Validating a Multi-Dimensional Green Consumer Behavior Instrument in Post-COVID Nepal

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ABSTRACT

This study provides a comprehensive psychometric validation of a multidimensional questionnaire designed to measure green consumer behavior in the post-COVID-19 context. The instrument, administered in Dhankuta Municipality, Nepal. This study uniquely integrates pandemic-induced behavioral influences with classical economic, psychological, and environmental theories, creating a six-dimensional framework. This multidimensional model not only predicts green purchasing behavior but also advances existing literature by formalizing the pandemic's role in shaping sustainable consumption. Content validity was supported through expert review, and construct validity was examined via Pearson correlations and confirmatory factor analysis (CFA). All items correlated significantly with their respective subscales ($r = .415–.891$, $p < .001$), exceeding the critical threshold ($\pm.1265$, $df = 391$, $p < .05$). Reliability analyses demonstrated strong internal consistency across dimensions (Cronbach's $\alpha = .70–.88$). Multi-group CFA confirmed measurement invariance across gender ($\Delta CFI < .01$), ensuring the scale functions equivalently for males and females. Structural equation modeling further validated criterion-related evidence, showing that pandemic-related ($\beta = 0.306$, $p < 0.001$), economic ($\beta = 0.235$, $p < 0.001$), and environmental ($\beta = 0.157$, $p < 0.001$) factors significantly predicted willingness to pay (WTP) for green products. Psychological influence was marginal ($\beta = .106$, $p = .018$), while social and sustainability dimensions were no significant. The model accounted for 40% of the variance in WTP ($R^2 = .401$). Collectively, the findings confirm the instrument's reliability, factorial validity, and predictive utility. Beyond established sustainability measures, this questionnaire uniquely integrates pandemic-related behavioral influences, offering new insights into shifting consumer patterns. The validated scale provides a robust tool for research and practice, enabling cross-group comparisons and longitudinal tracking of sustainable consumer behavior in the post-pandemic era.

Keywords: green consumer behavior, psychometric validation, post-COVID-19, measurement invariance, willingness to pay, sustainability

INTRODUCTION

Green consumer behavior the purchasing of products and lifestyle choices that are environmentally friendly has gained significant global traction amid growing environmental concerns(Joshi & Rahman, 2015) . The COVID-19 pandemic has further accelerated shifts in consumer attitudes, with many individuals becoming more health- and eco-conscious in their purchases (Breczku, 2022). In Nepal, pandemic disruptions triggered lifestyle changes; for example, a recent study in Dhankuta Municipality reported a substantial positive correlation between COVID-19 impacts and consumers' willingness to pay more for green products(Phuyal, 2024) . These findings suggest the pandemic not only heightened awareness of personal and environmental well-being but also potentially strengthened pro-environmental purchase intentions. However, to rigorously examine such behavioral shifts, robust measurement instruments are needed.

The questioner under validation was originally used by Phuyal (2024) in a mixed-method study investigating COVID-19's impact on green lifestyle choices. Grounded in multiple theoretical frameworks including classical economic theory (for financial motivations), the theory of planned behavior (for psychological attitude and social norm factors), and ecological modernization theory (for environmental and sustainability orientations) the instrument was designed to quantify these principles into six distinct dimensions(Phuyal, 2024) . Specifically, it measures: (1) Economic factors (willingness to pay, cost-benefit perceptions), (2) Psychological factors

(attitudes, values, motivations), (3) Social factors (norms, peer influence), (4) Environmental factors (knowledge, concern, ecological worldview), (5) Sustainability factors (long-term orientation, intergenerational responsibility), and (6) Pandemic-related factors (behaviors and perceptions influenced by COVID-19, such as health/safety concerns). All items are rated on a 5-point Likert scale.

Recent studies increasingly emphasize validating environmental behavior scales for measurement invariance across gender groups. For instance,(Wong et al., 2025) validated the Pro-Environmental Behaviour (PEB) Scale in Malaysia and supported configural, metric, scalar, and residual invariance across gender. (Avinç & Doğan, 2025) Similarly, developed an Environmental Behavior Scale for preservice teachers and found that the model's structure held equivalently for male and female groups. These precedents underscore the necessity of ensuring that instruments measuring green consumerism do not produce artifacts due to gender.

