



## Facilities

Recycling attitude and behaviour in university campus: a case study in Hong Kong

Calvin Wan, Ronnie Cheung, Geoffrey Qiping Shen,

## Article information:

To cite this document:

Calvin Wan, Ronnie Cheung, Geoffrey Qiping Shen, (2012) "Recycling attitude and behaviour in university campus: a case study in Hong Kong", Facilities, Vol. 30 Issue: 13/14, pp.630-646, <https://doi.org/10.1108/02632771211270595>

Permanent link to this document:

<https://doi.org/10.1108/02632771211270595>

Downloaded on: 22 January 2019, At: 02:36 (PT)

References: this document contains references to 45 other documents.

To copy this document: [permissions@emeraldinsight.com](mailto:permissions@emeraldinsight.com)

The fulltext of this document has been downloaded 5619 times since 2012\*

## Users who downloaded this article also downloaded:

(2011), "Investigating the determinants of recycling behaviour in Malta", Management of Environmental Quality: An International Journal, Vol. 22 Iss 4 pp. 463-485 <<https://doi.org/10.1108/14777831111136072>><https://doi.org/10.1108/14777831111136072></a>

(2003), "Science education and sustainability initiatives: A campus recycling case study shows the importance of opportunity", International Journal of Sustainability in Higher Education, Vol. 4 Iss 3 pp. 218-229 <<https://doi.org/10.1108/14676370310485410>><https://doi.org/10.1108/14676370310485410></a>

Access to this document was granted through an Emerald subscription provided by emerald-srm:272833 []

## For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit [www.emeraldinsight.com/authors](http://www.emeraldinsight.com/authors) for more information.

## About Emerald [www.emeraldinsight.com](http://www.emeraldinsight.com)

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

\*Related content and download information correct at time of download.



F  
30,13/14

630

# Recycling attitude and behaviour in university campus: a case study in Hong Kong

Calvin Wan

*Department of Building and Real Estate, The Hong Kong Polytechnic University,  
Hong Kong, China*

Ronnie Cheung

*The Hong Kong Polytechnic University, Hong Kong, China, and*

Geoffrey Qiping Shen

*Department of Building and Real Estate, The Hong Kong Polytechnic University,  
Hong Kong, China*

## Abstract

**Purpose** – This study investigates the recycling attitudes and behaviour of university students and staff members, and suggests ways to improve environmental policies and recycling facilities in a university campus.

**Design/methodology/approach** – This study applies the theory of planned behaviour, through which it develops an instrument to measure the determinants of recycling behaviour among the people in a university campus. A survey was designed and administered at a public university in Hong Kong; 205 valid responses from 179 students and 26 staff members were collected. A partial least squares approach was used to validate the proposed model. This model accounted for the 42.1 per cent and 50.3 per cent variance ( $R^2$ ) in behavioural intention and behaviour, respectively, *vis-à-vis* recycling activities.

**Findings** – The survey results suggested that behavioural intention with regard to recycling is influenced by attitude, the subjective norms, perceived behavioural control, awareness of consequences, the moral norms, and convenience. Educational and promotional programmes highlighting the benefits and importance of recycling activities and convenience of the recycling facilities can be adopted as the key strategies to encourage recycling on campus.

**Research limitations/implications** – The unique culture in relation to recycling in the specific campus environment and the nature of the sample might limit the generalisability of the results to other areas and contexts. The self-report-based measures adopted in this study might lead to a social desirability bias in the results provided by the respondents.

**Originality/value** – The findings provide insightful information for universities and the wider community to shape a more user-friendly and convenient recycling scheme. This can fulfil the actors' social responsibility.

**Keywords** Recycling, Attitude, Theory of planned behaviour, Facilities, University campus, Environmental management, Students, Hong Kong

**Paper type** Research paper



## 1. Introduction

To conserve natural resources and reduce the demand for landfill sites, the Hong Kong government consider waste reduction and recycling to be very important elements in the policy framework of waste management (Environmental Protection Department, 2010). The government introduced a campaign in 2005 to raise public awareness of recycling. It

set up waste separation facilities to facilitate recycling as part of the effort. Although waste disposal rates have declined slightly since the early 2000s, largely because of the government's endeavours to reduce waste (Chung, 2010), it was predicted that Hong Kong's three major landfills would reach full capacity by mid-2010. Hong Kong is a compact but land-hungry city (Tang *et al.*, 2007); the burden on landfills poses challenges for its planning and development. In October 2010, the Hong Kong government proposed a reduction in the size of a country park by five hectares to make way for an expanded landfill. This drew criticism from lawmakers, residents and pressure groups, given the negative environmental impacts such a move would create. Eventually, the lawmakers passed a motion repealing the executive order on landfill expansion (*The Standard*, 2010). Since then, the government has been taking other waste reduction measures instead. Drop-off recycling is one of the more effective programmes to deal with the increasing waste problem and limited landfill capacity.

Universities, being better miniatures of the society, may serve as a testing ground for formulating new ways to address those problems. Universities possess certain characteristics that are similar to those of the general public (Kelly *et al.*, 2006). Kaplowitz *et al.* (2009) highlighted that universities often involve diverse populations engaging in activities with a considerable consumption of materials and energy in a large area; they argued, therefore, that universities could be considered as communities that significantly influence wider society. Noeke (2000) suggested that the environmental friendliness of a university leads to a positive societal image. Reducing solid waste is one of the key strategies to develop a "green" and sustainable university campus (Smyth *et al.*, 2010). Kelly *et al.* (2006) debated that successful recycling programmes demand both technology and the involvement of people; it is important to develop and maintain pro-environmental behaviour. The Hong Kong government has committed itself to providing public education and recycling facilities. To further improve a campus-based recycling scheme, facilities management professionals should develop a sound understanding of people's attitudes and behaviours towards recycling. Such an understanding can shed light on programme formulation in environmental protection.

Previous research has examined the theory of planned behaviour in explaining the factors that influence recycling behaviour at a household or municipal level (e.g. Oom Do Valle *et al.*, 2005; Sidique *et al.*, 2010; Tonglet *et al.*, 2004a). These studies attempted to include additional factors that improved the model's sufficiency. However, there was no consensual model that which the recycling behaviour model could be extended to; this might due to the contextual factors of each of these studies (i.e. Tonglet *et al.*, 2004a; Sidique *et al.*, 2010; Oom Do Valle *et al.*, 2005). Little effort has been made to understand the situation of Hong Kong, a place that possesses most of the typical characteristics of a compact city (Ganesan and Lau, 2000). The objectives of the current study are to formulate a model to predict recycling behaviour in university campuses and to provide insights into a scheme *vis-à-vis* waste reduction and recycling.

## 2. Literature review

### 2.1 Theory of planned behaviour (TPB)

The theory of reasoned action (TRA; Ajzen and Fishbein, 1980) suggested that an individual's intention to perform certain behaviours is the immediate determinant of that behaviour, and that behavioural intentions are influenced by two factors:

- (1) attitude; and
- (2) subjective norms.

Attitude generally refers to the favourability of an individual toward certain behaviours, while a subjective norm involves perceived social pressure or acceptance of that behaviour. However, the performance of certain behaviours is usually deterred by the lack of appropriate opportunities, knowledge, skills, and time (Liska, 1984). These circumstances limit the sufficiency of the TRA in explaining an individual's behaviour. Therefore, the theory of planned behaviour (TPB) extended the TRA by including an additional variable (Figure 1), namely perceived behavioural control (PBC). PBC refers to an individual's perception of his or her ability to perform certain behaviours (Ajzen, 1991). Oom Do Valle *et al.* (2005) explained that PBC reflects two key dimensions:

- (1) external conditions; and
- (2) an individual's perceived ability.

