International Journal of Psychological Studies; Vol. 9, No. 2; 2017
ISSN 1918-7211 E-ISSN 1918-722X
Published by Canadian Center of Science and Education

# Predicting Intentions to Purchase Sustainable Apparel in China: A Structural Equation Modeling Approach

Yan Han[1]

[1] Business School, Beijing Institute of Fashion Technology, Beijing, China

Correspondence: Yan Han, Business School, Beijing Institute of Fashion Technology, Beijing, China. Tel: 86-1381-020-5599. E-mail: xtoula@188.com

Received: February 6, 2017 Accepted: February 22, 2017 Online Published: March 15, 2017

doi:10.5539/ijps.v9n2p53 URL: http://doi.org/10.5539/ijps.v9n2p53

**Abstract**

The present study aims at exploring psychological determinants of intention to purchase sustainable apparel within the framework of the Theory of Planned Behavior (TPB). A convenience sample of 784 university students studying in three major cities (Beijing, Shanghai, and Dalian) of China completed the anonymous surveys. All antecedents included in this study were significantly related to intention of sustainable apparel purchasing. Among them, the most important predictor of Intention to purchase sustainable apparel was individuals' Attitude towards buying sustainable apparel, followed by Perceived Behaviour Control and Subjective Norm. The TPB was proved to be a reliable predictive model of intention to purchase sustainable apparel in the Chinese context. Findings from this study give readers an understanding of the magnitude and significance of relationships between antecedents and intention in the sustainable apparel consumption domain. These results lead to suggestions for policy makers, marketers and stakeholders involved in the sustainable apparel market.

**Keywords:** sustainable apparel, organic cotton, sustainable consumption, Theory of Planned Behavior (TPB)

## 1. Introduction

Reducing the impacts of all social actors' consumption practices is vital to achieve sustainable development (UNCED, 1992). Given consumers' interest in sustainable consumption has been ignited with organic foods, it is not surprising that they are seeking to expand their sustainable lifestyle to include sustainable apparel, such as apparel made of organic cotton. The organic apparel market is experiencing increasing popularity accordingly. While the motivations of organic food consumption have been examined extensively in academic research, little has been published on the psychology of organic apparel consumers (Hustvedt & Dickson, 2009).

Some developed countries have paid much attention to sustainable development and green consumption and have acquired fruitful achievements, while consumers in China are just at the stage of green awakening. This may be one of the reasons that little is understood about Chinese consumers' acceptance and preferences of environmentally friendly clothing and sustainable apparel purchasing intentions.

## 2. Literature Review

### *2.1 Studies of Organic Apparel Consumers*

Apparel satisfies various human needs, from body protection, enjoyment, status symbol, to self-expression and lifestyle (Kim & Damhorst, 1999; Meyer, 2001). Compared with the fruitful research achievements in the organic food domain, little empirical research had addressed consumers of organic apparel.

A study of consumer likelihood of purchasing organic cotton apparel (Hustvedt & Dickson, 2009) discovered that the 38 percent of consumers who found used organic cotton content salient had positive attitudes towards organic and sustainable agriculture, preferred to "buy locally" and had a strong self-identity as environmental, organic, and socially responsible consumers. Another study of consumer willingness to pay for sustainable apparel (Hustvedt & Bernard, 2008) found that the premiums for labeling for organic and non-GM fibers are similar, with organic labeling being worth slightly (50 cents) more to consumers.

Results of a focus group study (Joergens, 2006) demonstrated little evidence that ethical issues had any effect on consumers' fashion purchase behavior. Consumers were less interested in environmental issues caused by

clothing production. When it comes to fashion purchase, personal needs motivate consumers primarily to buy garments and take precedence over ethical issues. The author argued that this does not mean that consumers do not care at all about unethical behavior, but it seems not all unethically behaviors affect purchasing behavior in the same way, especially when it comes to fashion items.

*2.2 Theory of Planned Behavior (TPB)*

The Theory of Planned Behavior (TPB) (Ajzen, 1985, 1988, 1991) is one of the most widely used conceptual models for explaining environmentally sustainable behaviors (Han, Hsu, & Sheu, 2010; Fielding , McDonald, & Louis, 2008; Groot & Steg, 2007), which demonstrates that behaviors are affected by rational considerations during the decision-making process.

Based on the TPB model, intention is the core determinant to predict individual's willingness and endeavors to implement one behavior (Azjen, 1991). According to the TPB model, there are three significant elements to determine individual's behavioral intention. Attitude towards the Behavior (AB) is to assess the degree to which implementation of the behavior is positively or negatively valued. Subjective Norm (SN) evaluates the degree of cognitive social pressure that affects whether people decide to involve or not to involve in the behavior. Perceived Behavioral Control (PBC) reveals how easy or difficult to perform the behavior attributable to people's ability (Azjen, 1991). Generally, TPB model demonstrates the more positive consequence of individual's attitude and subjective norm, and the better effects of one's perceived behavioral control, the more likely a person intends to perform that behavior.

## 3. The Present Study

The present study attempts to contribute to both the domain of sustainable apparel consumption and the realm of sustainable consumption in developing countries. To be specific, the purpose of this study is twofold: Firstly, it aims at exploring psychological determinants of intentions to purchase sustainable apparel in the context of Chinese university students. Secondly, it uses a Structural Equation Modeling (SEM) approach to test the Theory of Planned Behavior (TPB) model, in its power of explaining the intention of sustainable apparel purchase. The conceptual model for understanding consumer's intention to buy sustainable apparel was shown in Figure 1.