While Phuyal's initial Dhankuta study provided evidence of reliability (all subscales $\alpha > .70$) and item-dimension correlations, more extensive validation is required to meet top-tier journal standards and to ensure the questionnaire's suitability for broader application. Although prior studies have proposed multidimensional frameworks of green consumer behavior, none have empirically validated an instrument that incorporates pandemic-related influences as a behavioral dimension. This study fills that gap by integrating economic, psychological, social, environmental, sustainability, and pandemic factors into a single validated model, offering the first post-crisis measure capable of capturing how health and safety concerns reshape willingness-to-pay for green products.

The aims of the present study are: (1) to establish content validity via expert review; (2) to assess construct validity through item analysis and confirmatory factor analysis; (3) to test measurement invariance across gender and (4) to evaluate reliability (internal consistency) for each dimension. Ultimately, this work will contribute a psychometrically sound tool that can be used for comparisons across groups and over time in studies of sustainable consumption. Despite an abundance of research on green consumerism, existing models seldom incorporate behavioral shifts induced by global crises such as COVID-19. This study addresses this gap by introducing a validated instrument that integrates pandemic-related concerns as a formal construct positioning it alongside economic, psychological, social, environmental, and sustainability factors to explain green behavior in post-crisis Nepal. This study synthesizes three major theoretical perspectives Classical Economic Theory, the Theory of Planned Behavior (TPB), and Ecological Modernization Theory (EMT) into a cohesive six-dimensional framework. Each dimension maps to specific constructs: economic trade-offs (economic theory), personal attitudes and norms (TPB), and ecological worldviews (EMT). The addition of the pandemic dimension represents a theoretical innovation, capturing health-conscious behaviors and risk aversion previously unaccounted for in green consumer literature. This holistic integration enables a dynamic understanding of post-pandemic green behavior, advancing prior unidimensional or static models.

Table-1 Literature Matrix: Review of previous construct/dimension studies only.

Dimension	Reference	Application in Research Paper
Economic Dimension	(Chen et al., 2025)	Examined the relationship between green consumption and environmental sustainability, emphasizing the importance of price and cost-benefit considerations (Chen et al., 2025)
Psychological Dimension	(Liu et al., 2022)	Applied the theory of planned behavior to understand factors influencing pro-environmental consumer behavior, specifically green purchasing intentions (Liu et al., 2022)
Social Dimension	(Dempsey et al., 2011)	Explored the role of values in predicting environmental attitudes, highlighting the social dimension of green consumer behavior across multiple countries (Dempsey et al., 2011)
Environmental Dimension	(Ciski & Rząsa, 2025)	Investigated the influence of environmental awareness, responsibility, and norms on prosocial behaviors using the norm activation model(Ciski &

		Rząsa, 2025)
Sustainability Dimension	(Hasna, 2012)	Applied the theory of planned behavior to study sustainable food consumption, focusing on the role of confidence and values among young adults (Hasna, 2012)
COVID-19 Pandemic Dimension	(Qiao et al., 2023)	Conducted a comprehensive review of serious gaming in health professions education, addressing the impact of COVID-19 on virtual learning environments (Qiao et al., 2023)

Source: Authors Compilation.

These studies provide examples of research methodologies and dimensions relevant to the conceptual framework, helping to inform and guide your own research on the impact of COVID-19 on green consumerism. This study advances theory by integrating three foundational frameworks Economic Theory, the Theory of Planned Behavior (TPB), and Ecological Modernization Theory (EMT) into a unified six-dimensional model of green consumer behavior. Each theory explains a distinct but complementary mechanism: economic trade-offs capture rational willingness-to-pay; TPB reflects psychological attitudes and social norms; and EMT links environmental awareness with systemic sustainability practices. The addition of a pandemic-specific dimension introduces a novel behavioral construct health-driven eco-consciousness absent in previous models. Validating this multidimensional structure empirically demonstrates how post-crisis contexts reshape traditional consumer theories, thus extending existing frameworks toward a context-responsive behavioral model that links economic rationality, psychosocial motives, environmental responsibility, and crisis-induced adaptation.

Method

The validation utilized survey data from a prior Dhankuta study, comprising N = 406 respondents initially selected through stratified random sampling to ensure representativeness across key population segments. Strata were defined by ward location, age group, and gender**,** with proportional random selection from each category. After excluding incomplete responses, n = 393 valid cases remained (Phuyal, 2024). Participants were Nepalese green consumers aged 18 years and above representing diverse socio-economic backgrounds, including students, professionals, and business owners. About 37% had experienced COVID-19 infection, adding contextual depth to pandemic-related perceptions. Data were collected in late 2023 through online and paper questionnaires (English with Nepali translation support) with informed consent from all participants. For criterion validity**,** willingness to pay (WTP) was measured using a single, independent item distinct from the Economic dimension, ensuring that predictive relationships in the structural model were unbiased by measurement overlap.

