

## The Influence of Sustainable Packaging Criteria on Consumers' Environmental Behavior

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**Introduction and background.** In aligning with consumers' sustainability awareness and practices in their daily living, many companies (e.g., Coca-Cola, Unilever, Girl Intuitive) started to develop and use sustainable packaging for their consumer products, which results in a positive impact on the environment and living beings. According to Market Research Future's (2021) report, the global sustainable packaging market will reach \$470.3 billion by 2027. Various types of sustainable packaging (i.e., bio-based, edible, plantable, recyclable) are available in the current market; among those, recyclable packaging is the only one widely used, and the use of other sustainable packaging types is still limited (Dharmadhikari, 2012; Joya et al., 2018; Kazulytė, 2019; Reichert et al., 2020).

The Sustainable Packaging Coalition developed conceptual sustainable packaging criteria (SPC) to establish the sustainable packaging standard. These criteria were developed by considering the business' sustainability and industrial ecology objectives to address environmental concerns related to the lifecycle of packaging (Sustainable Packaging Coalition, 2011). Prior studies addressed consumers' adoption of sustainable packaging for limited products such as food and beverage (e.g., Rokka & Uusitalo, 2008); however, to the best of our knowledge, no study has been found to validate this SPC and examine its influence on consumers' adoption of sustainable packaging. Thus, this study aimed to examine the influence of SPC on consumers' environmental behavior. Specific objectives of this study were to (a) validate the existing SPC as a scale and (b) develop and test a theoretical research model to examine the influence of SPC on consumers' environmental attitude, intention, and behavior of using sustainable packaging.

A theoretical research model, rooted in Theory of Planned Behavior (Fishbein & Ajzen, 1980), was developed and 16 hypotheses were proposed for this study: SPC, experiential values (i.e., utilitarian, emotional, social, economic), subjective norms (SN), perceived behavioral control (PBC), and environmental attitude (EA) have positive influences on green purchase intention (GPI) (H1b, H2, H3, H4, H5, H6, H9a, and H11 respectively). It was also proposed that PBC, environmental concerns (EC), and GPI have positive influences on environmental behavior (EB) (H9b, H10, and H12, respectively). The positive effects of SPC on EA (H1a), environmental knowledge (EK) on environmental beliefs (EBI), EC, and PBC (H7a, H7b, and H7c, respectively), and EBI on EC were also postulated (H8).

**Method.** An online survey, using Amazon Mechanical Turk, was conducted with a nationwide convenience sample of men and women whose age was 18 years old and over living in the U.S. In administering the survey questionnaire to the study sample, four existing sustainable packaging types (bio-based, edible, plantable, and recyclable) were presented so that the participants could respond to the questions in relation to the particular sustainable packaging

type. Four different sustainable packaging types were randomly assigned to the study participants.

The survey questionnaire, adapted and modified from existing studies, consisted of three main sections: (a) the definition of a certain type of sustainable packaging along with its images; (b) 69 close-ended questions regarding SPC (8 items; Sustainable Packaging Coalition, 2011), experiential value (i.e., emotional value (5 items), utilitarian value (5 items), social value (4 items), economic value (4 items); Yang & Ahn, 2020), EBI (7 items; Kilbourne & Pickett, 2008), EC (6 items; Kilbourne & Pickett, 2008), EK (3 items; Hamzah & Ranwir, 2021), EA (4 items; Onurlubaş, 2018), PBC (6 items; Paul et al., 2016), SN (5 items; Fishbein & Ajzen, 1980), GPI (4 items; Hamzah & Ranwir, 2021), and EB including both direct and indirect behaviors (4 items for each behavior; Kilbourne & Pickett, 2008); and (c) five demographic questions (age, gender, ethnicity, education, and household income).

All latent constructs were measured based on a 7-point Likert-type scale, ranging from “Strongly disagree (1) to “Strongly agree” (7). SPSS 26 and Mplus 8.3 were used for data analysis, specifically for conducting exploratory factor analysis (EFA) for SPC, confirmatory factor analysis (CFA) for all constructs, and structural equation modeling (SEM). Maximum likelihood estimation method with the Promax rotation (Corner, 2009) was used to evaluate the model fit.