In the context of recycling behaviour, the former dimension can be explained in terms of the ease and convenience of performing recycling activities, while the latter depends on an individual's understanding and knowledge of the behaviour, i.e. the extent to which an individual knows how to recycle.

TPB has been widely adopted in attitude-behaviour studies, such as those that address technology acceptance (Mathieson, 1991), the dishonest actions of college students (Beck and Ajzen, 1991), smoking (Godin *et al.*, 1992), and driving violations (Parker *et al.*, 1992). It also serves as the foundation for studies on recycling behaviour, and so researchers have adopted TPB in this area (e.g. Cheung *et al.*, 1999; Davis *et al.*, 2006; Oom Do Valle *et al.*, 2005; Oreg and Katz-Gerro, 2006; Sidique *et al.*, 2010; Tonglet *et al.*, 2004a). However, while the findings of these studies suggested that TPB provides a good starting point for attitude-behaviour studies, the authors proposed the use of additional variables to improve the sufficiency of their respective models. Ajzen (1991) said that TPB allows for the use of additional variables to strengthen the ability to explain certain behaviours. The whole set of variables, including those of TPB, are explained as follows.

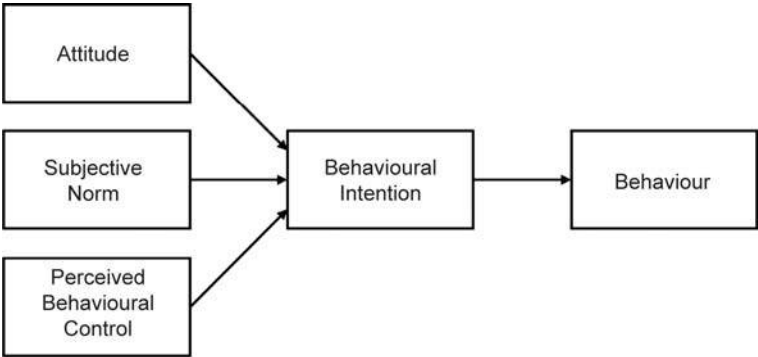


**Figure 1.**  
Theory of planned  
behaviour

**Source:** Adapted from Ajzen (1991)

*1.1.1 Attitude.* Attitude towards behaviour is defined as a function of an individual's beliefs towards a behaviour and a subjective evaluation of that behaviour (Fishbein and Ajzen, 1975). The belief component captures a person's knowledge and perceptions about a certain behaviour. Many studies confirmed the correlation between attitudes and behavioural intention (Kelly *et al.*, 2006; Oskamp *et al.*, 1991; Tonglet *et al.*, 2004a; Vining and Ebreo, 1990). This is also the most significant predictor of recycling behaviour to correlate strongly with recycling intentions (Tonglet *et al.*, 2004a).

*2.1.2 Subjective norm.* A subjective norm or social pressure is a function of the perceived expectations by other individuals or groups who are important or close to a person, and that person's motivation to comply with these expectations (Fishbein and Ajzen, 1975). It implies that pressure from peers, family members and neighbourhood has a positive effect on recycling behaviours. Previous studies have confirmed that social pressure is an important factor in motivating recycling behaviour (Oskamp *et al.*, 1991; Sidique *et al.*, 2010).

*2.1.3 Perceived behavioural control (PBC).* Davies *et al.* (2002) argued that, collectively, control factors that facilitate or inhibit the performance of a given behaviour provide a more accurate measure of PBC. Tonglet *et al.* (2004a) operationalised PBC by identifying in their study a set of traditionally perceived control variables (e.g. ease and opportunity) and facilitating or inhibiting factors (e.g. level of convenience; knowledge of how, what, and where to recycle; and provision of recycling resources). Knowledge and opportunity had been found to correlate significantly with recycling intentions.

*2.1.4 Convenience.* The number of expected recycling site visits increased when recycling was considered a convenient activity (Sidique *et al.*, 2010). Convenience is considered as the time, space and the perceived ease of an individual in managing waste (Barr *et al.*, 2001; Tonglet *et al.*, 2004b). This result accorded with the findings of previous studies, that convenience is an important factor in encouraging recycling behaviour (Domina and Koch, 2002; Gonzalez-Torre *et al.*, 2003; Hornik *et al.*, 1995; Saphores *et al.*, 2006; Vining and Ebreo, 1990).

*2.1.5 Awareness of consequences and moral norm.* The model of altruistic behaviour (Schwartz, 1977) proposed that behaviour is explained by four key factors:

- (1) personal norms;
- (2) social norms;
- (3) awareness of consequences; and
- (4) ascription of responsibility.

In this model, the impact of social-norm influences on individual behaviour is moderated by personal norms of altruistic behaviour. This relationship was confirmed by the results of Hopper and Nielsen's (1991) study on recycling behaviour. A personal norm can simply be interpreted as the rule that governs whether or not an individual in considering whether a behaviour is the right thing to do. In addition, the model elaborates that the correlation between personal and social norms is moderated by awareness of consequences and the ascription of responsibility. However, the consequences of recycling and concern for community have been proved to be significant predictors of recycling behaviour (Tonglet *et al.*, 2004a). The ascription of responsibility could be operationalized similarly to the moral norms as suggested by

Tonglet *et al.* (2004a) and Chen and Tung (2010). “Moral norm” refers to beliefs about moral standards and social responsibility in performing certain behaviour. Chen and Tung (2010) further recognized that a moral norm is involved and statistically significant in predicting behavioural intentions; examples of these studies included those pertaining to dishonest actions (Beck and Ajzen, 1991) and driving violations (Parker *et al.*, 1992).

3. Conceptual framework and research hypotheses

Drawing upon the aforementioned literature, a conceptual framework is proposed (Figure 2). There have been only a few research efforts on recycling attitudes and behaviours in university campus of Hong Kong, and this paper seeks to fill that gap.

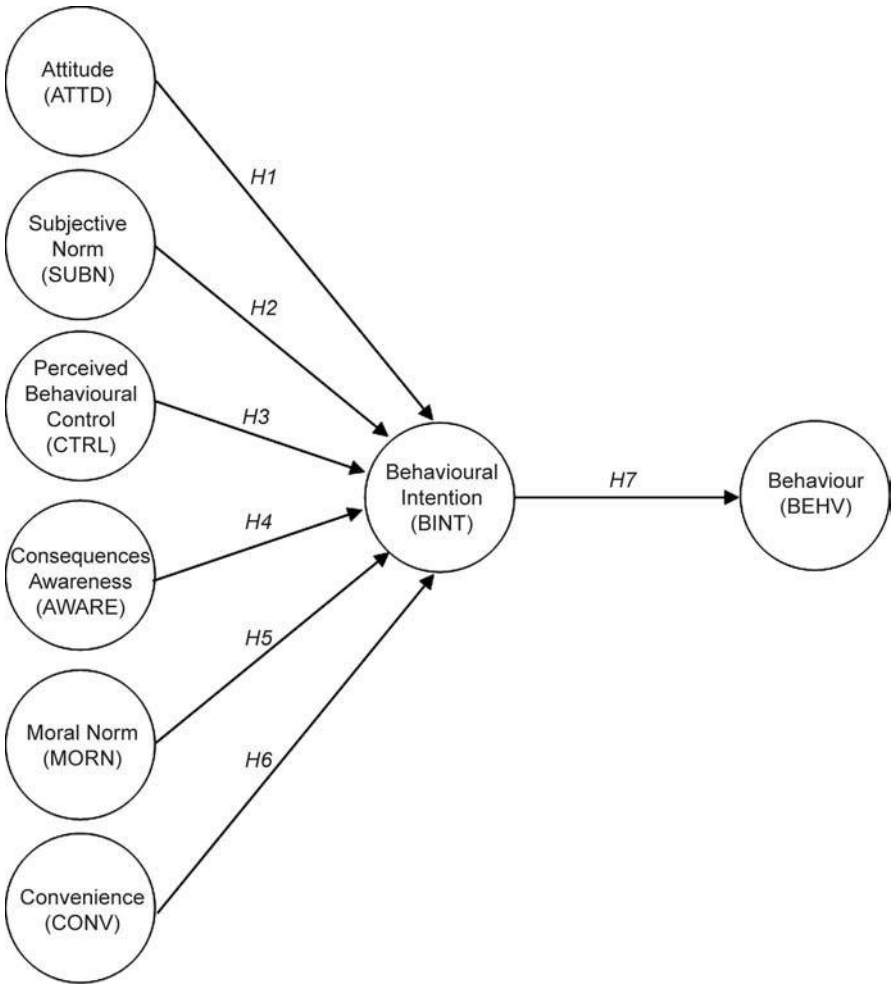


Figure 2.  
Research framework

TPB suggested that three predictors – i.e. attitudes, subjective norms, and PBC – are the key determinants in explaining the behavioural intention of an individual. Based on the existing model, the following hypotheses were formulated:

- H1.* Attitude relates positively to recycling intention.
- H2.* Subjective norms relate positively to recycling intention.
- H3.* Perceived behavioural control relates positively to recycling intention.

The model of altruistic behaviour (Schwartz, 1977) suggested that behaviour can be explained in terms of personal norms and social norms if awareness of consequences and the ascription of responsibility have been activated. A “personal norm” can be interpreted simply as the rule that governs an individual in considering if a certain behaviour would be the right thing to do; however, a social norm is similar to the subjective norm found in the TPB model. Awareness of consequences and the ascription of responsibility had been found to be significant predictors of recycling behaviour (Tonglet *et al.*, 2004a), and the ascription of responsibility is similar to the moral norm suggested by Tonglet *et al.* (2004a) and Chen and Tung (2010). Thus, this study camp up with the following additional hypotheses:

- H4.* Awareness of consequences relates positively to recycling intention.
- H5.* Moral norm relates positively to recycling intention.

The perceived convenience of recycling activity relates directly to the number of visits made to recycling facilities (Sidique *et al.*, 2010); it is considered an important factor in encouraging recycling behaviour (Domina and Koch, 2002; Gonzalez-Torre *et al.*, 2003; Hornik *et al.*, 1995; Saphores *et al.*, 2006; Vining and Ebreo, 1990). This is particularly significant for drop-off recycling, which requires considerable effort on the part of individuals (Saphores *et al.*, 2006). Therefore, the following hypothesis was defined:

- H6.* Convenience relates positively to recycling intention.

TRA and TPB (Ajzen, 1991; Ajzen and Fishbein, 1980) suggest that an individual's behavioural intention towards a certain behaviour is the mediating factor of performing that particular behaviour. Finally, the following hypothesis was formulated:

- H7.* Recycling intention relates positively to recycling behaviour.

## 4. Research methods

### 4.1 Questionnaire design and data collection

The questionnaire used was designed with reference to the recycling literature and the TPB theoretical framework (Tonglet *et al.*, 2004a; Sidique *et al.*, 2010). Five-point Likert scales were used to measure the components of TPB, with 5 indicating a positive view and 1 a negative view. The questionnaire contained the six major independent variables:

- (1) recycling attitudes;
- (2) subjective norms;
- (3) PBC;

- (4) awareness of consequences;
- (5) moral norms; and
- (6) convenience.

It also included two dependent variables:

- (1) recycling intention; and
- (2) recycling behaviour (see the Appendix, Table AI).

The constructs of attitude, PBC, and moral norms were adapted from the study by Tonglet *et al.* (2004a), while the constructs of subjective norms, awareness of consequences and convenience were adapted from the study by Sidique *et al.* (2010). Although Sidique *et al.* (2010) defined the constructs of subjective norms and awareness of consequences as social pressure and attitude, respectively, similar statements for these two constructs were operationalised in other studies as subjective norms and awareness of consequences (e.g. Tonglet *et al.*, 2004a; Oom Do Valle *et al.*, 2005).

The questionnaire also involved questions soliciting demographic information, such as age, gender, education level, occupation, and monthly income. To enhance internal validity, pre-testing was conducted to modify the questionnaire before launching formally. Thirty copies of the questionnaire were randomly distributed in this pre-test/pilot study. Some wording was then refined according to the results. The main data collection was conducted in November 2010, during which 300 questionnaires were distributed in the computer centre, library and cafeteria of a public university in Hong Kong. Two hundred and five completed and valid questionnaires (response rate 69 per cent) were returned. Table I shows the profile of the respondents. Since the study was conducted in a university, naturally the demographic variables of the respondents would illustrate that most of them were students.

## 5. Data analysis

Structural equation modelling (SEM) is a statistical technique for measuring latent and unobservable concepts through multiple observed indicators (Chin, 1998b; Jöreskog, 1989). Partial least squares (PLS) is a common statistical analysis in SEM, and it can be used to validate the constructs of an instrument, test and confirm the structural relationships among the constructs (Chin, 1998a; Gefen *et al.*, 2000). Jöreskog and Wold (1982) suggested that PLS is better suited for theory development, whereas linear structural relationship (LISREL) analysis is suitable to be applied for confirmatory analysis. This is because confirmatory analysis requires a more stringent distributional assumption and a large sample. The study used PLS because its premises are less limiting and the sample size in this study was relatively small. SmartPLS 2.0, a statistical software application for PLS-based path modelling, was applied to measure the causal relationships in the proposed model.

### 5.1 Measurement model

The PLS measurement model for the latent constructs was evaluated by examining the convergent and discriminant validity. The convergent validity can be assessed by the inter-correlations between indicators within the same constructs. The factor loadings,

**Table I.**  
Respondents' profile

| Demographic variable         | <i>n</i> | Percentage |
|------------------------------|----------|------------|
| <i>Gender</i>                |          |            |
| Female                       | 104      | 50.0       |
| Male                         | 101      | 49.3       |
| <i>Age</i>                   |          |            |
| Under 20                     | 36       | 17.6       |
| 20-24                        | 140      | 68.3       |
| 25-29                        | 7        | 3.4        |
| 30-34                        | 6        | 2.9        |
| 35-39                        | 7        | 3.4        |
| 40-44                        | 4        | 2.0        |
| 45-49                        | 3        | 1.5        |
| 50 or above                  | 2        | 1.0        |
| <i>Education level</i>       |          |            |
| Sub-degree                   | 99       | 48.3       |
| Bachelor's degree            | 80       | 39.0       |
| Master's degree or above     | 26       | 12.7       |
| <i>Monthly income (HK\$)</i> |          |            |
| Below or 4,999               | 166      | 81.0       |
| 5,000-9,999                  | 9        | 4.4        |
| 10,000-19,999                | 3        | 1.5        |
| 20,000-29,999                | 8        | 3.9        |
| 30,000-39,999                | 10       | 4.9        |
| 40,000-49,999                | 2        | 1.0        |
| 50,000 or above              | 7        | 3.4        |
| <i>Occupation</i>            |          |            |
| Student                      | 179      | 87.5       |
| Teacher                      | 26       | 12.5       |

composite reliabilities and average variance extracted as computed in PLS were examined using the three criteria suggested by Fornell and Larcker (1981) and Chin (1998b), namely:

- the factor loading of indicators should be statistically significant and exceed 0.5;
- the composite reliability of each construct should exceed 0.6; and
- the average variance extracted (AVE) by each construct should exceed 0.5.

