for this study because the objective of this research is to test the causal relationship between the predictor variables intention and also to investigate the extent to which predictor variables influence samples' behavior intention. Two step modelling was performed in this study. First step is establishing the measurement model, where the measurement model is revised and confirmed. Second step is test the structural model, where the direct relations among latent variables were modelled. The proposed model was evaluated and demonstrated a poor model fit which lead to subsequent modification of the model.

## 4. Findings and Discussion

The initial structural model fit the data poorly. The chi-square statistic was significant ( $\chi^2 = 924.697$ ,  $df = 149$ ,  $p = 0.000$ ,  $\chi^2/df = 6.206$ ) and three other fit indices also indicate a poor fit (CFI = 0.554, GFI = 0.776, RMSEA = 0.114). The initial structural model was modified to improve the model fit. The revised structural model produced a better fit (CFI = 0.767, GFI = 0.874, RMSEA = 0.086,  $\chi^2 = 542.249$ ,  $df = 137$ ,  $p = 0.000$ ,  $\chi^2/df = 3.958$ ), which indicate moderately fit the data. Based on figure 1, there were 24 path coefficients in the structural model. From the 5 path coefficients of the latent variables, there was one path coefficient which was not significant and have negative relationship direction (SA  $\rightarrow$  behaviour intention) ( $\beta = -0.310$ , C.R = -0.623,  $p > 0.05$ ). SA have indirect predictor relationship with behaviour intention ( $r = 0.812$ ) mediating through SN and PBC.

Hypothesis 1 predicted that as SA become more favourable towards recycling, intention for recycling would increase. The result didn't support hypothesis 1. The regression coefficient for SA-behaviour intention path was significant, but in reverse of the predicted direction. It has standardized regression coefficient of  $-0.38$  ( $p > 0.05$ ). In this study, SA was including cognitive and affective components, which was suggested by previous TPB studies (East, 1993). SA is usually operationalised by asking the individuals their feelings about performing the behaviour. While the measure captures the affective component of attitude, it does not pay sufficient attention to the cognitive element, which is based on the individual's knowledge of the outcomes or consequence of performing the behaviour (Davies et al 2002). It was therefore considered important to incorporate within the model a measure which also

assesses the cognitive element of recycling behaviour. Studies have found that children acquire a good deal of environmental knowledge by the time they reach junior high school (Prestin & Pearce 2009) and thus it is common for them to hold well defined beliefs about recycling and other environmental issues. For example, more than half of children as young as 6 years old have a basic understanding of the definition of recycling, as well as beliefs regarding its benefits for the environment (Palmer 1998). However, though many children might have a brief understanding of recycling, often they are unable to connect the benefits of recycling and consequences of not recycling to the environment in a sophisticated way (Prestin & Pearce 2009).

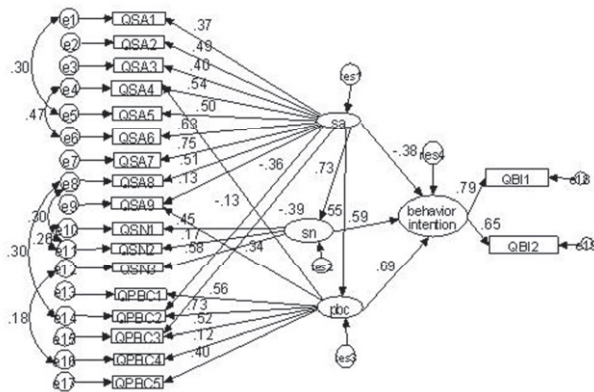


Fig.1. Modified Structural Model

\*Note: All path coefficients are standardized

Generally, attitude towards recycling predicts behaviour intention for adults. There are no studies to date examining the relationship between adolescents’ SA about recycling and recycling intentions or behaviour (Prestin & Pearce 2009). In Tonglet et al (2003) study, cognitive element of recycling was significant but has negative relationship between cognitive element and behaviour intention. This suggests that while the respondents had strong and favourable views about specific aspects of recycling, they seem to be less concerned about the ‘bigger’ picture. The result in this study showed, SA has indirect effect toward intention behavior ( $r = 0.816$ ) mediating through SN and PBC. The regression coefficient path SA- SN is  $\beta 0.735$  and SA –PBC is  $\beta =0.553$ . In this study, SA occurs to have indirect effect to behaviour intention maybe due to lack of recycling facilities provided by local council. Tonglet et al (2003) suggested that access to the factors which make recycling easier may have influenced their positive recycling attitude. This study also incorporated situational factors which were measured under PBC variable. Individuals may hold positive attitudes towards recycling; nevertheless this does not necessarily mean that they will engage in recycling behaviour. Lack of opportunities, skills or resources may be the constraints of recycling behaviour (Tonglet 2003).

Hypothesis 2 predicted that as SN become more favourable to recycling, behaviour intention for recycling would increase. The results supported hypothesis 2. The SN– behaviour intention path had a significant standardized regression coefficient  $\beta = 0.59$ . The SN variable is the second strongest predictor of behaviour intention. This finding is different from most of TPB studies. Typically the SN variable was the weakest influence on behaviour intention. In Tonglet et all (2003) and Davis et all (2005) the SN variable was the weakest predictor of the TPB variables. In Boldero’s study, (1995) it was not significant at all. The findings in this study showed that SN is the second strongest predictor of behaviour intention. This is possibly true when recycling is a public behaviour such as in the school (Bar et al. 2003). SN may be important especially for adolescents, whose behaviour is often influenced by peers. In fact, the primary needs of one subgroup of adolescents between ages 10 – 13 are acceptance, success (Acuff 1997) and popularity (Comstock & Scharrer 2007). Comstock and Sharrer (2007) stated that for 11-12 years old in particular, conformity with peers is priority.