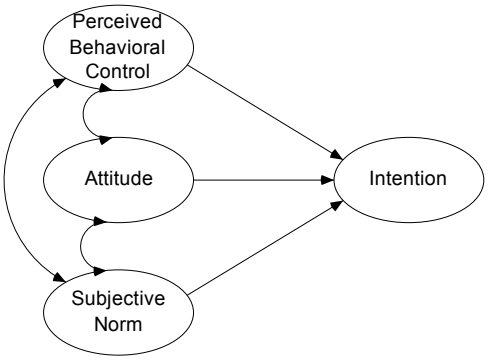


Figure 1. Conceptual model

## 4. Method

*4.1 Sample and Procedure*

Data was collected in October 2016 from a sample of university students studying in three major cities (Beijing, Shanghai, and Dalian) of China. Convenience sampling was used at the university campuses to contact the potential respondents. After a brief introduction, respondents who were willing to participate in the study were given a copy of the anonymous questionnaire. A total of 784 usable surveys were included in the analysis. The main sample characteristics were shown in Table 1.

Table 1. Sample characteristics

| Variable | | Category | Frequency | Percent |
|---|---|---|---|---|
| University | Beijing | Beijing University of Technology | 47 | 6.0 |
| | | Beijing Institute of Technology | 43 | 5.5 |
| | | Renmin university of China | 44 | 5.6 |
| | | Beijing University of Chemical Technology | 50 | 6.4 |
| | | Beijing Institute of Fashion Technology | 45 | 5.7 |
| | | University International Business and Economics | 41 | 5.2 |
| | | *Total respondents from Beijing* | *270* | *34.4* |
| | Dalian | Dalian University of Technology | 45 | 5.7 |
| | | Dalian Polytechnic University | 39 | 5.0 |
| | | Dalian Maritime University | 58 | 7.4 |
| | | Dongbei University of Finance and Economics | 44 | 5.6 |
| | | Dalian Nationalities University | 49 | 6.2 |
| | | *Total respondents from Dalian* | *235* | *30.0* |
| | Shanghai | Shanghai Normal University | 41 | 5.2 |
| | | Shanghai Jiao Tong University | 47 | 6.0 |
| | | Donghua University | 45 | 5.7 |
| | | Shanghai University of T.C.M | 48 | 6.1 |
| | | East China University of Science and Technology | 18 | 2.3 |
| | | Shanghai University Of Engineering Science | 35 | 4.5 |
| | | Tongji University | 45 | 5.7 |
| | | *Total respondents from Shanghai* | *279* | *35.6* |
| Gender | | Male | 335 | 42.7 |
| | | Female | 449 | 57.3 |
| Category of specialties | | Arts, Education and Social Science | 363 | 48.6 |
| | | Science and Technology | 384 | 51.4 |

### *4.2 Measures*

Participants received the following definition of sustainable apparel prior to completing the measures: "'Sustainable apparel', also named as 'organic apparel', 'ecological apparel', 'eco-friendly apparel', or 'green apparel', has been produced using methods that are free from most synthetic chemical inputs while not harming the environment or workers by using biodegradable material and organic cotton. The most common sustainable apparel products are made of organic cotton. Manufacturing technology has also helped to develop fleece fabrics made from recycled plastic bottles and jeans from recycled denim".

The questionnaire used in this study was composed of two sections: the first section contained items designed to assess the major constructs (Attitude, Subjective Norm, Perceived Behavioral Control, and Intention) in the Theory of Planned Behavior, and the second section contained questions for demographic information. The items (responses on seven-point Likert scale) measuring TPB constructs were constructed according to the recommendations of Ajzen and Fishbein (1980) and Ajzen (1985, 1991). The questionnaire was pre-tested and some minor modifications were made before sending it out to the final sample. Items were arranged so that no two items from a particular construct were adjacent to each other. The measurement items for each construct are presented in Table 2.

Table 2. Measurement items for each construct

| Construct | Measurement Item | Value Label (form 1 to 7) |
|---|---|---|
| Attitude towards Behavior | AB1、For me to buy sustainable apparel is： | 1=meaningless; 7=meaningful |
| | AB2、For me to buy sustainable apparel is： | 1=wrong; 7=right |
| | AB3、For me to buy sustainable apparel is： | 1=harmful; 7=beneficial |
| Subjective Norm | SN1、Most people who are important to me would think that I should buy sustainable apparel instead of conventional apparel. | 1=strongly disagree; 7=strongly agree |
| | SN2、Most people I value would buy sustainable apparel instead of conventional apparel. | 1=strongly disagree; 7=strongly agree |
| Perceived Behavioral Control | PBC1、Whether or not I choose sustainable apparel when purchasing is completely up to me. | 1=strongly disagree; 7=strongly agree |
| | PBC2、I am confident that if I want, I can choose sustainable apparel when purchasing. | 1=strongly disagree; 7=strongly agree |
| | PBC3、I have resources, time, and opportunities to choose sustainable apparel when purchasing. | 1=strongly disagree; 7=strongly agree |
| Intention | IT1、I plan to buy sustainable apparel. | 1=extremely unlikely; 7=extremely likely |
| | IT2、I am willing to choose sustainable apparel when purchasing. | 1=strongly disagree; 7=strongly agree |
| | IT3、How likely is it that you will purchase sustainable apparel within the next three months? | 1=extremely unlikely; 7=extremely likely |

## 5. Results

### *5.1 Testing for Multivariate Normal Distribution*

Before the measurement model was tested, the original data was carefully screened to avoid any violation of the assumptions of the general linear model.

Regardless of whether the distribution of observed variables is univariate normal, the multivariate distribution can still be multivariate nonnormal (West et al., 1995). Thus, the index of multivariate kurtosis and its critical ratio should be used for the test of multivariate normal distribution. Of the two indices, the C.R. value is especially important because it represents Mardia's normalized estimate of multivariate kurtosis. When the sample size is very large and multivariately normal, Mardia' s normalized estimate is distributed as a unit normal variate such that large values reflect significant positive kurtosis and large negative values reflect significant negative kurtosis. Bentler (2005) has suggested that, in practice, values>5.00 are indicative of data that are nonnormally distributed.

In this application, multivariate kurtosis and its critical ratio were 7.632 and 6.318 respectively, which was slightly suggestive of nonnormality in the sample. Considering the large sample size (N=784) of this study, 37 observations farthest from the centroid (Mahalanobis distance) were excluded as extreme multivariate outliers among the cases, and index of multivariate kurtosis and its critical ratio were calculated again for the remaining 747 cases. In this application, multivariate kurtosis and its critical ratio were 5.337 and 4.313 respectively, which was suggestive of normality in the sample. The remaining 747 cases were included in the following descriptive statistics and Structural Equation Modeling (SEM) analyses.