As shown in Table II, the factor loadings of all constructs in the measurement model exceeded 0.5 and were significant at  $p = 0.001$ . The composite reliabilities of constructs ranged from 0.83 to 0.88, and the AVE ranged from 0.51 to 0.79. Therefore, all three of the aforementioned criteria for convergent validity were met. This indicated that the constructs in the proposed model demonstrated adequate internal consistency. The Cronbach's  $\alpha$  scores for each construct were also computed, with the value ranging from 0.68 to 0.77 as shown in Table II. This also demonstrated that each construct exhibited strong internal reliability. A generally acceptable low limit is 0.7 (Hair *et al.*, 1998); however, an  $\alpha$  coefficient of 0.5 has also been considered an acceptable limit in previous research on recycling behaviour (Sidique *et al.*, 2010).

F  
30,13/14

638

**Table II.**  
Measurement model

| Constructs                           | Indicators | Factor loadings | <i>t</i> -value | Average variance extracted (AVE) | Composite reliability (CR) | Cronbach's $\alpha$ |
|--------------------------------------|------------|-----------------|-----------------|----------------------------------|----------------------------|---------------------|
| Attitude (ATTD)                      | ATTD1      | 0.66            | 11.84           | 0.59                             | 0.85                       | 0.77                |
|                                      | ATTD2      | 0.78            | 22.44           |                                  |                            |                     |
|                                      | ATTD3      | 0.80            | 13.34           |                                  |                            |                     |
|                                      | ATTD4      | 0.83            | 31.27           |                                  |                            |                     |
| Subjective norm (SUBN)               | SUBN1      | 0.74            | 11.87           | 0.51                             | 0.81                       | 0.70                |
|                                      | SUBN2      | 0.84            | 19.61           |                                  |                            |                     |
|                                      | SUBN3      | 0.61            | 6.29            |                                  |                            |                     |
|                                      | SUBN4      | 0.65            | 7.46            |                                  |                            |                     |
| Perceived behavioural control (CTRL) | CTRL1      | 0.70            | 10.85           | 0.52                             | 0.81                       | 0.70                |
|                                      | CTRL2      | 0.78            | 18.07           |                                  |                            |                     |
|                                      | CTRL3      | 0.75            | 13.24           |                                  |                            |                     |
|                                      | CTRL4      | 0.64            | 9.63            |                                  |                            |                     |
| Consequences awareness (AWARE)       | AWARE1     | 0.65            | 6.44            | 0.52                             | 0.80                       | 0.68                |
|                                      | AWARE2     | 0.84            | 18.47           |                                  |                            |                     |
|                                      | AWARE3     | 0.75            | 8.92            |                                  |                            |                     |
|                                      | AWARE4     | 0.62            | 5.52            |                                  |                            |                     |
| Moral norm (MORN)                    | MORN1      | 0.63            | 6.50            | 0.56                             | 0.83                       | 0.74                |
|                                      | MORN2      | 0.88            | 26.31           |                                  |                            |                     |
|                                      | MORN3      | 0.81            | 15.04           |                                  |                            |                     |
|                                      | MORN4      | 0.65            | 7.41            |                                  |                            |                     |
| Convenience (CONV)                   | CONV1      | 0.75            | 15.06           | 0.64                             | 0.85                       | 0.72                |
|                                      | CONV2      | 0.85            | 32.76           |                                  |                            |                     |
|                                      | CONV3      | 0.81            | 22.73           |                                  |                            |                     |
| Behavioural intention (BINT)         | BINT1      | 0.91            | 89.69           | 0.79                             | 0.88                       | 0.74                |
|                                      | BINT2      | 0.87            | 41.24           |                                  |                            |                     |
| Behaviour (BEHV)                     | BEHV1      | 0.76            | 14.03           | 0.62                             | 0.83                       | 0.73                |
|                                      | BEHV2      | 0.78            | 14.10           |                                  |                            |                     |
|                                      | BEHV3      | 0.80            | 30.50           |                                  |                            |                     |

In relation to discriminant validity of constructs, indicators should have stronger loadings on their own constructs than the others in the same model. A rule to assess discriminant validity (Chin, 1998b) is that the square root of the AVE of a construct should be larger than the correlations between the specific construct and other constructs in the model. Table III reveals the requirement was met by all constructs, and thus adequate discriminant validity was exhibited.

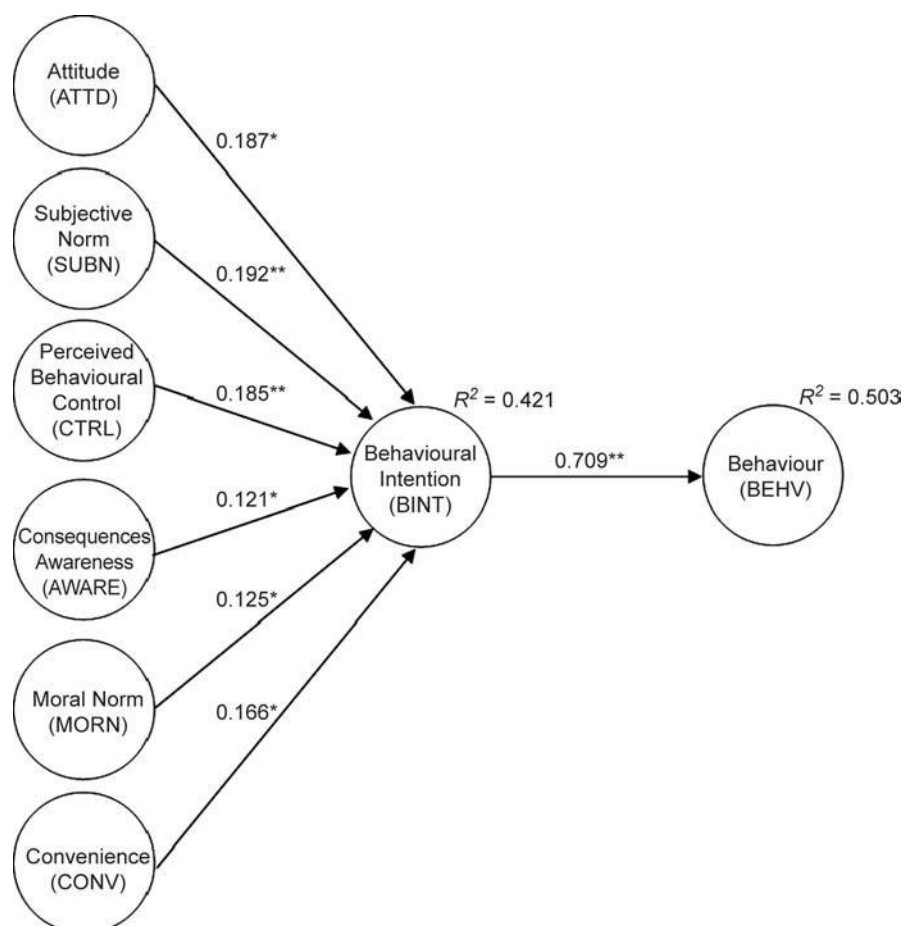
### 5.2 Structural model

The structural model was evaluated by examining the path coefficients, *t*-statistics, and variance explained (i.e.  $R^2$  value). Path significances were determined by running the model using a bootstrap resampling routine with 205 cases and 1,000 samples. Hypothesis tests were carried out to test the study's proposed model. Results of the analysis are presented in Figure 3.

