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Empirical Evidence on the Construct Validity and Reliability of an Instrument Assessing Antecedents to Willingness to Pay a Premium: A Pilot Study

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Abstract

Research on sustainable and green consumption behaviour has been widely studied, including within the Malaysian context. However, there has been limited research on sustainable labelling on packaged food among Malaysian consumers. Therefore, there is a limited questionnaire specifically tailored to this sustainable labelling on packaged food products. A pilot test was carried out to support an investigation into the antecedents of consumers' WTPP for sustainably labelled packaged food. Based on Signaling Theory and Diffusion of Innovation Theory, a conceptual framework comprising six constructs was formulated. In total, 34 questionnaire items were adopted or adapted from prior studies. Responses from 30 working adults were evaluated to assess the measurement instrument. All six constructs used to examine the antecedents of WTPP, Altruistic Concerns (AC), Biospheric Concerns (BC), Egoistic Concerns (EC), Perceived Credibility (PC), Perceived Relative Advantage (PRA), and WTPP, demonstrated strong internal consistency. At this pilot study stage, internal consistency reliability was assessed using Cronbach's alpha and corrected item-total correlations. Their alpha values are 0.899, 0.913, 0.904, 0.901, 0.860, and 0.890, respectively, exceeding the recommended minimum threshold of 0.70. In addition, the corrected item-total correlations for all items were above 0.30, confirming that each item contributes meaningfully to its respective construct and is psychometrically sound. These pilot results indicate the questionnaire items are suitable for use in future research and may offer useful evidence to inform sustainable labelling policies, certification standards, and incentives that promote greener manufacturing among Malaysian producers.

Keywords: environmental concern, perceived credibility, perceived relative advantage, sustainable labelling, willingness to pay a premium

1. Introduction

Rising concerns about climate change in recent years have contributed to the increase in consumer sensitivity towards their purchase decisions (Leggen, 2023). Aligned with "SDG 12: Responsible consumption and Production", consumers are increasingly willing to purchase products that are considered sustainably produced and processed (Lestari & Nita, 2021; Ut-tha et al., 2021; Vicente et al., 2021). Meanwhile, producers are also placing greater emphasis on conveying their sustainability initiatives in the process of development and production of the product (Shahidi Hamedani et al., 2025; Zhang & Yin, 2025). The use of sustainable labelling on product packaging helps consumers to identify the environmentally friendly options, and at the same time, signals the producers' sustainability efforts. However, the certification processes come with additional costs, which are often reflected in the final product prices (Fanasch & Frick, 2020; Singh et al., 2023).

Past research has investigated the willingness to pay a premium for green, eco-friendly, and sustainable products in general (Al Mamun et al., 2018, 2023; Bastounis et al., 2021; Lestari & Nita, 2021; Oesman, 2021; Singh et al., 2023; Wei et al., 2018). Limited research has been done to examine the role of sustainable labels on packaged food products, especially in emerging markets, particularly Malaysia. In the effort to measure the antecedents of Malaysian consumers' WTPP for sustainably labelled packaged food, it is crucial to analyze the validity and reliability of the adopted or adapted research instruments by conducting a pilot study (Khanal & Chhetri, 2024). The validation process includes face validity, content validity, and construct validity, through expert review, pre-testing, and a pilot study to confirm the clarity and contextual relevance of the instruments, thus reducing the measurement errors (Masuwai et al., 2024). Accordingly, the objective of this pilot study is to evaluate the validity and reliability of the adopted and adapted instruments developed to study the antecedents of WTPP for packaged food products with sustainable labels.

Table 1 below provides a summary of the variables adopted and adapted, their reference sources, the corresponding reliability value of the construct, and the Likert-scale format used in the source literature.