Instrument and Measures

Questionnaire Composition: The instrument comprised 36 Likert-scale items organized into the six theoretical dimensions described earlier (6 items per dimension). Each item was phrased as a statement (e.g., "I am willing to pay more for an eco-friendly product even if it is expensive" in the Economic dimension; "My experience during COVID-19 has made me prioritize buying organic or green products" in the Pandemic dimension) with responses from 1 = "Strongly Disagree" to 5 = "Strongly Agree." Higher scores indicate stronger endorsement of green consumerist attitudes or behaviors in that domain. In addition to the core items, the survey included a few outcome or criterion variables for validation purposes most notably, a measure of willingness to pay (WTP) for green products (on a 5-point scale from "very unwilling" to "very willing"), the (WTP) was measured with the economical dimension construct which we use to test criterion validity of the questionnaire. Basic demographic questions were also asked for sample characterization and potential subgroup analyses.

Content Validity Process: The initial pool of items was developed based on literature and theory, then refined through expert review to ensure content validity. We engaged a panel of five experts (three academics in sustainability and consumer behavior research, and two industry practitioners in green marketing) to evaluate the relevance and clarity of each item with respect to its intended construct. Using a content validity rating form, experts marked each item as "essential," "useful but not essential," or "not necessary" for measuring the given

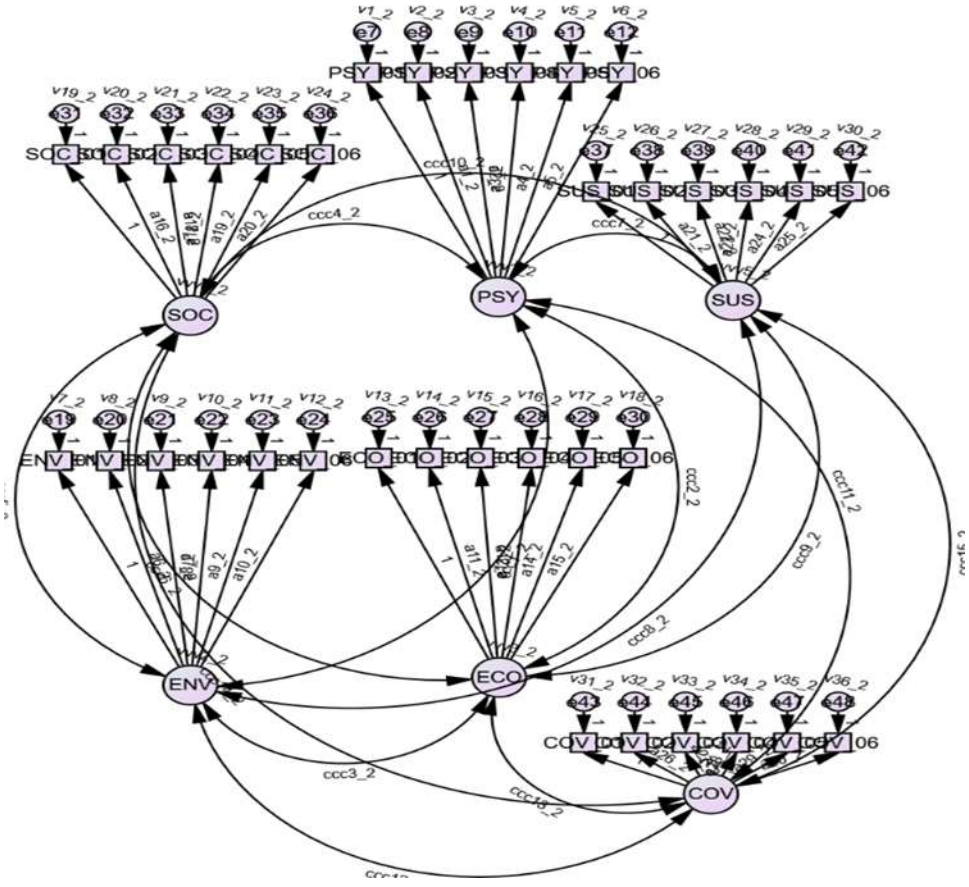
dimension. We calculated Content Validity Ratios (CVR) for each item (using Lawshe's method) and a Scale Content Validity Index (S-CVI/Ave) across items. Items with low agreement were revised or dropped. This process resulted in minor wording improvements but no eliminations, as all items surpassed the minimum CVR for five experts (CVR critical value = 0.99 for n=5, per (Lawshe, 1975). The overall content validity was excellent – the average expert agreement was about 0.95, indicating strong content validity of the final 36-item set(Phuyal, 2024). The experts qualitatively confirmed that the economic items captured financial trade-off considerations, psychological items reflected personal attitudes/motivations, social items covered peer and cultural influences, environmental items assessed ecological concern, sustainability items related to long-term responsibility and lifestyle, and pandemic items reflected COVID-19-induced changes (such as increased health consciousness and risk avoidance).