**Table III.**  
Correlations among  
constructs

| Constructs | ATTD        | SUBN        | CTRL        | AWARE       | MORN        | CONV        | BINT        | BEHV        |
|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ATTD       | <i>0.77</i> |             |             |             |             |             |             |             |
| SUBN       | 0.36        | <i>0.72</i> |             |             |             |             |             |             |
| CTRL       | 0.57        | 0.34        | <i>0.72</i> |             |             |             |             |             |
| AWARE      | 0.16        | 0.16        | 0.14        | <i>0.72</i> |             |             |             |             |
| MORN       | 0.20        | 0.35        | 0.33        | 0.24        | <i>0.75</i> |             |             |             |
| CONV       | 0.62        | 0.29        | 0.45        | 0.15        | 0.24        | <i>0.80</i> |             |             |
| BINT       | 0.51        | 0.43        | 0.49        | 0.26        | 0.36        | 0.47        | <i>0.89</i> |             |
| BEHV       | 0.35        | 0.31        | 0.31        | 0.11        | 0.23        | 0.29        | 0.71        | <i>0.79</i> |

**Notes:** ATTD, attitude; SUBN, subjective norm; CTRL, perceived behavioural control; AWARE, consequences awareness; MORN, moral norm; CONV, convenience; BINT, behavioural intention; BEHV, behaviour. Italicised figures are the square roots of the average variance extracted (AVE)



**Notes:** \* $p < 0.05$ ; \*\* $p < 0.01$

**Figure 3.**  
The structural model

F  
30,13/14

640

The  $R^2$  value of behavioural intention (0.421) showed the amount of variance in recycling behavioural intention that could be explained by attitudes, subjective norms, PBC, consequences awareness, moral norms, and convenience. In addition, the  $R^2$  value of behaviour (0.503) revealed the amount of variance in recycling behaviour was explained by behavioural intention. The values of 0.421 and 0.503 demonstrated that the model explained a good amount of variance in behavioural intention and behaviour *vis-à-vis* recycling. The path coefficients are also shown in Figure 3; all paths were significant at  $p < 0.05$ .

The results shown in Table IV supported all the hypotheses. The coefficient of the path from ATTD to BINT was significant with low effect size and low predictive relevance ( $\beta = 0.19, t = 2.32, p < 0.05, f^2 = 0.03, q^2 = 0.02$ ). The path from SUBN to BINT was significant, with a relatively higher, albeit still low, level of effect size and predictive relevance ( $\beta = 0.19, t = 3.54, p < 0.01, f^2 = 0.05, q^2 = 0.03$ ). In addition, the CTRL significantly correlated with BINT with a low effect size and low predictive relevance ( $\beta = 0.19, t = 3.10, p < 0.01, f^2 = 0.04, q^2 = 0.02$ ). The coefficient of the path from AWARE to BINT was significant with a low effect size and low predictive relevance ( $\beta = 0.12, t = 2.19, p < 0.05, f^2 = 0.02, q^2 = 0.02$ ). The paths from MORN to BINT ( $\beta = 0.13, t = 2.16, p < 0.05, f^2 = 0.02, q^2 = 0.01$ ) and from CONV to BINT ( $\beta = 0.17, t = 2.14, p < 0.05, f^2 = 0.03, q^2 = 0.03$ ) were also significant, with low effect size and low predictive relevance.

The exogenous variables in the model explained low amounts of variance of BINT ( $R^2 = 0.421$ ). The  $R^2$  value can be divided based on the path coefficients and correlations between the dependent and explanatory variables (Tenenhaus *et al.*, 2005). Table V illustrates the contribution of  $R^2$  value by each explanatory variable in predicting the dependent variables. For this model, attitude and PBC were the most important variables in the prediction of BINT, contributing 22.46 per cent and 21.42 per cent of  $R^2$ , respectively. In addition, SUBN and CONV contributed 19.62 per cent and

**Table IV.**  
Path coefficients

| Path                     | $\beta$ | $t$    | $f^2$ | $q^2$ |
|--------------------------|---------|--------|-------|-------|
| ATTD $\rightarrow$ BINT  | 0.187   | 2.323  | 0.03  | 0.02  |
| SUBN $\rightarrow$ BINT  | 0.192   | 3.538  | 0.05  | 0.03  |
| CTRL $\rightarrow$ BINT  | 0.185   | 3.100  | 0.04  | 0.02  |
| AWARE $\rightarrow$ BINT | 0.121   | 2.192  | 0.02  | 0.02  |
| MORN $\rightarrow$ BINT  | 0.125   | 2.163  | 0.02  | 0.01  |
| CONV $\rightarrow$ BINT  | 0.166   | 2.141  | 0.03  | 0.03  |
| BINT $\rightarrow$ BEHV  | 0.709   | 31.286 |       |       |

**Table V.**  
Explanation of  
behavioural intention of  
recycling (BINT)

| Block | $\beta$ | $r$  | Contribution to $R^2$ (per cent) |
|-------|---------|------|----------------------------------|
| ATTD  | 0.187   | 0.51 | 22.46                            |
| SUBN  | 0.192   | 0.43 | 19.62                            |
| CTRL  | 0.185   | 0.49 | 21.42                            |
| AWARE | 0.121   | 0.26 | 7.46                             |
| MORN  | 0.125   | 0.36 | 10.58                            |
| CONV  | 0.166   | 0.47 | 18.47                            |

18.47 per cent of  $R^2$ , respectively. Each of these four exogenous variables contributed around 20 per cent of  $R^2$ ; on the other hand, the AWARE and MORN contributions were only 10.58 per cent and 7.46 per cent, respectively – far lower than those of other exogenous variables.

The blindfolding results ( $G =$  seven blocks) are presented in Table VI. In the model, all blocks had high values for the cv-communality index  $H^2$  that were higher than the threshold level of 0 (Fornell and Cha, 1994). The cv-redundancy index  $F^2$ , BINT and BEHV had relatively high values. This measured the model's sufficiency in predicting the dependent variables indirectly from a prediction of their own latent variables using the related structural relation, by cross-validation (Tenenhaus *et al.*, 2005). The proposed model had a GoF index of 0.52, which indicated a good fit and an acceptable level of predictive relevance.

## 6. Discussion and conclusions

The TPB provided a useful foundation in explaining recycling behaviour. Attitudes, subjective norms, and PBC significantly correlated with behavioural intention. This finding was consistent with those empirical studies in related areas, including those of Chen and Tung (2010), Oom Do Valle *et al.* (2005), and Cheung *et al.* (1999).

The additional measures of moral norms, awareness of consequences, and convenience were included in the model; these variables were also statistically significant in explaining the behavioural intention of recycling behaviour. Moral norm was an important predictor in the studies of Chen and Tung (2010) and Oom Do Valle *et al.* (2005). The current study's result regarding awareness of consequences was consistent with the findings by Tonglet *et al.* (2004a). In addition, the significance of convenience factor accorded with the results of previous studies (e.g. Saphores *et al.*, 2006; Sidique *et al.*, 2010; Vining and Ebreo, 1990).

This study gives insightful information to facilities management professionals as regards shaping a more user-friendly and convenient recycling scheme to fulfil the social responsibility for environmental protection. The results suggested that each of the four predictors – attitude, subjective norms, PBC, and convenience – contributed approximately 20 per cent of  $R^2$  in explaining behavioural intention. However, the contributions of the other two variables – i.e. awareness of consequence and moral norms – were comparatively low. These findings implied that the key challenges and

| Block   | $R^2$ | Communality | $H^2$ | Redundancy | $F^2$ |
|---------|-------|-------------|-------|------------|-------|
| ATTD    |       | 0.59        | 0.59  |            |       |
| SUBN    |       | 0.51        | 0.51  |            |       |
| CTRL    |       | 0.52        | 0.52  |            |       |
| AWARE   |       | 0.52        | 0.52  |            |       |
| MORN    |       | 0.56        | 0.56  |            |       |
| CONV    |       | 0.65        | 0.65  |            |       |
| BINT    | 0.421 | 0.79        | 0.79  | 0.33       | 0.34  |
| BEHV    | 0.503 | 0.62        | 0.63  | 0.31       | 0.27  |
| Average | 0.462 | 0.58        |       |            |       |
| GoF     | 0.52  |             |       |            |       |

**Table VI.**  
Communality and  
redundancy

considerations for practitioners about the design and implementation of recycling schemes included:

- The need to focus on people's attitude toward recycling behaviour. This can be achieved through educational and promotional programmes. From a marketing or promotional perspective, attitudes can be changed via a variety of strategies (Schiffman and Kanuk, 2010), such as changing the motivational function by highlighting the prominent needs to recycle, associating with an admired group or event to project a favourable image, and so forth. For example, the promotional messages should not only focus on the benefits of recycling but also illustrate how recycling behaviour would change a person's values and lifestyle towards a better environment. In addition, environmental protection groups can be invited to improve the image of recycling activities.
- The need to enhance knowledge and understanding of recycling and its environmental impacts. This would enhance the PBC of the individuals. For example, a related promotional programme would highlight how recyclables should be dealt with, where the university members can find recycling facilities, and the like. Therefore the promotional programme can highlight how the recyclables should be sorted, stored and handled, etc. In addition, directional signage can be considered to be placed in the campus to show the location of recycling facilities.
- The need to position participation in recycling activities as a social norm and trend through marketing communication and public relation events. This is similar to the attitude-change strategy mentioned above by associating with an admired group or event, or even identifying a celebrity to promote recycling. In a university setting, the senior management, student or alumni representatives can be considered. Celebrities may serve as a role model for recycling. In addition, campus authorities may include feedback in the form of statistical figures about recycling, for example the amount of recyclables collected. These figures can illustrate the popularity and acceptance of recycling in the campus.
- The need to make recycling activities more convenient, for example by providing more facilities or drop-off points in the campus. This had been highlighted by a number of studies, such as those of Tonglet *et al.* (2004a), Oom Do Valle *et al.* (2005), and Saphores *et al.* (2006). The related authorities may consider setting up more drop-off points in the campus such as lift lobbies, cafeterias, and main entrances. Apart from collection points for papers, plastic bottles and aluminium cans, there can be drop-off points for discs and rechargeable batteries, since these are common types of waste on university campuses.

This study contained several limitations that should be addressed in future research. First, the Cronbach's  $\alpha$  for the construct of consequences awareness marginally fell below the generally acceptable low limit of 0.7 (Hair *et al.*, 1998). This construct could be considered for revision in further studies, or new relevant indicators could be developed and added. Second, the setting and nature of the sample for this study might have limitations, because the study was conducted in a university in Hong Kong, and most of the respondents were students. The unique culture *vis-à-vis* recycling activities in the specific campus environment and the sample nature might confine the generalisability of the results to other areas and contexts. Therefore, further studies

were suggested to apply the model in different higher education institutions in different areas, and to include different campus users, such as administrative staff, and faculty members, etc., as samples. Third, since all measures were based on self-report, and respondents could choose whether to provide their responses, social desirability bias might exist in the results, particularly when recycling is commonly promoted and encouraged as a socially desired behaviour to protect the environment.

This study developed a model to identify the determinants of attitude and behaviour *vis-à-vis* recycling activities in university campus in Hong Kong. The results showed that our critical factors including recycling behaviour were influenced by attitude, subjective norms, perceived behavioural control, awareness of consequences, moral norms, and convenience and that each of these correlated positively with recycling intentions. This study also confirmed that recycling intention correlated positively with recycling behaviours. This sheds light for facilities managers on the design and implementation of recycling schemes in university.

## References

- Ajzen, I. (1991), "The theory of planned behaviour", *Organizational Behaviour and Human Decision Processes*, Vol. 50, pp. 170-211.
- Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behaviour*, Prentice Hall, Englewood Cliffs, NJ.
- Barr, S., Gilg, A.W. and Ford, N.J. (2001), "A conceptual framework for understanding and analysing attitudes towards household-waste management", *Environment and Planning A*, Vol. 33 No. 11, pp. 2025-48.
- Beck, L. and Ajzen, I. (1991), "Predicting dishonest actions using the theory of planned behaviour", *Journal of Research in Personality*, Vol. 25 No. 3, pp. 285-301.
- Chen, M.F. and Tung, P.J. (2010), "The moderating effect of perceived lack of facilities on consumers' recycling intentions", *Environment and Behaviour*, Vol. 42 No. 6, pp. 824-44.
- Cheung, S.F., Chan, D.K.S. and Wong, Z.S.Y. (1999), "Reexamining the theory of planned behaviour in understanding wastepaper recycling", *Environment and Behaviour*, Vol. 31, pp. 587-611.
- Chin, W.W. (1998a), "Issues and opinion on structural equation modeling", *MIS Quarterly*, Vol. 22 No. 1, pp. 7-16.
- Chin, W.W. (1998b), "The partial least squares approach for structural equation modeling", in Marcoulides, G.A. (Ed.), *Modern Methods for Business Research*, Lawrence Erlbaum Associates, Mahwah, NJ, pp. 295-336.
- Chung, S.S. (2010), "Projecting municipal solid waste: the case of Hong Kong SAR", *Resources, Conservation and Recycling*, Vol. 54, pp. 759-68.
- Davies, J., Foxall, G.R. and Pallister, J. (2002), "Beyond the intention-behaviour mythology: an integrated model of recycling", *Market Theory*, Vol. 2 No. 1, pp. 29-113.
- Davis, G., Phillips, P.S., Read, A.D. and Iida, Y. (2006), "Demonstrating the need for the development of internal research capacity: understanding recycling participation using the theory of planned behaviour in West Oxfordshire, UK", *Resources, Conservation and Recycling*, Vol. 46, pp. 115-27.
- Domina, T. and Koch, K. (2002), "Convenience and frequency of recycling: implications for including textiles in curbside recycling programmes", *Environment and Behaviour*, Vol. 34, pp. 216-38.

- Environmental Protection Department (2010), "An overview on challenges for waste reduction and management in Hong Kong", available at: [www.epd.gov.hk/epd/english/environmentinhk/waste/waste\\_maincontent.html](http://www.epd.gov.hk/epd/english/environmentinhk/waste/waste_maincontent.html)
- Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intention, and Behaviour: An Introduction to Theory and Research*, Addison-Wesley, Reading, MA.
- Fornell, C. and Cha, J. (1994), "Partial least squares", in Bagozzi, R.P. (Ed.), *Advanced Methods of Marketing Research*, Basil Blackwell, Cambridge, MA, pp. 52-78.
- Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-47.
- Ganesan, S. and Lau, S.S.Y. (2000), "Urban challenges in Hong Kong: future directions for design", *Urban Design International*, Vol. 5 No. 1, pp. 3-12.
- Gefen, D., Straub, D.W. and Boudreau, M.C. (2000), "Structural equation modeling and regression: guidelines for research practice", *Communications of the Association for Information System*, Vol. 4 No. 7, pp. 1-79.
- Godin, G., Valois, P., Lepage, L. and Desharnais, R. (1992), "Predictors of smoking behaviour: an application of Ajzen's theory of planned behaviour", *British Journal of Addiction*, Vol. 87 No. 9, pp. 1335-43.
- Gonzalez-Torre, P.L., Adenso-Diaz, B. and Ruiz-Torres, A. (2003), "Some comparative factors regarding recycling collection systems in regions of the USA and Europe", *Journal of Environmental Management*, Vol. 69, pp. 129-38.
- Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1998), *Multivariate Data Analysis*, 5th ed., Prentice Hall, Upper Saddle River, NJ.
- Hopper, J. and Nielsen, J.M. (1991), "Recycling as altruistic behaviour: normative and behavioural strategies to expand participation in a community recycling programme", *Environment and Behaviour*, Vol. 23, pp. 195-220.
- Hornik, J., Cherian, J., Madansky, M. and Narayana, C. (1995), "Determinants of recycling behaviour: a synthesis of research results", *Journal of Socio-economics*, Vol. 24, pp. 105-27.
- Jöreskog, K.G. (1989), *LISREL 7: A Guide to the Programme and Applications*, SPSS, Chicago, IL.
- Jöreskog, K.G. and Wold, H. (1982), "The ML and PLS techniques for modeling with latent variables: historical and comparative aspects", in Jöreskog, K.G. and Wold, H. (Eds), *Systems under Indirect Observation: Causality, Structure and Prediction*, North Holland, Amsterdam, pp. 219-43.
- Kaplowitz, M.D., Yeboah, F.K., Thorp, L. and Wilson, A.M. (2009), "Garnering input for recycling communication strategies at a Big Ten University", *Resources, Conservation and Recycling*, Vol. 53 No. 11, pp. 612-23.
- Kelly, T.C., Mason, I.G. and Leiss, M.W. (2006), "University community responses to on-campus resources recycling", *Resources Conservation and Recycling*, Vol. 47 No. 1, pp. 42-55.
- Liska, A.E. (1984), "A critical examination of the causal structure of the Fishbein/Ajzen attitude-behaviour model", *Social Psychology Quarterly*, Vol. 47 No. 1, pp. 61-74.
- Mathieson, K. (1991), "Predicting user intentions: comparing the technology acceptance model with the theory of planned behaviour", *Information Systems Research*, Vol. 2 No. 3, pp. 173-91.
- Noeke, J. (2000), "Environmental management systems for universities – a case study", *International Journal of Sustainability in Higher Education*, Vol. 1 No. 3, pp. 237-51.
- Oom Do Valle, P., Rebelo, E., Reis, E. and Menezes, J. (2005), "Combining behavioural theories to predict recycling involvement", *Environment and Behaviour*, Vol. 37 No. 3, pp. 364-96.
- Oreg, S. and Katz-Gerro, T. (2006), "Predicting proenvironmental behaviour cross-nationally: values, the theory of planned behaviour, and value-belief-norm theory", *Environment and Behaviour*, Vol. 38, pp. 462-83.