Table 1: Summary of variables, their Sources, Reliability Value, Number of adopted and adapted questions, and Likert-scale points

Variable name	Source	Reliability	Number of Adopted & Adapted Questions	Scales
WTPP	Al Mamun et al. (2023)	0.855	4	7-point
	Bhutto et al. (2021)	0.832	1	5-point
	Bushara et al. (2023)	0.715	1	5-point
	Al Mamun et al. (2018)	0.980	1	5-point
	Wei et al. (2018)	0.938	1	7-point
Environmental Concern	Wesley Schultz (2001) in Cruz & Manata (2020)	EC: 0.92	4	7-point
		AC: 0.91	4	7-point
		BC: 0.95	4	7-point
PRA	Stachewicz (2011)	0.870	8	5-point
PC	Moussa & Touzani (2008)	0.847	6	7-point

Adopted and adapted instruments should be reliable and valid for further analysis (Hair et al., 2019). Validity and reliability of the questionnaires are a vital part of quantitative research (Masuwai et al., 2024). To overcome the measurement error, validity and reliability must be established before the commencement of the research (Masuwai et al., 2024). By conducting this pilot study, the empirical result will be able to quantify the measurability of questionnaires, ensuring the questions being asked permit valid inferences to be made.

The constructs on environmental concerns were adopted from Schultz (2001). One example of items on environmental concerns is "I am more concerned about the environmental problems because of the consequences for the people in my country" (Code: AC1). The PC instruments were adapted from Moussa & Touzani (2008). One example of the instrument is "I can rely on the claims made by the sustainable labels on the packaging" (Code: PC1). The PRA instruments were adapted from Stachewicz(2011), bearing questions such as "Choosing packaged food products with a sustainable label allows me to make better choices more quickly" (Code: PRA4). Lastly, the items for WTPP are adapted from a few different authors, namely Al Mamun et al.(2018, 2023), Bhutto et al. (2021), Bushara et al.(2023), and Wei et al. (2018). One example of WTPP questions is "I am willing to pay a higher price for packaged food products with sustainable labels than similar products without sustainable labels." (Code: WTPP 2). The PRA constructs were measured using a five-point Likert Scale, while the rest of the constructs, such as AC, BC, EC, PC, and WTPP, were measured using a seven-point Likert scale, in accordance with the scale format used in the original studies. The survey concluded with items to collect information on sociodemographic information of the respondents.

Content validity and face validity will indicate whether a measurement instrument is truly accurate and represents the construct of interest (Masuwai et al., 2024). It also refers to the degree to which a measure

captures all aspects of a given construct. In this pilot study, content and face validity were initially examined qualitatively through evaluations by subject-matter experts. The expert reviewers were chosen based on pre-defined criteria, including more than twenty years of experience in academia and substantial experience in social research. The selection of two academic experts was based on judgmental sampling. This judgmental sampling approach is appropriate, as the experts were chosen based on their relevant knowledge and subject expertise(Sekaran & Bougie, 2010). The two academic professors evaluated the face and content validity of the questionnaires to ensure that the items were appropriate and sufficiently reflected the intended content. Based on the feedback from the two experts, revisions were made to the questionnaires.

To further assess the face and content validity, a pre-test was conducted. Five relevant respondents, comprising industry experts and academics, were not only chosen to answer the questionnaire but also to check the grammar, spelling, language, content, and sentence construction. The instruments need to be evaluated to ensure they are effective and fit to measure the intended research objectives (Masuwai et al., 2024). Administration of the questionnaire was done by distributing Google Forms. Consents were secured from the industry experts and academics before the review process began. Based on the feedback given, the instruments were refined further to improve clarity and maintain the relevance of the study context.