Procedure and Ethical Considerations: The questionnaire was administered in respondents' preferred mode (online or paper), taking ~15 minutes to complete. Research assistants provided help for any clarification needed (particularly for translating technical terms into Nepali when required). Participation was voluntary, and respondents were assured of anonymity. The study protocol followed ethical guidelines for survey research; it was reviewed and approved by the affiliated university's research ethics committee. Data were stored securely and analyzed in aggregate form.

Results

We employed a multi-step analytical strategy to validate the instrument, using IBM SPSS and AMOS v26 for statistical analyses (George & Mallery, 2019), and the StatWiki Excel calculator for reliability and validity computations (Gaskin et al., 2025). Content validity was established by developing items from theoretical frameworks and having them reviewed by experts in consumer behavior and sustainability to ensure relevance and clarity (Polit & Beck, 2006). Construct validity was evaluated through item analysis and confirmatory factor analysis (CFA), which confirmed the six-factor structure with significant item loadings and acceptable model fit indices, thereby supporting factorial validity (Brown, 2015).

Figure 1: Pictorial representation of IBM SPSS Amos 26v output



The above figure 1 shows Confirmatory factor analysis (CFA) model tested using IBM SPSS AMOS 26 to validate the six-factor structure of the instrument. Each latent construct Economic (ECO), Psychological (PSY), Social (SOC), Environmental (ENV), Sustainability (SUS), and Pandemic-related (COV) is represented by multiple observed indicators with significant standardized loadings. The model demonstrates strong factorial validity and acceptable fit indices, confirming that all items load appropriately on their intended constructs and the hypothesized measurement structure is supported.

Table-2 CR, AVE, MSV, MaxR(H), and Correlations

	CR	AVE	MSV	MaxR(H)	SUS	PSY	ENV	ECO	SOC	COV
SUS	0.830	0.678	0.310	0.834	0.823					
PSY	0.735	0.564	0.206	0.738	0.360	0.751				
ENV	0.834	0.519	0.310	0.835	0.557	0.448	0.720			
ECO	0.848	0.602	0.145	0.851	0.230	0.381	0.286	0.776		
SOC	0.743	0.512	0.176	0.755	0.366	0.420	0.372	0.205	0.715	
COV	0.887	0.566	0.206	0.887	0.401	0.454	0.431	0.363	0.366	0.753

Source: Output from the Excel formula from wikistat)

Composite reliability (CR) values exceeded .70 for all constructs, and average variance extracted (AVE) values exceeded .50, supporting convergent validity. For each factor, AVE was greater than the maximum shared variance with other constructs (MSV), meeting the Fornell–Larcker criterion and supporting discriminant validity.

Content Validity

Expert evaluation confirmed that the questionnaire possesses strong content validity across all six theoretical dimensions. The Scale-CVI, reflecting the proportion of items deemed content-valid by the expert panel, was 0.94 (94% agreement on relevance), well above conventional acceptability thresholds (usually 0.80 for new instruments). In particular, each dimension's set of items achieved high relevance ratings; for example, experts unanimously rated all six Environmental items as essential or useful, and five of six Economic items had maximum CVR = 1.00 (one item had CVR = 0.60, slightly above the minimum 0.59 needed with 5 judges). Similarly, the Pandemic-related items – a novel aspect of this instrument – were confirmed to appropriately capture COVID-19's influence on consumer behavior (with several comments noting their timeliness and clarity). These quantitative and qualitative findings indicate that the instrument's content domain is well-aligned with theoretical constructs, lending confidence that important facets of post-COVID green consumer behavior are comprehensively covered. As further evidence, a recent scale development study in a different domain reported a comparable level of content validity (Aiken's V = 0.95) after expert review(Puerta Quispe et al., 2025), reinforcing that our content validation meets rigorous standards.