- Oskamp, S., Harrington, M.J., Edwards, T.C., Sherwood, D.L., Okuda, S.M. and Swanson, D.C. (1991), "Factors influencing household recycling behaviour", *Environment and Behaviour*, Vol. 23, pp. 494-519.
- Parker, D., Manstead, A.S.R., Stradling, S.G., Reason, J.T. and Baxter, J.S. (1992), "Intention to commit driving violations: an application of the theory of planned behaviour", *Journal of Applied Psychology*, Vol. 77 No. 1, pp. 94-101.
- Saphores, J.M., Nixon, H., Ogunseitan, O.A. and Shapiro, A.A. (2006), "Household willingness to recycle electronic waste: an application to California", *Environment and Behaviour*, Vol. 38, pp. 183-208.
- Schiffman, L.G. and Kanuk, L.L. (2010), *Consumer Behaviour*, 10th ed., Pearson Prentice Hall, Englewood Cliffs, NJ.
- Schwartz, S.H. (1977), "Normative influences on altruism", in Berkowitz, L. (Ed.), *Advances in Experimental Social Psychology*, Academic Press, New York, NY, pp. 221-79.
- Sidique, S.F., Lupi, F. and Joshi, S.V. (2010), "The effects of behaviour and attitudes on drop-off recycling activities", *Resources, Conservation and Recycling*, Vol. 54, pp. 163-70.
- Smyth, D.P., Fredeen, A.L. and Booth, A.L. (2010), "Reducing solid waste in higher education: the first step towards 'greening' a university campus", *Resources, Conservation and Recycling*, Vol. 54 No. 11, pp. 1007-16.
- (The) Standard (2010), "Dump fight looms again", *The Standard*, November 30.
- Tang, B., Wong, S. and Lee, A.K. (2007), "Green belt in a compact city: a zone for conservation or transition?", *Landscape and Urban Planning*, Vol. 79 Nos 3/4, pp. 358-73.
- Tenenhaus, M., Esposito Vinzi, V., Chatelin, Y.-M. and Lauro, C. (2005), "PLS path modeling", *Computational Statistics & Data Analysis*, Vol. 48 No. 1, pp. 159-205.
- Tonglet, M., Phillips, P.S. and Read, A.D. (2004a), "Using the theory of planned behaviour to investigate the determinants of recycling behaviour: a case study from Brixworth, UK", *Resources Conservation and Recycling*, Vol. 41, pp. 191-214.
- Tonglet, M., Phillips, P.S. and Bates, M.P. (2004b), "Determining the drivers for householder pro-environmental behaviour: waste minimisation compared to recycling", *Resources, Conservation & Recycling*, Vol. 42, pp. 27-48.
- Vining, J. and Ebreo, A. (1990), "What makes a recycler? A comparison of recyclers and non-recyclers", *Environment and Behaviour*, Vol. 22, pp. 55-73.

### About the authors

Calvin Wan is a Research Student in the Department of Building and Real Estate at The Hong Kong Polytechnic University. His research interests include public attitudes and values, environmental psychology and sustainable development. Calvin Wan is the corresponding author and can be contacted at: spcalvin@speed-polyu.edu.hk

Ronnie Cheung held various posts, including Lecturer, Senior Lecturer and Assistant Professor at The Hong Kong Polytechnic University. Currently, he is working as a Consultant for the Hong Kong CyberU. He also has extensive consultancy experience for various public and commercial organizations. He also served as the Chairman of ACM-HK chapter of the Association for Computing Machinery.

Geoffrey Qiping Shen is the Chair Professor of Construction Management, the Associate Dean, Faculty of Construction and Land Use and the Head, Department of Building and Real Estate at The Hong Kong Polytechnic University. He has a proven track record of academic research in collaborative working in construction, supported by information and communication technologies.

F  
30,13/14

## Appendix

646

| Construct                             | Variables                                                            |
|---------------------------------------|----------------------------------------------------------------------|
| <i>Attitude (ATTD)</i>                |                                                                      |
| ATTD1                                 | 1. Recycling is good                                                 |
| ATTD2                                 | 2. Recycling is useful                                               |
| ATTD3                                 | 3. Recycling is responsible                                          |
| ATTD4                                 | 4. Recycling is sensible                                             |
| <i>Subjective norm (SUBN)</i>         |                                                                      |
| SUBN1                                 | 5. My friends expect me to recycle recyclables                       |
| SUBN2                                 | 6. My classmates/colleagues expect me to recycle recyclables         |
| SUBN3                                 | 7. Media influences me to recycle recyclables                        |
| SUBN4                                 | 8. Environmental groups influence me to recycle recyclables          |
| <i>Perceived control (CTRL)</i>       |                                                                      |
| CTRL1                                 | 9. I know what items can be recycled                                 |
| CTRL2                                 | 10. I know where to take my recyclables for recycling                |
| CTRL3                                 | 11. I know how to recycle my recyclables                             |
| CTRL4                                 | 12. I know would recycle more if I had more information on recycling |
| <i>Consequences awareness (AWARE)</i> |                                                                      |
| AWARE1                                | 13. Recycling is a major way to reduce pollution                     |
| AWARE2                                | 14. Recycling is a major way to reduce wasteful use of landfills     |
| AWARE3                                | 15. Recycling is a major way to conserve natural resources           |
| AWARE4                                | 16. Recycling improves environmental quality                         |
| <i>Moral norm (MORN)</i>              |                                                                      |
| MORN1                                 | 17. It would be wrong of me not to recycle my recyclables            |
| MORN2                                 | 18. I would feel guilty if I did not recycle my recyclables          |
| MORN3                                 | 19. Not recycling goes against my principles                         |
| MORN4                                 | 20. Everybody should share the responsibility to recycle recyclables |
| <i>Convenience (CONV)</i>             |                                                                      |
| CONV1                                 | 21. It is not a difficult task for me to recycle the recyclables     |
| CONV2                                 | 22. I have enough time to sort the materials for recycling           |
| CONV3                                 | 23. I have enough space to store the materials for recycling         |
| <i>Behavioural intention (BINT)</i>   |                                                                      |
| BINT1                                 | 24. I intend to recycle my recyclables in the next four weeks        |
| BINT2                                 | 25. I will recycle my recyclables regularly                          |
| <i>Behaviour (BEHV)</i>               |                                                                      |
| BEHV1                                 | 26. I have been recycling my recyclables regularly                   |
| BEHV2                                 | 27. I have recycling behaviour over the past four weeks              |
| BEHV3                                 | 28. I have recycling behaviour at the university                     |