Following these improvements, the instruments were then distributed to potential respondents as a pilot study. Thirty responses were collected, and the analysis was done quantitatively using Cronbach's alpha for the six constructs to assess the internal consistency of the construct. Based on Table 1, the sources for each instrument were demonstrated in the second column, next to the variable name, as well as the reliability value of adopted or adapted questionnaires, and the scale (in points) used. This pilot study employed a combination of five-point and seven-point scales for two primary reasons. First, to preserve the integrity of the adopted measurement items, the original scale formats were maintained. Second, the mixed scales employed in the questionnaire will reduce respondents' tendency to use repetitive response patterns across all sections of the survey questionnaire, which can artificially inflate covariance due to the measurement method rather than true relationships among variables. This procedural strategy is recommended by Podsakoff et al. (2003) in Cheah et al. (2018) to address common method variance (CMV) in PLS-SEM analysis.

2. Methodology

This pilot study adopted a cross-sectional methodology to examine the variable of interest. Responses from 30 working adults were sampled, which is considered adequate for assessing internal consistency using Cronbach's alpha, item-total correlations, and inter-item correlation analysis (Bujang et al., 2024; Khanal & Chhetri, 2024). Working adults in Malaysia were chosen because they frequently serve as one of the decision makers within households (Qi et al., 2024), thus making them a relevant

demographic to examine their consumption behaviour. As the chosen respondents in this pilot study are aligned with the characteristics of the target population in the main study, the responses are expected to exhibit a high degree of homogeneity with the target population, thereby enhancing the validity and accuracy of the results of this pilot study (Masuwai et al., 2024). SPSS 29.0 was used to analyze the data.

3. Results

3.1 Demographic Characteristics

The demographic analysis of the respondents is presented in Table 2.

Table 2. Demographic Characteristics of Respondents (n = 30)

Variable	Category	Frequency (n)	Percent (%)	Variable	Category	Frequency (n)	Percent (%)
Gender	Male	14	47.0	Household Income (Monthly)	Below RM5,999	12	40.0
	Female	16	53.0		RM6,000-RM11,999	8	27.0
Occupation	Full-time student	7	23.0		RM12,000 - RM17,999	7	17.0
	Employee	19	63.0		RM18,000 and above	2	7.0
	Self-employed	3	10.0		Other	3	10.0
	Other	1	3.0	Age Group	18-29 years	15	50.0
Education Level	SPM	1	3.0		30-41 years	6	20.0
	Certificate/ Pre-U	1	3.0		42-53 years	8	27.0
	Diploma/STPM/STAM	8	27.0		54-65 years	1	3.0
	Bachelor's	9	30.0	Ethnicity	Malay	17	57.0
	Master's	8	27.0		Chinese	2	7.0
	Doctorate	3	10.0		Indian	7	23.0
					Other	4	13.0

Table 2 shows that the respondents had an almost equal number between men (47%) and women (53%). Sixty-three percent of the respondents worked in the private sector, while 23 percent were full-time students pursuing tertiary education. Most respondents had tertiary education, where 30% hold bachelor's degrees, 27% hold master's degrees, and 10% hold doctorate degrees. The focus of this study is younger working adult respondents (70% are below 41 years old) with higher education, following the assumption that these respondents are more environmentally conscious and would choose products with eco-labels in their consumption (Alam et al., 2023). This group of respondents is found to exhibit more awareness of sustainability-related matters too (Filho et al., 2024). The result of the household

income shows that 44% of the respondents receive between RM6,000 to RM17,999 monthly. A study by Hamilton et al. (2019) found that higher-income individuals are willing to pay more for products with a sustainable label. Another finding also reinforces the result that consumers prefer products with sustainable labels (Ma et al., 2022). Malays made up 57% of the respondents, followed by 23% Indians, 7% Chinese, and 10% other. The composition reflects Malaysia's diversity and representation of different cultural perspectives in consumption behaviour. As a conclusion, the respondents' demographic categories align with the typical Malaysian family structure, which substantiates the representativeness of the sample.