### *5.2 Descriptive Statistics*

One-way ANOVA was used to see the differences across groups of various backgrounds, and post hoc tests were also performed to detect any significant differences between the subgroups. Results showed that female students had significantly more positive attitude (AB=5.816) towards buying sustainable apparel than male (AB=5.521). Respondents from Shanghai had a significantly lower intention to purchase sustainable apparel (IT=4.884) than did respondents from Beijing (IT=5.048) and Dalian (IT=5.176), while no significant difference existed between the last two groups on the same construct. In addition, no other significant difference had been found for the other constructs across groups of different gender or location.

It's interesting but unsurprising to find that the category of specialties had significant influences on three constructs and their corresponding items at the 0.05 level except for SN. Table 3 displays the means, standard deviations and independent-samples T tests of all constructs and items used in this study. Table 3 is divided into four columns. Column 1 shows means and standard deviations of the constructs and the items obtained from all the respondents. Column 2 and column 3 show means and standard deviations for Group A (Arts, Education and Social Science) and Group B (Science and Technology) respectively. Statistical differences among groups are reported in column 4. Generally speaking, respondents majoring in Arts, Education and Social Science (Group A) scored higher for all items than did respondents majoring in Science and Technology (Group B) except for the items of SN. It could be argued that humanism is responsible for the differences to some extent. Although Group A scored a little bit lower for the items of SN than did Group B, the differences were not statistically significant.

Table 3. Means, standard deviations and independent-samples T tests

| | All respondents | | Group A (Arts, Education and Social Science) | | Group B (Science and Technology) | | Independent-samples T test* |
|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | |
| **AB (mean)** | **5.691** | **1.019** | **5.806** | **0.971** | **5.582** | **1.052** | **A＞B** |
| AB1 | 5.538 | 1.227 | 5.642 | 1.186 | 5.440 | 1.259 | A＞B |
| AB2 | 5.794 | 1.119 | 5.890 | 1.084 | 5.703 | 1.145 | A＞B |
| AB3 | 5.740 | 1.128 | 5.887 | 1.072 | 5.602 | 1.163 | A＞B |
| **SN (mean)** | **4.505** | **1.079** | **4.483** | **1.047** | **4.525** | **1.109** | — |
| SN1 | 4.561 | 1.253 | 4.521 | 1.227 | 4.599 | 1.279 | — |
| SN2 | 4.448 | 1.189 | 4.446 | 1.182 | 4.451 | 1.197 | — |
| **PBC (mean)** | **5.237** | **0.919** | **5.340** | **0.906** | **5.140** | **0.923** | **A＞B** |
| PBC1 | 5.395 | 1.215 | 5.444 | 1.232 | 5.349 | 1.198 | — |
| PBC2 | 5.564 | 1.154 | 5.697 | 1.081 | 5.438 | 1.208 | A＞B |
| PBC3 | 4.752 | 1.393 | 4.879 | 1.371 | 4.633 | 1.404 | A＞B |
| **IT (mean)** | **5.028** | **0.933** | **5.098** | **0.881** | **4.961** | **0.977** | **A＞B** |
| IT1 | 5.296 | 1.122 | 5.408 | 1.064 | 5.190 | 1.166 | A＞B |
| IT2 | 5.438 | 1.141 | 5.512 | 1.108 | 5.367 | 1.169 | — |
| IT3 | 4.349 | 1.372 | 4.375 | 1.380 | 4.326 | 1.366 | — |

*Note.* AB=attitude towards behavior; SN=social norm; PBC=perceived behavioral control; IT=intention. *All differences were significant at the 0.05 level. "—" represents nonsignificant difference.

### *5.3 Confirmatory Factor Analyses*

The Factor Analytic–Structural Equation Modeling (FASEM) method advocated by Bentler (1995) was adopted for model construction. In the first step of the analysis, a Confirmatory Factor Analysis (CFA) model with AMOS 17.0 was used to test the adequacy of the measures in representing their associated hypothesized constructs (latent variables).

The appropriateness of the model was examined using several fit indices. The chi-square ($\chi^2$) statistic is a global test which provides a test of the null hypothesis that the covariance matrix conforms to the particular model being tested. A nonsignificant chi-square value indicates that the model being tested fits the data well. But it is known that the chi-square statistic is highly sensitive to sample size (Jreskog, 1993), and even trivial differences can lead to a significant chi-square result in large samples. Thus, the chi-square statistic must be interpreted with caution, and tests from each category of fit indices (absolute fit, comparative fit, and parsimony correction) should be examined for the tested model (Brown, 2006; Hu & Bentler, 1999). Generally speaking, smaller values of root mean square residual (RMR) (below 0.05) and Root Mean Square Error of Approximation (RMSEA) (below 0.07) and lager values (0.90 or higher) of Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index

(AGFI), Normed Fit Index (NFI) and Comparative Fit Index (CFI) are associated with better model fit (Steiger, 2007; Bentler, 1990; Byrne, 1989; Jreskog & Sorbom, 1984; Bentler & Bonett, 1980), which indicates that only a relatively small amount of variance remains unexplained by the model.

The model used for the initial CFA is illustrated in Figure 2. Confirmatory factor analysis using maximum likelihood estimation with the 747 cases was conducted to assess the underlying structure of the variables in the TPB model. The CFA results indicated that the model fits the data well ($\chi^2$=281.723, df=38 (p=0.000), RMR=0.091, RMSEA=0.093, CFI=0.933, GFI=0.935, NFI=0.923). Although the $\chi^2$ statistic was significant (p=0.000), it is known to be highly sensitive to sample size (Jreskog, 1993).