Hypothesis 3 predicted that as PBC increases, behaviour intention for recycling would increase. The regression path for the PBC-behaviour intention was significant  $\beta = 0.687$ . The findings in this study supported hypothesis 3.

PBC was the strongest predictor of behaviour intention. This result was different from Cordano's (1998) study, in which PBC was significant but in reverse of the prediction direction. PBC plays an important part in TPB. In fact, TPB differs from the Theory of Reasoned Action in its addition of PBC. Previous recycling studies had indicated that PBC measures did not contribute significantly to the explanation of intention and behaviour (Boldero 1995; Davies et al 2002). Boldero (1995) suggest that situational factors are likely to be important to recycling behaviour, whereas Davies et al (2002) argue that control factor which facilitate or inhibit the performance of the behaviour in question provide a more accurate measure of PBC than the measure normally used. This study operationalised PBC by using a mix of traditionally perceived control variables (easy and opportunity) and facilitating / inhibiting factors (inconvenient, knowledge of how, what and where to recycle, provision of recycling resources).

## 5. Conclusion

The primary purpose of this research was to determine the antecedents of intention to recycle among Malaysian school students using TPB. The strongest predictor of intention to recycle is PBC, SN is the second strongest predictor of intention to recycle. SA, on the other hand, has reverse direction of prediction to intention to recycle. However, SA have indirect effect to intention mediating through perceived behavior control and SN. As a conclusion, EE in Malaysia school system should focus on elements that can effectively inculcate a pro-environmental behaviour among students.

## References

- Acuff D.S. (1997). *The psychology of marketing to kids: what kids buy and why*. New York: The free Press.
- Ajzen, I & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. New Jersey: Prentice-Hall.
- Barr, S. Ford, N.J, Gilg, A. (2003). Attitude towards recycling household waste in Exeter, Devon: quantitative and qualitative approaches. *Local Environment*. 8, 407- 428
- Beedle, J., & Rehman, T. (2000). Using social-psychology models to understand farmers' conservation behavior. *Journal of Rural Studies*, 16, 117-127.
- Boldero, J. (1995). The prediction of household recycling of newspaper: the role of attitude intention and situational factors. *Journal Application Social Psychology*. 25(5),440-502.
- Chamuri Siwar, Ahmad Hossain & Norshamleeda Chamuri. (2000). *Waste recycling and scavenging : review of concepts and practices for waste minimization in Malaysia*. Paper presented at Conference on Environmental Management Issues and Challenges in Malaysia. 25-26 Julai..Bangi : Universiti Kebangsaan Malaysia.
- Comstock G. & Scharrer E. (2007) *Media and American child*. San Diego: Elsevier/Academic Press.
- Cordano, M. (1998). Environmental attitudes and environmental management behavior: an application of the theory of planned behavior. Phd thesis. University of Pittsburgh.
- Daniel, E.G.S., Nadeson, T. & Mhd. Shafiee b. Abd Ghani (2006). *Organising for action in environmental education through smart partnerships: a Malaysian experience*. A paper presented at the International Conference for the Environment .April, 2006. Zimbabwe.
- Davies, J. Foxall, G.R., Pallister, J. (2002). Beyond the intention- behavior mythology: an integrated model of recycling. *Market Theory* .1. 29-113.
- Davis, G. Phillips, P.S., Read, A.D. (2005). Demonstrating the need for the development of internal research capacity: Understanding recycling participation using the Theory of Planned Behavior in West Oxfordshire , UK . *Resources, Conservation & Recycling*. 46,115-127.
- East R. (1993) Investment decisions and the theory of planned behavior. *Journal of Economy Psychology*, 14, 337-75
- Fielding, K.S., Terry, D.J., Masser, B., & Hogg, M.A (2008). Integrating social identity theory and the theory of planned behaviour to explain decision to engage in sustainable agricultural practices. *British Journal of Social Psychology*, 47, 23-48.
- Kline, Rex B. (2005). *Principles and practice of structural equation modeling*. 2nd edition. New York: The Guilford Press
- Malaysia. (2001). Malaysia 8<sup>th</sup> Plan 2001-2005.
- Palmer, K., Sigman, H. & Walls, M. 1998. The cost reducing municipal solid waste. *Journal of Environmental Economics and Management*. 33, 128-150.

- Prestin, A. & Pearce, K.E. (2009). We care a lot: Formative research for a social marketing campaign to promote school-based recycling. *Resources, Conservation and Recycling*. 35,1-10
- Seow, T.W. & Jamaluddin Md. Jahi. (2003). Pengurusan sampah sarap di Lembangan Saliran Langat. A paper presented at National Seminar on Environmental Issues and Challenges in Malaysia. 25-26 Julai. Bangi: Universiti Kebangsaan Malaysia.
- Taylor, S., & Todd, P. (1995). An integrated model of waste management behavior: A test of household recycling and composting intentions. *Environment and Behavior*, 27(5), 603-630
- Tonglet, M. Phillips, P.S., Read, A. D. (2003). Using the Theory of Planned Behavior to investigate the determinants of recycling behavior: a case study from Brixworth, UK. *Resources, Conservation & Recycling*. 41,191-214.