3.2 Descriptive Statistics

Table 3. Constructs' Descriptive Statistics (n = 30)

Construct	Mean (M)	Standard Deviation (SD)	Scale Type
Altruistic Concern (AC)	5.9833	0.93064	7-point Likert
Biospheric Concern (BC)	5.7583	0.99239	7-point Likert
Egoistic Concern (EC)	5.8917	1.10189	7-point Likert
Perceived Credibility (PC)	5.4167	0.96366	7-point Likert
Perceived Relative Advantage (PRA)	4.0417	0.63681	5-point Likert
Willingness to Pay Premium (WTPP)	4.6875	0.95240	7-point Likert

Table 3 demonstrates descriptive statistics for each of the constructs. Basically, the means for all constructs indicated that the mean for environmental concerns (AC = 5.9833, BC = 5.7583, and EC = 5.8917), perceived credibility (PC = 5.4167), perceived relative advantage (PRA = 4.041), and WTPP (4.6875), are above the mid-point based on the seven-point or five-point Likert scales, which is consistent with findings from the previous literature. (Cruz & Manata, 2020; Singh et al., 2023). The results indicate that most of the respondents perceived sustainability-labelled packaged foods are more environmentally friendly (Minh Vu et al., 2022), relatively better than those without sustainable labels (Hosseinikhah Choshaly, 2019), the labels are credible (Moussa & Touzani, 2008; Singh et al., 2023), and they are willing to pay more for the products (Al Mamun et al., 2018, 2023; Wei et al., 2018).

3.3 Reliability and Instrument Robustness

Cronbach's alpha coefficient is used to measure internal consistency. In social science research, Constructs' internal consistency values above 0.80 are preferable, and values higher than 0.7 are considered acceptable (Nunnally & Bernstein, 1994; Hair et al., 2019). As displayed in Table 4, all constructs indicated values exceeding the 0.70 recommended threshold. BC showed the highest reliability (α=0.913), followed by EC (α=0.904), PC (α=0.901), AC (α=0.899), WTPP (α=0.890), and PRA (α=0.860). These results are consistent with prior studies done on sustainability-related measures

by Moussa and Touzani (2008) and Singh et al. (2023). The findings validate that the instrument developed to assess the antecedents of the WTPP is reliable and suitable for further comprehensive data collection.

Table 4. Constructs' Reliability Statistics (n = 30)

Construct	No. of Items	Cronbach's Alpha (α)	Interpretation
Altruistic Concern (AC)	4	0.899	Good
Biospheric Concern (BC)	4	0.913	Good
Egoistic Concern (EC)	4	0.904	Good
Perceived Credibility (PC)	6	0.901	Good
Perceived Relative Advantage (PRA)	8	0.860	Good
Willingness to Pay Premium (WTPP)	8	0.890	Good

3.3.1 Item-Total Statistics

Willingness to Pay a Premium

Table 5: Item analysis of WTPP (n=30)

Item	Range Inter-Item Correlation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item - Total Correlation	Cronbach's Alpha if Item Deleted	Action
WTPP1	0.054 – 0.493	32.6333	48.240	0.371	0.909	Retain
WTPP2	0.452 – 0.793	32.7667	45.702	0.739	0.871	Retain
WTPP3	0.271 – 0.719	33.0333	44.033	0.729	0.870	Retain
WTPP4	0.493 – 0.748	32.9333	43.651	0.822	0.862	Retain
WTPP5	0.054 – 0.700	32.8000	47.476	0.548	0.887	Retain
WTPP6	0.362 – 0.748	32.8667	44.395	0.823	0.863	Retain
WTPP7	0.216 – 0.680	32.6667	44.092	0.621	0.882	Retain
WTPP8	0.279 – 0.793	32.8000	43.545	0.796	0.864	Retain

As shown in Table 5, the Cronbach's Alpha if Item Deleted for eight WTPP items range between 0.862 to 0.909, which suggests that all items strengthen the internal consistency and are deemed reliable, as they are well above the cut-off of 0.70 (Hair et al., 2019; Nunnally & Bernstein, 1994). The adjusted item-total correlations for the eight items exceeded the suggested threshold of 0.30, indicating that the items exhibit strong internal consistency (Al Mamun et al., 2023; Ramu et al., 2023). Accordingly, all eight items were retained.