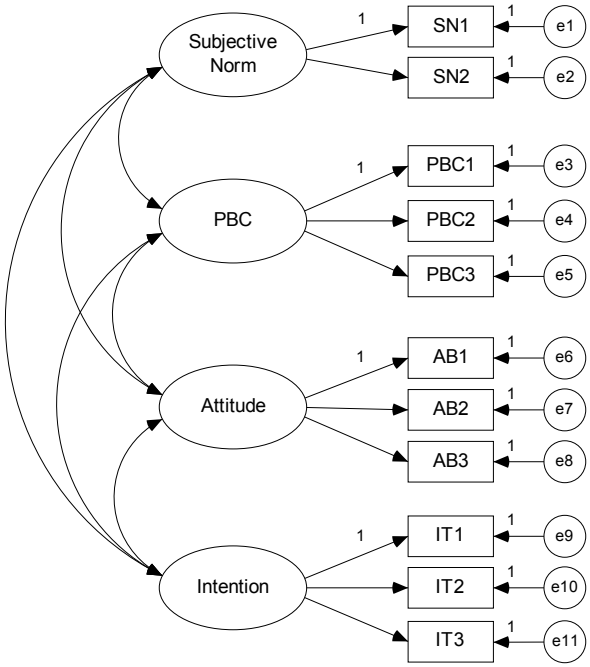


Figure 2. Model used for the initial Confirmatory Factor Analysis (CFA)

Results indicated that all items were significantly associated with their specified constructs (p<0.001). However, the standardized factor loading values for two items (PBC3 and IT3) didn't meet the minimum criterion of 0.50 (Ford, MacCallum, & Tait, 1986), so these two item need to be eliminated to increase reliability and decrease measurement error. Composite reliability was calculated using the procedures outlined by Fornell and Larcker (1981). Parameter estimates were made and assessed the Average Variance Extracted (AVE) for each factor (Anderson & Gerbing, 1988; Bagozzi & Yi, 1988). Composite reliability of constructs (as shown in Table 4) ranged from 0.590 to 0.857. Two AVE values, of the constructs of PBC and Intention respectively, didn't exceed the recommended value of 0.50 (Fornell & Larcker, 1981). This didn't support convergent validity of these two constructs.

Table 4. Results of convergent validity analyses (First time)

| Latent Variable | Indicator | Standardized factor loading | $R^2$ | Measurement error | Composite reliability | AVE |
|---|---|---|---|---|---|---|
| Attitude | AB1 | 0.756 | 0.572 | 0.428 | 0.857 | 0.667 |
| | AB2 | 0.863 | 0.745 | 0.255 | | |
| | AB3 | 0.828 | 0.686 | 0.314 | | |
| Subjective Norm | SN1 | 0.808 | 0.653 | 0.347 | 0.723 | 0.567 |
| | SN2 | 0.694 | 0.482 | 0.518 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Perceived Behavioral Control | PBC1 | 0.503 | 0.253 | 0.747 | | |
| | PBC2 | 0.763 | 0.582 | 0.418 | 0.590 | 0.339 |
| | PBC3 | 0.425 | 0.181 | 0.819 | | |
| Intention | IT1 | 0.736 | 0.542 | 0.458 | | |
| | IT2 | 0.799 | 0.638 | 0.362 | 0.694 | 0.448 |
| | IT3 | 0.404 | 0.163 | 0.837 | | |

*Note*. $\chi^2$=281.723, df=38 (p=0.000), RMSEA=0.093, CFI =0.933, NFI=0.923.

Considering the standardized factor loading values of these two items (PBC3 and IT3) were below the minimum criterion of 0.50 (Ford, MacCallum, & Tait, 1986), they were eliminated to see whether reliability could be increased and measurement error could be decreased. After the exclusion of these two items, the remaining items were again subjected to CFA. The results showed a satisfactory fit to the data ($\chi^2$=109.005, df=21 (p=0.000), RMR=0.044, RMSEA=0.075, CFI=0.973, GFI=0.968, NFI=0.967). All the standardized factor loading values for the items met the minimum criterion of 0.50 (Ford, MacCallum, & Tait, 1986). All items were significantly associated with their specified constructs (p<0.001). These results provided evidence for the unidimensionality of each scale.

Table 5. Results of convergent validity analyses (Second time)

| Latent Variable | Indicator | Standardized factor loading | $R^2$ | Measurement error | Composite reliability | AVE |
|---|---|---|---|---|---|---|
| Attitude | AB1 | 0.755 | 0.570 | 0.430 | | |
| | AB2 | 0.865 | 0.748 | 0.252 | 0.857 | 0.667 |
| | AB3 | 0.826 | 0.682 | 0.318 | | |
| Subjective Norm | SN1 | 0.814 | 0.663 | 0.337 | 0.724 | 0.569 |
| | SN2 | 0.689 | 0.475 | 0.525 | | |
| Perceived Behavioral Control | PBC1 | 0.514 | 0.264 | 0.736 | 0.587 | 0.425 |
| | PBC2 | 0.765 | 0.585 | 0.415 | | |
| Intention | IT1 | 0.741 | 0.549 | 0.451 | 0.745 | 0.594 |
| | IT2 | 0.799 | 0.638 | 0.362 | | |

*Note*. $\chi^2$=109.005, df=21 (p=0.000), RMSEA=0.075, CFI=0.973, NFI=0.967.

Composite reliability of constructs this time ranged from 0.587 to 0.857 (as shown in Table 5). All the AVE values exceeded the recommended value of 0.50 (Fornell & Larcker, 1981), except for the construct of PBC, whose AVE value is 0.425. As can be seen, the standardized factor loading value of the item PBC1 was 0.514, which was just above 0.50, so it was eliminated from the measurement model of the construct of PBC, which leaving PBC2 the only indicator of the construct of PBC. The path for single-item scale of PBC was fixed to 0.9 and the error term was fixed to 0.19 to impose measurement error on the scale for the purpose of enforcing a stronger test as suggested by some researchers (Hansen et al., 2008; Bagozzi & Yi, 1988). Results of parameter estimates (standardized path coefficients) of the final confirmatory factor analysis are presented in Figure 3. Item-factor loadings are estimates of the validity of the observable variables (measurement items). All the factor loadings of the items exceed 0.60, and they are all significant at the 0.001 level. This is the evidence that the measured variables represent the underlying constructs according to Bagozzi and Yi's (1988) suggestions.