**Table AI.**  
Questionnaire items

**Sources:** Adapted from Tonglet *et al.* (2004a) and Sidique *et al.* (2010)

**This article has been cited by:**

1. Farhana Khan, Waqar Ahmed, Arsalan Najmi. 2019. Understanding consumers' behavior intentions towards dealing with the plastic waste: Perspective of a developing country. *Resources, Conservation and Recycling* **142**, 49-58. [[Crossref](#)]
2. Anita Kumar. 2019. Exploring young adults' e-waste recycling behaviour using an extended theory of planned behaviour model: A cross-cultural study. *Resources, Conservation and Recycling* **141**, 378-389. [[Crossref](#)]
3. Nilgün Balkaya, Ayla Bilgin. 39. [[Crossref](#)]
4. Hongyi Sun, Pei-Lee Teh, Jonathan D. Linton. 2018. Impact of environmental knowledge and product quality on student attitude toward products with recycled/remanufactured content: Implications for environmental education and green manufacturing. *Business Strategy and the Environment* **27**:7, 935-945. [[Crossref](#)]
5. CheungTsz Yan, Tsz Yan Cheung, FokLincoln, Lincoln Fok, CheangChi-Chiu, Chi-Chiu Cheang, YeungChi Ho, Chi Ho Yeung, SoWing-Mui Winnie, Wing-Mui Winnie So, ChowCheuk-Fai, Cheuk-Fai Chow. 2018. University halls plastics recycling: a blended intervention study. *International Journal of Sustainability in Higher Education* **19**:6, 1038-1052. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
6. ChaudharyRicha, Richa Chaudhary, BisaiSamrat, Samrat Bisai. 2018. Factors influencing green purchase behavior of millennials in India. *Management of Environmental Quality: An International Journal* **29**:5, 798-812. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
7. Chuanhui Liao, Dingtao Zhao, Shuang Zhang. 2018. Psychological and conditional factors influencing staff's takeaway waste separation intention: An application of the extended theory of planned behavior. *Sustainable Cities and Society* **41**, 186-194. [[Crossref](#)]
8. Sheng-Hsiung Chang, Ching-Hsien Chou. 2018. Consumer Intention toward Bringing Your Own Shopping Bags in Taiwan: An Application of Ethics Perspective and Theory of Planned Behavior. *Sustainability* **10**:6, 1815. [[Crossref](#)]
9. ChaudharyRicha, Richa Chaudhary. 2018. Green buying behavior in India: an empirical analysis. *Journal of Global Responsibility* **9**:2, 179-192. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
10. YU HAO, LING-OU WANG, XI-SHENG CHEN, LU WANG. 2018. THE DETERMINANTS OF WASTE-SORTING INTENTION AND BEHAVIOR AMONG CHINESE UNDERGRADUATE STUDENTS: A CASE STUDY IN BEIJING. *The Singapore Economic Review* **25**, 1-26. [[Crossref](#)]
11. Calvin Wan, Geoffrey Qiping Shen, Stella Choi. 2018. The moderating effect of subjective norm in predicting intention to use urban green spaces: A study of Hong Kong. *Sustainable Cities and Society* **37**, 288-297. [[Crossref](#)]
12. Yatish Joshi, Zillur Rahman. Determinants of Sustainable Consumption Behaviour 239-262. [[Crossref](#)]
13. Abbas Mardani, Dalia Streimikiene, Edmundas Zavadskas, Fausto Cavallaro, Mehrbakhsh Nilashi, Ahmad Jusoh, Habib Zare. 2017. Application of Structural Equation Modeling (SEM) to Solve Environmental Sustainability Problems: A Comprehensive Review and Meta-Analysis. *Sustainability* **9**:10, 1814. [[Crossref](#)]
14. Kamyar Kianpour, Ahmad Jusoh, Abbas Mardani, Dalia Streimikiene, Fausto Cavallaro, Khalil Md. Nor, Edmundas Zavadskas. 2017. Factors Influencing Consumers' Intention to Return the End of Life Electronic Products through Reverse Supply Chain Management for Reuse, Repair and Recycling. *Sustainability* **9**:9, 1657. [[Crossref](#)]

15. Ayob Siti Fadzilah, Siti Fadzilah Ayob, Sheau-Ting Low, Low Sheau-Ting, Abdul Jalil Rohaya, Rohaya Abdul Jalil, Chin Hon-Choong, Hon-Choong Chin. 2017. Key determinants of waste separation intention: empirical application of TPB. *Facilities* 35:11/12, 696-708. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
16. Alessandra Varotto, Anna Spagnolli. 2017. Psychological strategies to promote household recycling. A systematic review with meta-analysis of validated field interventions. *Journal of Environmental Psychology* 51, 168-188. [[Crossref](#)]
17. Calvin Wan, Geoffrey Qiping Shen, Stella Choi. 2017. Experiential and instrumental attitudes: Interaction effect of attitude and subjective norm on recycling intention. *Journal of Environmental Psychology* 50, 69-79. [[Crossref](#)]
18. Wisecup Allison K., Allison K. Wisecup, Grady Dennis, Dennis Grady, Roth Richard A., Richard A. Roth, Stephens Julio, Julio Stephens. 2017. A comparative study of the efficacy of intervention strategies on student electricity use in campus residence halls. *International Journal of Sustainability in Higher Education* 18:4, 503-519. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
19. Rambalak Yadav, Govind S. Pathak. 2017. Determinants of Consumers' Green Purchase Behavior in a Developing Nation: Applying and Extending the Theory of Planned Behavior. *Ecological Economics* 134, 114-122. [[Crossref](#)]
20. Chang Sheng-Hsiung, Sheng-Hsiung Chang, Chang Chin-Wen, Chin-Wen Chang. 2017. Tie strength, green expertise, and interpersonal influences on the purchase of organic food in an emerging market. *British Food Journal* 119:2, 284-300. [[Abstract](#)] [[Full Text](#)] [[PDF](#)]
21. Rambalak Yadav, Govind Swaroop Pathak. 2016. Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. *Journal of Cleaner Production* 135, 732-739. [[Crossref](#)]
22. Siti Fadzilah Ayob, Low Sheau-Ting. 2016. Key Determinants of Waste Separation Intention among Students on Campus. *MATEC Web of Conferences* 66, 00066. [[Crossref](#)]
23. Adekunle Oke. 2015. Workplace Waste Recycling Behaviour: A Meta-Analytical Review. *Sustainability* 7:6, 7175-7194. [[Crossref](#)]
24. Ratchaneekorn Dansiricha, Opal Suwunnamek. 2014. A Comparison of Thai Consumers Purchasing Behaviour with the Environmental Characteristics: Electric Appliances Market. *Research Journal of Business Management* 8:4, 338-352. [[Crossref](#)]
25. Calvin Wan, Geoffrey Qiping Shen, Ann Yu. 2014. The moderating effect of perceived policy effectiveness on recycling intention. *Journal of Environmental Psychology* 37, 55-60. [[Crossref](#)]
26. Calvin Wan, Geoffrey Qiping Shen, Ann Yu. 2014. The role of perceived effectiveness of policy measures in predicting recycling behaviour in Hong Kong. *Resources, Conservation and Recycling* 83, 141-151. [[Crossref](#)]