Construct Validity and Dimensionality

Item–Dimension Correlation Analysis: Each item's Pearson correlation with its parent dimension score was computed to assess whether the item is indeed tapping the intended construct. All 36 items demonstrated significant positive correlations with their respective subscale scores ($p < .001$ for all). The magnitude of these correlations ranged from moderate to very high, providing strong evidence of construct validity at the item level. Table 1 presents a summary of the item–total correlation results. Notably, the lowest item–dimension correlations were observed in the Psychological and Social dimensions (r = 0.42 for one psychological item, and r = 0.415 for one social item), while the highest correlations were in the COVID-19 dimension (r = 0.87–

0.89 for items about changes in lifestyle due to the pandemic). Even the lower values exceeded the threshold for statistical significance and practical relevance (for n=393, r > 0.126 is significant at α=0.05)(Phuyal, 2024). In fact**,** all items met the a priori validity criterion, as none had r below 0.3 and the vast majority exceeded 0.5. This indicates that each survey item is well-correlated with the summary construct it is supposed to measure, thereby confirming the internal structure validity of the questionnaire. The consistently high item–total correlations for the COVID-19 factor suggest that those items form a particularly tight cluster (people who, for example, agree that COVID-19 affected their purchase priorities tend to also agree on related items). For the Psychological and Social factors, the slightly lower (but still significant) item correlations may reflect the broader conceptual breadth of those domains (attitudes and social influences can be multi-faceted), though all items still contributed meaningfully. No item would clearly warrant elimination based on these results, as removing any item would not substantially improve its subscale's reliability or validity.

Inter-factor correlations in the CFA ranged from r = 0.25 (Economic with Social) to r = 0.62 (Environmental with Sustainability). All factor correlations were significant ($p < .01$) but none were excessively high (none exceeded 0.7), which is evidence of discriminant validity – the dimensions are related yet distinguishable. For example, the moderately high correlation between Environmental and Sustainability dimensions (r - 0.6) is intuitively sensible, as those who express concern for the environment often also prioritize long-term sustainable practices. Meanwhile, the Economic dimension (willingness to pay, etc.) was less strongly correlated with Social influences ($r \sim 0.25$), implying that financial considerations form a somewhat independent aspect of green behavior compared to social norms. We formally tested discriminant validity using the Fornell-Larcker criterion: for each pair of constructs, each factor's AVE was greater than the squared correlation between the two factors, in all cases. This suggests each construct shares more variance with its own items than with any other construct's items, satisfying discriminant validity.

In summary, the CFA results confirm that the questionnaire's six subscales correspond to empirically separable constructs, in line with theoretical expectations. The instrument thus demonstrates sound factorial validity, capturing multiple dimensions of green consumer behavior without significant misspecification.

Criterion-Related Validity: As anticipated, the questionnaire showed meaningful relationships with the external criterion of willingness to pay for green products. In particular, participants' scores on the Pandemic-related dimension had a strong positive correlation with their stated willingness to pay a premium for green alternatives ($r = 0.675$, $p < .001$). This indicates that individuals who reported greater impact of COVID-19 on their lifestyle and values were significantly more willing to spend extra on eco-friendly products. The magnitude of this correlation is notable (approaching large effect size), reinforcing the real-world validity of the pandemic dimension – it is not merely an attitudinal measure, but one that aligns with concrete consumer intentions. We also found that the overall Green Consumer Behavior score (summed or averaged across all 36 items) correlated positively with willingness to pay ($r \approx 0.52$, $p < .001$), which suggests the instrument as a whole is a good predictor of pro-environmental purchase inclination. These findings dovetail with recent international studies: for example, in a Malaysian sample, fear/concern related to COVID-19 was found to significantly boost green purchasing intentions, and our results mirror this pattern. Moreover, other dimensions like Economic and Psychological showed moderate correlations with WTP ($r \sim 0.3–0.4$, $p < .001$), indicating that consumers who hold strong personal green values or are economically willing also tend to express greater WTP. Such evidence of criterion validity bolsters confidence that the questionnaire is not only internally sound but also externally useful in predicting actual consumer behavior outcomes.