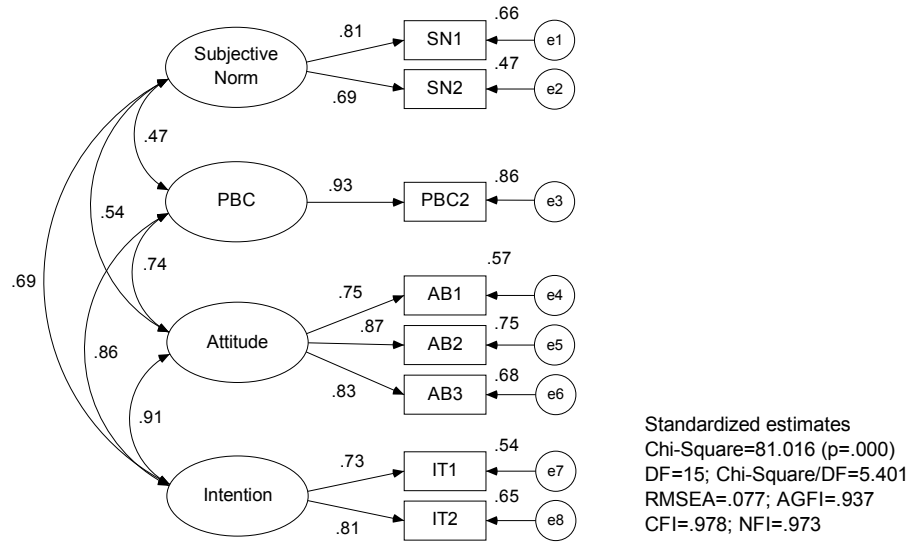


Figure 3. Parameter estimates of the final CFA model

We also assessed discriminant validity with Fornell and Larcker's (1981) criterion. Table 6 shows that the Average Variance Extracted (AVE) of Attitude didn't exceed the squared correlation between Attitude and Intention, which indicated a relatively lower level of discriminant validity. As for Subjective Norm, the AVE value for this construct was greater than the squared correlation between constructs, indicating that discriminant validity was achieved.

Table 6. Discriminant validity

| | Subjective Norm | Attitude | Intention |
|---|---|---|---|
| Subjective Norm | **0.569** | | |
| Attitude | 0.294 | **0.667** | |
| Intention | 0.475 | 0.821 | **0.594** |

*Note*. Bold numbers on the diagonal show the AVE. Numbers below the diagonal represent the squared correlations.

### *5.4 Structural Equation Model Analyses*

According to Bentler's (1995) Factor Analytic-Structural Equation Modeling (FASEM) method, subsequent analyses involves structural equation modeling to test model fit. This model stipulated the hypothesized structural paths among the latent constructs in accordance with the prediction of the Intention in a sustainable apparel context (see Figure 4). All exogenous latent variables (namely PBC, SN and Attitude) in the TPB model were left free to correlate. Maximum Likelihood (ML) method was employed to estimate free parameters in structural equation model. A number of goodness-of-fit indices were examined for the tested model. Table 7 presents the fit indices of the model, which produced statistically acceptable fit indices, according to the joint fit indices criterion mentioned above (Steiger, 2007; Bentler, 1990; Byrne, 1989; Jreskog & Sorbom, 1984; Bentler & Bonett, 1980).

Table 7. Summary of fit indices of the model

| Model | $\chi^2$ | $\chi^2$/DF | NFI | GFI | AGFI | CFI | RMR | RMSEA |
|---|---|---|---|---|---|---|---|---|
| TPB | 81.016 | 5.401 | 0.973 | 0.974 | 0.937 | 0.978 | 0.043 | 0.077 |

Results of parameter estimates (standardized path coefficients and explained variances) are presented in Figure 4. All the paths were statistically significant at the 0.001 level. As shown in Figure 4, the most important predictor of Intention to purchase sustainable apparel was individuals' Attitude towards buying sustainable apparel (0.49), followed by PBC (0.38) and Subjective Norm (0.24). The result here is relatively close to the findings of a meta-analytic structural equation modeling analysis of determinants of sustainable food consumption (Han & Hansen, 2012), which reported that the standardized path coefficients between Attitude-Intention, PBC-Intention and SN-Intention were 0.42, 0.22 and 0.22 respectively. Another meta-analysis of psycho-social determinants of pro-environmental behavior (Bamberg & Mser, 2007) reported that the standardized path coefficients between Attitude-Intention, PBC-Intention and SN-Intention were 0.29, 0.31 and 0.29 respectively. It should be noted that Ajzen (1991) argued that the weight of the predictors of TPB might be variable, according to the behavior under study.

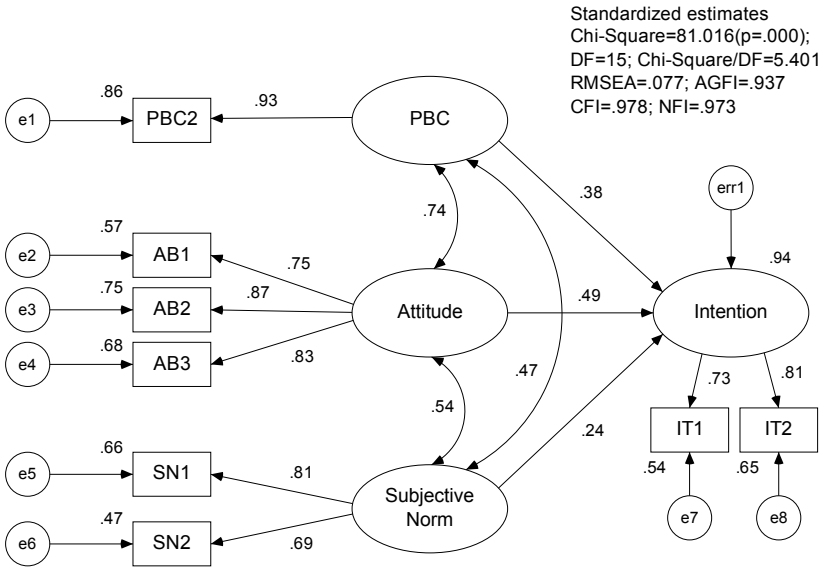


Figure 4. Parameter estimates of the structural model

Both total effects and standardized total effects were considered and shown in Table 8. The total effects represent the sum of both direct and mediated indirect effects through which a predictor influences a dependant variable. As for the standardized total effects of antecedents on Intention, Attitude (0.494) showed highest total effects, followed by PBC (0.378) and SN (0.244). It deserves attention that total effects depend on the validity of the present model and they should be viewed as correlations instead of causal relationships.