**Results.** The total usable sample of 1,604 (397 bio-based, 408 edible, 397 plantable, and 402 recyclable) was used for data analysis. The respondents’ age range was from 21 to 86 years old with the mean age of 40. Of the respondents, 55% were males and 45% were females. The majority was Caucasian/European American (69%), followed by Hispanic American/Latino (8%), Asian/Pacific Islander (7.2%), African American (6.4%), and combination of other ethnic groups (9.4%). Around 85% of the respondents had at least bachelors’ degree or higher and 15% had less than bachelor’s degree.

EFA was first performed for SPC to examine whether 8 items measure a single construct of SPC, or whether multiple constructs underlie it. With considering .70 as a cutoff value (Hu & Bentler, 1999), all 8 items were extracted loading on one factor. Thus, in this study, a single 8-item SPC construct was used when running CFA. CFA was then performed to test the measurement model fit. Due to their low standardized factor loadings ( $< .60$ ), 1 item of SPC, 1 item of PBC, and 4 items of EB were dropped. The fit indices of the revised measurement model demonstrated an acceptable model fit:  $\chi^2(1812) = 6216.13$ ,  $p < .001$ , TLI = .87, CFI = .88, RMSEA = .05, and SRMR = .05. Then, the 16 hypothesized path model was tested, resulting an acceptable model fit:  $\chi^2(1953) = 7238.25$ ,  $p < .001$ , TLI = .86, CFI = .87, RMSEA = .05, and SRMR = .04.

The model testing results presented that 60% of EBI, 96% of EC, 65% PBC, 86% of EA, 87% of GPI, and 82% of EB were explained by the proposed constructs. Twelve out of 16 hypotheses were supported. The results also presented that SPC, emotional value of EV, PBC, and EA have positive influences on GPI (H1b:  $\beta = .64$ ,  $p < .001$ ; H3:  $\beta = .43$ ,  $p < .001$ ; H9a:  $\beta = .94$ ,  $p < .001$ ; H11:  $\beta = .83$ ,  $p < .001$ , respectively). The positive effects of PBC, EC, and GPI on

EB were also presented (H9b:  $\beta = .70, p < .001$ ; H10:  $\beta = .21, p < .001$ ; H12:  $\beta = .24, p < .001$ , respectively). The positive effect of SPC on EA (H1a:  $\beta = .92, p < .001$ ), EK on EBI, EC, and PBC (H7a:  $\beta = .76, p < .001$ ; H7b:  $\beta = .84, p < .001$ ; H7c:  $\beta = .94, p < .001$ , respectively), and EBI on EC (H8:  $\beta = .16, p < .001$ ) were also revealed.

**Conclusion.** The findings of this study have several implications for researchers in academia, industry professionals (e.g., product developers and designers), and policymakers. This study validated the SPC scale to measure the sustainable packaging standard, which is a unique and innovative aspect of this study. This scale is a viable measure for the use in future research. The findings of this study demonstrated a significant positive influence of SPC on consumers' EA and GPI, which provides insights for industry professionals to consider reflecting SPC in future sustainable packaging design and development to fulfill their target market's satisfaction. Besides the main implications of SPC, the study findings lead to two more implications. Emotional value of EV had a positive significant influence on consumers' GPI, highlighting the necessity of considering this value (e.g., sense of comfortability, enjoyment, fun) when it comes to designing and developing sustainable packaging in the packaging industry. In addition, EK had a significant positive influence on EBI, EC, and PBC, which positively influenced consumers' EB. This finding can be an insightful takeaway for policymakers to formulate public policies to increase consumers' level of EK and promote their sustainable action and behavior. This study considered various sustainable packaging options as a single sustainable packaging for statistical data analysis, which is the study limitation. In future research, the effect of different sustainable packaging types (e.g., bio-based, edible, plantable, recyclable) on consumers' EB should be further investigated.

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