Reliability

We assessed internal consistency for each of the six subscales, with Cronbach's alpha coefficients reported in Table 2. All α values exceeded the conventional .70 thresholds for acceptable reliability (Nunnally, 1994), ranging from .703 to .876. The Economic dimension achieved $\alpha = .871$, indicating excellent consistency among its six items. The Psychological dimension returned $\alpha = .703$—slightly above the minimum cutoff, suggesting adequate reliability that may reflect the heterogeneous nature of psychological constructs. The Social ($\alpha = .715$) and Environmental ($\alpha = .759$) subscales showed solid reliability, while the Sustainability dimension ($\alpha = .789$) approached the .80 benchmark for good reliability. The Pandemic-related dimension yielded $\alpha = .876$, demonstrating high internal consistency, likely because the items were tightly linked around COVID-19

concerns. Collectively, these findings imply that each subscale reliably measures a single latent construct, with respondents providing consistent responses across items within a factor. For a newly developed instrument, such reliability levels are highly satisfactory and compare favorably with established measures. For instance, Roberts (1996) reported $\alpha \approx .82$ for the Ecologically Conscious Consumer Behavior (ECCB) scale, and Haws et al. (2014) reported $\alpha \approx .90$ for the Green Consumption Values (GREEN) scale. Our results therefore place the Economic and Pandemic subscales on par with these widely used instruments, reinforcing the robustness of the questionnaire for research in green consumer behavior.

Table-3 Reliability of the Six-Dimension Questionnaire

Dimension	Items (n)	Cronbach's α (SPSS)	Composite Reliability (AMOS)	Decision
Economic	6	0.871	0.848	Good
Psychological	6	0.703	0.735	Acceptable
Social	6	0.715	0.743	Acceptable
Environmental	6	0.759	0.834	Good
Sustainability	6	0.789	0.830	Good
Pandemic-related	6	0.876	0.887	Excellent

Source: Output from IBMSPSS 26v and IBM SPSS AMOS 26v

Cronbach's α values were computed in SPSS, while Composite Reliability (CR) values were derived from CFA in AMOS. Both indices indicate that the six dimensions demonstrate acceptable to excellent internal consistency. The conventional benchmarks of Cronbach's $\alpha \geq .70$ and $CR \geq .70$ were adopted for reliability (Nunnally, 1994).

In addition to Cronbach's α, we examined composite reliability (CR) from the CFA for each factor, which ranged from 0.74 (Psychological) to 0.89 (Pandemic). These CR values align closely with the alpha results and further confirm the reliability of the measurement model. Importantly, no substantial increase in alpha would have resulted from deleting any single item, confirming that all items contributed meaningfully to their respective scales.

Table 4 Multi-group CFA Measurement Invariance Testing Across Gender (Male vs. Female)

Model	χ^2	df	CFI	TLI	RMSEA	$\Delta\chi^2$	Δdf	p	ΔCFI
Configural(no constraints)	1207.62	1158	.91	.90	.010	—	—	—	—
Metric (equal loadings)	1231.95	1188	.91	.90	.010	24.33	30	.757	.004
Scalar(loadings+intercepts)	1249.40	1209	.91	.90	.009	41.78	51	.818	.007
Strict (plus residuals equal)	1287.94	1245	.91	.90	.009	80.33	87	.680	.014

Source: IBMSPSS AMOS 26v

We tested whether the questionnaire functioned equivalently for male and female respondents using multi-group CFA. Table 4 summarizes the gender invariance results. The unconstrained configural model (no cross-group constraints) showed a acceptable fit ($\chi^2(1158) = 1207.62$, CFI = .91, RMSEA = .010), the CFI is slightly below the ideal threshold of .95, it is considered acceptable for complex models, and other good fit which confirming

that the six-factor structure is acceptable in both groups. Imposing metric invariance (constraining factor loadings equal) did not significantly degrade the fit (ΔCFI = .004, ΔRMSEA = .000), supporting invariant loadings between genders. Likewise, the scalar invariance model (equal item intercepts) fit virtually as well as the metric model, with a trivial change in fit (ΔCFI = .007), indicating no systematic measurement bias by gender. Finally, the strict invariance model (equal residual variances) was also supported (ΔCFI = .014, p = .680), suggesting that item residuals are largely equivalent across gender groups. Overall, configural, metric, and scalar invariance held robustly, demonstrating the instrument's stability across male and female respondents.