Table 8. Total effects (upper triangular matrix) and standardized total effects (lower triangular matrix)

| Construct | SN | Attitude | PBC | Intention |
|---|---|---|---|---|
| SN | | — | — | 0.197 |
| Attitude | — | | — | 0.440 |
| PBC | — | — | | 0.261 |
| Intention | 0.244 | 0.494 | 0.378 | |

*Note*. SN=social norm; PBC=perceived behavioral control.

*5.5 Multigroup Analyses*

Structural equation modeling analyses concerning hypotheses about potential group differences are also commonly referred to as tests for model invariance (Marcoulides & Heck, 1993), while the other terms such as multigroup analyses, multigroup modeling, and multisample modeling are also used interchangeably (Schumacker & Marcoulides, 1998). Considering that significant differences in three constructs (except for SN) and their corresponding items were found at the 0.05 level across groups of different categories of specialties, the respondents were thus divided into two groups based on the category of specialties, namely, Group A (Arts, Education and Social Science), and Group B (Science and Technology).

5.5.1 Multigroup Analyses of CFA

Prior to comparing the key structural relationships among the TPB constructs in the proposed model across the two subgroups, measurement invariance was tested to identify any variation in the measurement model (as shown in Figure 3). Specifically, an unrestricted model using CFA was first assessed, and then this model was compared to the constrained model in which measurement weights (factor loadings) were constrained to be equivalent across samples. Invariance of the measurement weights (factor loadings) is considered the minimum acceptable criterion for measurement invariance (Byrne et al., 1989). Model invariance was then examined using both a chi-square ($\chi^2$) difference test and a Comparative Fit Index (CFI) difference test to determine whether the model and the measurement weights were invariant across the groups. Although a number of other fit indices are often examined for traditional confirmatory factor analyses, only the $\chi^2$ difference test and the CFI difference test are normally considered when conducting tests of model invariance. A nonsignificant $\chi^2$ difference and a CFI difference value below 0.05 represent model invariance and the null hypothesis that the parameters are equal across groups is accepted (Little, 1997; Raykov & Marcoulides, 2000).

Table 9. Goodness-of-fit statistics and model comparisons for multigroup CFA

| Model | $\chi^2$ | $\chi^2$/DF | CFI | RMSEA | Models compared | $\Delta\chi^2$ | p | ΔCFI |
|---|---|---|---|---|---|---|---|---|
| 1: Unconstrained | 102.565 | 3.419 | 0.976 | 0.057 | | | | |
| 2: Measurement weights | 105.569 | 3.105 | 0.976 | 0.053 | 2 and 1 | 3.004 | 0.557 | 0.000 |

Table 9 presents the fit indices of the unconstrained model and the measurement weight-invariant model, as well as the results of chi-square ($\chi^2$) difference test and Comparative Fit Index (CFI) difference test. Both the unconstrained model and the measurement weight-invariant model produced statistically acceptable fit indices (Steiger, 2007; Bentler, 1990; Byrne, 1989; Jreskog & Sorbom, 1984; Bentler & Bonett, 1980). In addition, standardized factor loadings for the latent factors on each of their indicators were all positive and significant, exceeding the recommended minimum value of 0.50 (Ford, MacCallum, & Tait, 1986) in the two models. This indicated that both the unconstrained model and the measurement weight-invariant model fitted the data well. As for model comparisons, the unconstrained model and the measurement weight-invariant model were not statistically different ($\Delta\chi^2$=3.004; p=0.557＞0.05). And also, Δ CFI didn't exceed the threshold value of 0.05 (Little, 1997; Raykov & Marcoulides, 2000). Thus measurement invariance was supported. Both unconstrained model and factor loading-invariant model showed a satisfactory fit. The model invariance represented construct validation across the two groups of interest in the multigroup analyses.

5.5.2 Multigroup Analyses of SEM

As the next step, the proposed structural model (as shown in Figure 4) was fitted to the data for each group separately with all paths freely estimated across groups. This unconstrained model served as the baseline model, and then the baseline model was compared to a series of nested models, in which more stringent constraints were placed on the model in a hierarchical fashion by specifying the parameters of interest to be constrained across the groups, to examine invariance in the specific paths across groups.

Table 10. Summary of fit indices of the unconstrained model for each group

| Group | $\chi^2$ | $\chi^2$/DF | GFI | NFI | CFI | RMR | RMSEA |
|---|---|---|---|---|---|---|---|
| Group A | 58.818 | 3.921 | 0.963 | 0.956 | 0.966 | 0.047 | 0.090 |
| Group B | 43.746 | 2.916 | 0.972 | 0.974 | 0.983 | 0.043 | 0.071 |

Table 11. Standardized parameter estimates among latent factors and factor correlations for each group

| Parameter | | Group A (Arts, Education and Social Science) | Group B (Science and Technology) |
|---|---|---|---|
| Structural parameter | PBC → Intention | $0.321^{***}$ | $0.430^{***}$ |
| | Attitude → Intention | $0.585^{***}$ | $0.406^{***}$ |
| | Subjective Norm → Intention | $0.213^{***}$ | $0.279^{***}$ |
| Factor correlation | Attitude ←→ PBC | $0.709^{***}$ | $0.756^{***}$ |
| | Attitude ←→ Subjective Norm | $0.526^{***}$ | $0.567^{***}$ |
| | Subjective Norm ←→ PBC | $0.505^{***}$ | $0.454^{***}$ |

*Note*. PBC=perceived behavioral control. $^{***}p<0.001$.