Environmental Concerns

Table 6a: Item analysis of BC (n=30)

Item	Range Inter-Item Correlation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item - Total Correlation	Cronbach's Alpha if Item Deleted	Action
BC1	0.632 - 0.862	17.4333	8.185	0.788	0.900	Retain
BC2	0.669 – 0.862	17.3333	9.126	0.829	0.877	Retain
BC3	0.632 – 0.910	17.2333	9.564	0.805	0.887	Retain
BC4	0.657 – 0.910	17.1000	9.610	0.813	0.885	Retain

From Table 6a, all corrected items-total correlations for the four BC items were above 0.78, surpassing the 0.30 threshold (Ramu et al., 2023). Each item improved the internal consistency of the BC, with the 'Cronbach's Alpha if Item Deleted' values ranging from 0.877 to 0.900, which were lower than the overall alpha of 0.913 if any of the items were deleted. As a result, the scale demonstrated good reliability, and all four items were kept (Nunnally & Bernstein, 1994; Hair et al., 2019).

Table 6b: Item analysis of EC (n=30)

Item	Range Inter-Item Correlation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item - Total Correlation	Cronbach's Alpha if Item Deleted	Action
EC1	0.708 – 0.713	17.7667	9.702	0.785	.890	Retain
EC2	0.680 – 0.760	18.0000	11.379	0.794	.873	Retain
EC3	0.708 – 0.760	17.5333	11.775	0.823	.866	Retain
EC4	0.680 – 0.755	17.4000	12.248	0.790	.879	Retain

As indicated in Table 6b, all corrected item–total correlation values were over 0.78, exceeding the suggested minimum cutoff of 0.30 (Ramu et al., 2023) for four EC items. The 'Cronbach's Alpha if Item Deleted' values (ranging from 0.866 to 0.890) confirmed that each item contributed positively to the internal consistency of the scale, as deleting any of the items resulted in a lower than the construct's overall alpha value of 0.904. Therefore, all four items in the EC construct were maintained, as they showed that they are all reliable (Hair et al., 2019; Nunnally & Bernstein, 1994).

Table 6c: Item analysis of AC (n=30)

Item	Range Inter-Item Correlation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item - Total Correlation	Cronbach's Alpha if Item Deleted	Action
AC1	0.594 – 0.816	18.1667	7.937	0.789	0.864	Retain
AC2	0.536 – 0.816	18.3000	7.390	0.813	0.856	Retain
AC3	0.536 – 0.759	17.5333	9.499	0.688	0.902	Retain
AC4	0.677 – 0.771	17.8000	7.407	0.834	0.847	Retain

As shown in Table 6c, all values for Corrected Item-Total Correlations were above 0.68, exceeding the minimum value of 0.30, which means all items were strong indicators of the overall construct and should be retained (Ramu et al., 2023). The Cronbach's Alpha if Item Deleted values for all four items will be below the overall Cronbach's Alpha of 0.899 for AC, signifying that each item contributes to the construct reliability. Therefore, all four AC items were retained (Hair et al., 2019; Nunnally & Bernstein, 1994).

Perceived Relative Advantage (PRA)

Table 7: Item analysis of PRA (n=30)

Item	Range Inter-Item Correlation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item - Total Correlation	Cronbach's Alpha if Item Deleted	Action
PRA1	0.046 – 0.724	28.1000	20.507	0.571	0.846	Retain
PRA2	0.086 – 0.626	28.3333	20.437	0.512	0.854	Retain
PRA3	0.328 – 0.761	28.2333	20.047	0.785	0.826	Retain
PRA4	0.315 – 0.631	28.4333	18.737	0.662	0.836	Retain
PRA5	0.252 – 0.529	28.6333	19.895	0.550	0.851	Retain
PRA6	0.329 – 0.761	28.1667	20.075	0.795	0.825	Retain
PRA7	0.086 – 0.711	28.1000	21.197	0.543	0.849	Retain
PRA8	0.046 – 0.711	28.3333	21.264	0.522	0.851	Retain