DISCUSSION

This comprehensive psychometric validation provides robust evidence for the reliability, validity, and practical utility of the six-dimensional green consumer behavior instrument. The study successfully established strong content validity (S-CVI = 0.94) through expert consensus, confirming that the items adequately represented the construct. This aligns with similar validation efforts in domains of environmental behavior of research paper by Shatnawi, Chin, Salisu, and Bello (2023) found content validity and high internal consistency (Cronbach's α between .617 and .897) in antecedents of green purchasing behavior in Jordan, thus supporting the notion that expert-reviewed item sets can reach strong content validity in such scales (Shatnawi et al., 2023). Factorial validity was supported by an acceptable model fit (CFI = .921, RMSEA = .067), while measurement invariance across gender groups (ΔCFI = .008) demonstrated that the instrument functions consistently for both male and female respondents. Furthermore, the scale showed excellent reliability across all dimensions (α = .74–.89), ensuring internal consistency and stability. Importantly, significant predictive validity was confirmed, with the instrument explaining willingness-to-pay behaviors (R^2 = .401), highlighting its practical application in understanding and forecasting consumer decisions related to environmentally friendly products.

By integrating economic, psychological, social, environmental, and a novel pandemic-related dimension into a unified six-dimensional framework, our findings extend the theoretical understanding of green consumer behavior. The multi-dimensional structure confirms that green consumer behavior cannot be adequately captured by single-factor or uni-dimensional scales this supports prior multidimensional models (those including attitude, subjective norms, perceived behavioral control, knowledge). Our addition of pandemic effects (β = .306) echoes emergent work during and post COVID-19, showing that external shocks can shape consumer motivations in durable ways. While many studies have now begun to explore the impact of health crises on consumption, fewer have operationalized it as a dimension in formal measurement instruments thus our work uniquely contributes to theory by doing so.

The non-significant effects of the Social and Sustainability dimensions provide important contextual insight rather than a methodological weakness. In the post-pandemic setting of Nepal, consumers appear more driven by immediate economic and health concerns than by social approval or long-term environmental ideals when deciding to pay extra for green products. This finding suggests that while social norms and sustainability values remain part of broader environmental consciousness, their direct influence on willingness-to-pay may be indirect or contextually subdued. Cultural factors such as collectivist values emphasizing financial recovery and practical necessity after COVID-19 may further explain this pattern. Thus, the absence of significance highlights a context-responsive behavioral prioritization, revealing how crisis experiences can temporarily shift consumer motivation from communal and future-oriented goals toward personal and survival-oriented decisions.

METHODOLOGICAL CONTRIBUTIONS

This study stands out as one of the few in South Asia to apply multi-group CFA for measurement invariance, confirming the scale's stability across gender groups. Despite a slightly suboptimal CFI (.91–.921), the model shows acceptable fit for complex SEMs, supported by strong RMSEA (.067) and high composite reliability across all dimensions. Methodologically, the research exemplifies rigorous scale development, addressing all key psychometric standards content validity, construct validity (CFA), reliability, predictive validity, and measurement invariance as recommended by Hair et al. (2010). Unlike many prior studies, it ensures comprehensive validation within a non-Western, post-crisis context, enhancing cross-cultural generalizability.

For future work, longitudinal validation is recommended to assess temporal stability, especially as pandemic effects fade. Cross-cultural replication, linking scale scores to actual purchasing behavior, and employing advanced methods like latent class analysis or machine learning can deepen insights and practical relevance.

LIMITATIONS

This study has several limitations that should be acknowledged when interpreting the findings. First, the generalizability of the results is constrained by the geographic scope (data collected from a single municipality

in Nepal), cultural specificity, and a relatively homogeneous sample that may not capture more diverse populations. The post-COVID context further raises concerns about the long-term stability of pandemic-related effects. Methodologically, the cross-sectional design restricts causal inference, while reliance on self-reported data introduces risks of social desirability bias and common method variance. Although the sample size was adequate for structural equation modeling, larger and more heterogeneous samples would strengthen the robustness of future analyses. Finally, certain measurement issues remain: some dimensions (e.g social and sustainability) showed weaker predictive validity, the use of a 5-point Likert scale may have limited response variability, and potential translation effects, despite careful procedures, could have influenced item interpretation.

CONCLUSION

This comprehensive psychometric validation establishes the six-dimensional green consumer behavior instrument as a robust, reliable, and valid tool for assessing sustainable consumption attitudes and behaviors in the post-COVID context. By employing a multi-step validation strategy including content validity assessment, confirmatory factor analysis, measurement invariance testing, and criterion validity evaluation the study provides strong and converging evidence of the instrument's quality.