Goodness-of-fit statistics for the unconstrained model (see Table 10) were acceptable for each group according to the joint fit indices criterion (Steiger, 2007; Bentler, 1990; Byrne, 1989; Jreskog & Sorbom, 1984; Bentler & Bonett, 1980). Standardized parameter estimates among latent factors and factor correlations for each group are presented in Table 11. Attitude, Subjective Norm and PBC were significant predictors of Intention for each group. Among the three predictors, Attitude ranked first for Group A, while PBC ranked first for Group B.

Table 12. Goodness-of-fit statistics and model comparisons for multigroup SEM

| Model | $\chi^2$ | $\chi^2$/DF | CFI | RMSEA | Models compared | $\Delta\chi^2$ | p | ΔCFI |
|---|---|---|---|---|---|---|---|---|
| 1: Unconstrained | 102.565 | 3.419 | 0.976 | 0.057 | | | | |
| 2: Measurement weights | 105.569 | 3.105 | 0.976 | 0.053 | 2 and 1 | 3.004 | 0.557 | 0.000 |
| 3: Structural weights | 108.578 | 2.935 | 0.976 | 0.051 | 3 and 2 | 3.009 | 0.390 | 0.000 |
| 4: Structural covariances | 118.129 | 2.747 | 0.975 | 0.048 | 4 and 3 | 9.551 | 0.145 | -0.001 |
| 5: Structural residuals | 118.827 | 2.701 | 0.975 | 0.048 | 5 and 4 | 0.698 | 0.403 | 0.000 |
| 6: Measurement residuals | 121.965 | 2.391 | 0.976 | 0.043 | 6 and 5 | 3.138 | 0.872 | 0.001 |

Six models with different invariance hypotheses were subsequently compared in a hierarchical fashion at each stage adding an additional constraint on the basis of the former model. Goodness-of-fit indices for each model in the invariance routine and model comparisons among these models are given in Table 12. The results showed that all the six models produced statistically acceptable fit indices (Steiger, 2007; Bentler, 1990; Byrne, 1989; Jöreskog & Sorbom, 1984; Bentler & Bonett, 1980). As for model comparisons, a nonsignificant $\chi^2$ difference and a CFI difference value below 0.05 represent model invariance (Little, 1997; Raykov & Marcoulides, 2000). Thus the null hypothesis that the parameters are equal across groups is accepted for this study. While Attitude, Subjective Norm, and PBC had different structural weights in each subgroup (shown in Table 11), these weights were not statistically different across Group A (Arts, Education and Social Science) and Group B (Science and Technology). And also, the two groups did not differ in terms of structural covariances, structural residuals, and

measurement residuals. This finding implies that the mechanisms underlying the Attitude-Intention, Subjective Norm-Intention, and PBC-Intention links do not differ according to the respondents' category of specialties.

## 6. Conclusion and Discussion

The present study aims at exploring psychological determinants of intentions to purchase sustainable apparel in the context of Chinese university students within the framework of the TPB. As expected, all antecedents included in our study were significantly related to intention of sustainable apparel purchasing. Among them, the most important predictor of Intention to purchase sustainable apparel was individuals' Attitude towards buying sustainable apparel, followed by PBC and Subjective Norm. The TPB was proved to be a reliable (i.e., results exhibited both acceptable internal fit and external consistency with other findings) predictive model of intention to purchase environmentally friendly products including sustainable apparel. Furthermore, the mechanisms underlying the Attitude-Intention, Subjective Norm-Intention, and PBC-Intention links did not differ according to the respondents' category of specialties.

The results of our study give readers an understanding of the magnitude and significance of relationships between antecedents and intention in the sustainable apparel consumption domain. From a practical perspective, these results lead to interesting suggestions for policy makers, marketers and stakeholders involved in the sustainable apparel market. Since consumers rely more on positive attitudes to form intentions of purchasing sustainable apparel, it may be both crucial and beneficial to find effective ways to increase consumers' environmental concerns and knowledge of sustainable apparel that could potentially contribute to the formation of their positive attitudes towards sustainable apparel consumption in the long-term. And also, favorable attitudes towards sustainable apparel purchasing in the whole society will enhance the subjective norms produced by one's important referents. Moreover, marketers in the sustainable apparel market should conduct informative and appealing communications with consumers to increase their perceived behavioral control of purchasing sustainable apparel. In a more fundamental perspective, education should play more influential roles in promoting consumers' attitudes towards and intentions of purchasing sustainable apparel, considering that today's consumers were yesterday's students without exception. Developing a sense of humanism hinges on a good ethical education. Emphases should also be attached to the teaching of humanities besides technological subjects in school.

This paper provided an overview of psychological determinants of intentions to purchase sustainable apparel within the framework of the TPB in the Chinese context. However, the current study has some limitations. First, the university-student sample used in the present study weakens the generalization of the results. However, today's university students will be the major power of apparel market in the near future, so the results are still of momentous current significance and far-reaching future significance. Second, no actual measure of behavior was obtained for this study, and the only endogenous latent variable examined here is intention. The limitations of our study also indicate some directions of future research. First, future research might focus on the sustainable apparel market segment rather than the student or the general population. Second, future research may pay more attention to the actual behaviors of sustainable apparel consumption instead of focusing narrowly on intention.