As demonstrated in Table 7, the Corrected Item Total values range from 0.52 to 0.80, well above the minimum recommended threshold of 0.30 (Ramu et al., 2023). The Cronbach Alpha if_Item Deleted values for the PRA construct range between 0.825 to 0.854, which means that if any item were deleted, it would result in a lower alpha than the construct alpha of 0.860, demonstrating that all items contribute positively to the reliability of the PRA construct. The analysis confirmed that the PRA construct exhibited high internal consistency, justifying the decision to maintain all eight items.

Perceived Credibility (PC)

Examination of Cronbach's alpha in Table 8 revealed that values are between 0.865 and 0.898. Deleting any of the items will reduce the Cronbach alpha value for the PC construct, which is now at 0.901, implying that the removal of any of the items will reduce the reliability of the construct. The Corrected Item-Total Correlations also demonstrate that all items exceed the 0.30 recommended by Ramu et al. (2023). As such, it is confirmed that all items significantly contribute to the internal consistency as well as reliability of the construct.

Table 8: Item analysis of Perceived Credibility (PC) (n=30)

Item	Range Inter-Item Correlation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item - Total Correlation	Cronbach's Alpha if Item Deleted	Action
PC1	0.498 – 0.779	27.3000	23.114	0.807	0.872	Retain
PC2	0.466 – 0.625	26.9667	25.344	0.668	0.892	Retain
PC3	0.493 – 0.625	27.1000	22.921	0.707	0.888	Retain
PC4	0.466 – 0.605	27.0000	25.034	0.624	0.898	Retain
PC5	0.574 – 0.841	27.0667	22.892	0.852	0.865	Retain
PC6	0.468 – 0.841	27.0667	22.754	0.742	0.882	Retain

4. Discussion

This pilot study's result demonstrates that the adopted and adapted instruments to measure the constructs for broader research on antecedents of WTPP for sustainably labelled food packaged products meet the established reliability standards. All six constructs tested in this pilot study, namely AC, BC, EC, PC, PRA, and WTPP itself, are considered methodologically robust, as they show good internal consistency, ensuring the applicability of the instruments for a larger-scale empirical analysis. The Cronbach alpha value exceeds 0.70 for all constructs, as recommended by Hair et al. (2019). As demonstrated by the lower Cronbach alpha value, if any of the items are removed, it means that deleting any of the items will reduce the strength of the constructs. In addition, the value of Corrected Item-Total Correlations in this pilot study exceeds 0.30, as stated by Ramu et al. (2023). Therefore, it is confirmed that all measurement items need to be maintained, as they are psychometrically sound and fit for use in future empirical research.

5. Conclusion and Recommendation

This pilot study confirms that the adapted and adopted instruments exhibit acceptable reliability and are methodologically robust, as all constructs exhibit Cronbach alpha values above 0.7. This pilot study's result demonstrated that the instruments on the antecedents influencing WTPP for packaged food bearing sustainable labels are fit for broader empirical research. Nevertheless, to further strengthen the feasibility of the instruments, further empirical work is encouraged to validate the items by assessing the content validity index (CVI) of the questionnaire, using confirmatory factor analysis for the items, test-retest reliability, or discriminant validity testing for a stronger scale development. The availability of these empirically validated measurement tools can support the government's formulation of sustainable labelling policy, a third-party certification standard on sustainable labelling, and green manufacturing incentives aimed at improving the country's competitiveness in the global green economy.

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Conflicts of Interest

Authors declare that they have no conflict of interest in the conduct of this research.

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Ethics Approval and Informed Consent

Participation was voluntary, and informed consent was obtained from all respondents. The study compiled with standard research ethics principles.

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