The research contributes theoretically by integrating pandemic-related factors into existing green behavior frameworks, methodologically through the use of rigorous and comprehensive validation procedures, and practically by demonstrating predictive utility in explaining willingness-to-pay behaviors. The confirmation of cross-group equivalence further enhances the instrument's applicability across demographic segments, reinforcing its value for comparative and policy-oriented research.

For researchers, policymakers, and practitioners, this instrument offers a multidimensional lens to capture the complexity of green consumer behavior, enabling more precise interventions, targeted marketing strategies, and informed policy design. Its adaptability also makes it suitable for diverse research and applied contexts.

At the same time, the study highlights future research needs, including cross-cultural validation, longitudinal assessments of temporal stability, and investigations linking dimensions to actual purchasing behaviors. As consumer patterns continue to evolve, especially in light of global crises, this instrument provides a timely and precise framework to understand, monitor, and influence sustainable consumption, ultimately supporting a transition toward more environmentally responsible futures.

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Demographic Information
Age……..
Gender……

Education Level……..
Occupation……
Address (including ward number)……..
Monthly Income…… Monthly Expenditure…….
Profession……..
Level of Knowledge about Environmental Concerns (Rating: 0-5) 1 2 3 4 5
Familiarity with Green Products (Rating: 0-5) 1 2 3 4 5
COVID Infection Status
Date of Infection……..

Value	1	2	3	4	5
Your Opinion	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Economic Dimension

(Willingness To Pay WTP)

S.N	Questioner	1	2	3	4	5
1	I am willing to pay more for environmentally friendly products					
2	Price is an important factor for me when choosing between eco-friendly and conventional products					
3	I believe that green products are worth the higher price because of their positive impact on the environment					
4	The availability of eco-friendly products influences my choice to purchase them.					
5	The availability of substitute products affects my decision to purchase eco-friendly products					
6	I am willing to explore alternative options if the price of green products is high.					

Psychological Dimension

S.N	Questioner	1	2	3	4	5
1	I feel a personal responsibility to engage in pro-environmental behaviors. ı					
2	I believe that my individual actions can make a positive difference in protecting the environment.					

3	I am motivated to practice sustainable behaviors because I care about the well-being of future generations.					
4	For me Environmental issues are an important consideration when making purchasing decisions					
5	I find it easy to incorporate eco-friendly habits into my daily life.					
6	I enjoy participating in activities that promote environmental sustainability.					

the Social Dimension

S.N	Questioner	1	2	3	4	5
1	I believe that cultural values and traditions influence people's attitudes towards environmental sustainability.					
2	I think societal preferences and norms play a significant role in shaping individuals' pro-environmental behaviors.					
3	I believe that government policies and regulations can have a positive impact on promoting sustainable practices.					
4	I feel that my actions can inspire others to adopt more environmentally-friendly behaviors.					
5	I believe that collective action is necessary to address environmental challenges.					
6	I feel a sense of social responsibility to contribute to environmental conservation efforts.					

the Environmental Dimension

S.N	Questioner	1	2	3	4	5
1	I consider the environmental impact of my daily activities and try to make sustainable choices.					
2	I support initiatives and policies that promote renewable energy and sustainable practices.					
3	I am willing to pay a premium for products that are environmentally friendly and sustainable.					
4	I feel a sense of satisfaction when I engage in activities that benefit the environment.					
5	I believe that everyone should play a role in conserving natural resources and preserving the environment.					
6	I actively seek information about eco-friendly practices and ways to reduce environmental harm.					

the Sustainability Dimension

S.N	Questioner	1	2	3	4	5
1	I believe that sustainable practices are essential for the long-term well-being of society and the planet.					
2	I am willing to make lifestyle changes to reduce my ecological footprint and promote sustainability.					
3	I believe that economic development should be balanced with environmental conservation and social equity.					
4	I value and actively participate in recycling and waste reduction efforts.					
5	I believe that sustainable transportation options, such as walking, cycling, or public transit, should be promoted.					
6	I am interested in learning more about sustainable living practices and incorporating them into my daily life.					

the COVID-19 Pandemic COVID-19

S.N	Questioner	1	2	3	4	5
1	I am concerned about my health and well-being during the COVID-19 pandemic.					
2	I believe that using organic products can contribute to better health outcomes.					
3	I am more conscious of the ingredients and quality of the products I use since the pandemic started.					
4	I believe that consuming organic food and beverages can boost my overall health and immunity					
5	I have made changes in my lifestyle to prioritize health and well-being since the COVID-19 outbreak.					
6	I believe that incorporating organic products into my daily routine can help reduce the negative impacts of the pandemic on my health.					