## References

Ajzen, I. (1985). From intention to actions: A theory of planned behavior. In J. Kuhl, & J. Beckman (Eds.), *Actions-control: From cognition to behavior*. Heidelberg: Springer. https://doi.org/10.1007/978-3-642-69746-3_2

Ajzen, I. (1988). *Attitudes, personality and behavior*. Chicago: Dorsey Press.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two step approach. *Psychological Bulletin*, *103*, 411-423. https://doi.org/10.1037/0033-2909.103.3.411

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, *16*, 74-94. https://doi.org/10.1007/BF02723327

Bentler, P. M. (1990). Comparative Fit Indexes in Structural Models. *Psychological Bulletin*, *107*, 238-246. https://doi.org/10.1037/0033-2909.107.2.238

Bentler, P. M. (1995). *EQS structural equations program manual*. Encino, CA: Multivariate Software Inc.

Bentler, P. M., & Bonnet, D. G. (1980). Significance Tests and Goodness-of-fit in the Analysis of Covariance Structure. *Psychological Bulletin*, *88*, 588-606. https://doi.org/10.1037/0033-2909.88.3.588

Bentler, P. M., Liang, J., & Yuan, K.-H. (2005). Some recent advances in two-level structural equation models: Estimation, testing and robustness. In J. Fan, & G. Li (Eds.), *Contemporary multivariate analysis and design of experiments: In celebration of Prof. Kai-Tai Fang's 65th birthday* (pp. 99-120). NJ: World Scientific. https://doi.org/10.1142/9789812567765_0007

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.

Byrne, B. M. (1989). *A Primer of LISREL: Basic Applications and Programming for Confirmatory Factor Analytic Models*. Springer-Verlag, NY: New York. https://doi.org/10.1007/978-1-4613-8885-2

Byrne, B. M., Shavelson, R. J., & Muthen, B. (1989). Testing for the equivalence of factor covariance and means structures: The issue of partial measurement invariance. *Psychological Bulletin*, *105*, 456-466. https://doi.org/10.1037/0033-2909.105.3.456

Fielding, K. S., McDonald, R., & Louis, W. R. (2008). Theory of planned behavior, identity and intentions to engage in environmental activism. *Journal of Environmental Psychology*, *28*, 318-326. https://doi.org/10.1016/j.jenvp.2008.03.003

Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The applications of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel Psychology*, *39*, 291-314. https://doi.org/10.1111/j.1744-6570.1986.tb00583.x

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*, 39-50. https://doi.org/10.2307/3151312

Groot, J., & Steg, L. (2007). General Beliefs and the Theory of Planned Behavior: The Role of Environmental Concerns in the TPB. *Journal of Applied Social Psychology*, *37*, 1817-1836. https://doi.org/10.1111/j.1559-1816.2007.00239.x

Han, H., Hsu, J., & Sheu, C. (2010). Application of the Theory of Planned Behavior to green hotel choice: Testing the effect of environmental friendly activities. *Tourism Management*, *31*, 325-334. https://doi.org/10.1016/j.tourman.2009.03.013

Hansen, H., Samuelsen, B. M., & Silseth, P. R. (2008). Customer perceived value in B-t-B service relationships: Investigating the importance of corporate reputation. *Industrial Marketing Management*, *37*, 206-217. https://doi.org/10.1016/j.indmarman.2006.09.001

Hu, L., & Bentler, P. M. (1999). Cut-off criteria for fit indexes for covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1-55. https://doi.org/10.1080/10705519909540118

Hustvedt, G., & Bernard, J. C. (2008). Consumer willingness to pay for sustainable apparel: The influence of labeling for fiber origin and production methods. *International Journal of Consumer Studies*, *32*, 491-498. https://doi.org/10.1111/j.1470-6431.2008.00706.x

Hustvedt, G., & Dickson, M. A. (2009). Consumer likelihood of purchasing organic cotton apparel: Influence of attitudes and self-identity. *Journal of Fashion Marketing and Management*, *13*, 49-65. https://doi.org/10.1108/13612020910939879

Joergens, C. (2006). Ethical fashion: Myth or future trend? *Journal of Fashion Marketing and Management*, *10*, 360-371. https://doi.org/10.1108/13612020610679321

Jreskog, K. G. (1993). Testing structural equation models. In K. A. Bollen, & L. S. Long (Eds.), *Testing structural equation models* (pp. 249-315). Newbury Park, CA: Sage Publications.

Jreskog, K., & Sorbom, D. (1984). LISREL VI: Analysis of Linear Structural Relationships by the Method of Maximum Likelihood. In *National Educational Resources*. Chicago, IL.

Kim, H. S., & Damhorst, M. L. (1999). Environmental attitude and commitment in relation to ad message credibility. *Journal of Fashion Marketing & Management*, *3*, 1-30. https://doi.org/10.1108/eb022545

Little, T. D. (1997). Mean and covariance structures (MCAS) analyses of cross-cultural data: Practical and theoretical issues. *Multivariate Behavioral Research*, *32*, 53-76. https://doi.org/10.1207/s15327906mbr3201_3

Marcoulides, G. A., & Heck, R. H. (1993). Organizational culture and performance: Proposing and testing a model. *Organization Science*, *4*, 209-225. https://doi.org/10.1287/orsc.4.2.209

Meyer, A. (2001). What's in it for the customers? Successfully marketing green clothes. *Business Strategy and the Environment*, *10*, 317-330. https://doi.org/10.1002/bse.302

Raykov, T., & Marcoulides, G. A. (2000). *A first course in structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum.

Schumacker, R. E., & Marcoulides, G. A. (1998). *Interaction and nonlinear effects in structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences*, *42*, 893-898. https://doi.org/10.1016/j.paid.2006.09.017

UNCED. (1992). *Agenda 21 and the UNCED Proceedings*. Oceana Pblicationa, New York.

West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with non-normal variables: Problems and remedies. In R. H. Hoyle (Ed.), *Structural equation modeling* (pp. 56-75). Thousand Oaks, CA: Sage.

Yan, H., & Håvard, H. (2012). Determinants of Sustainable Food Consumption: A Meta-Analysis Using a Traditional and a Structural Equation Modelling Approach. *International Journal of Psychological Studies*, *4*, 22-45.

Yoo, B. (2002). Cross-group comparisons: A cautionary note. *Psychology & Marketing*, *19*, 357-368. https://doi.org/10.1002/mar.10014