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Green purchase intention among Vietnamese university students: an extended theory of planned behavior study

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ABSTRACT

Green purchase intention (GPI) is important in sustainable consumption research. However, less is known about how perceived value, environmental knowledge, social influence, social media, and green self-identity operate together among university students in Vietnam. This cross-sectional study surveyed 891 university students in Da Nang and analyzed the data using partial least squares structural equation modeling, importance-performance map analysis, and multigroup analysis. Perceived green product value, environmental knowledge, and subjective norms were significantly associated with GPI both directly and indirectly through attitude and perceived behavioral control. The model explained 84.2% of the variance in GPI. Perceived behavioral control showed the strongest direct association with GPI, whereas perceived green product value showed the highest overall importance. Importance-performance results suggest prioritizing perceived behavioral control by improving green-product affordability, availability, and accessibility, while sustaining credible communication of green product value. Social media was associated with stronger attitude-intention and perceived behavioral control-intention relationships, whereas green self-identity was associated only with a stronger attitude-intention relationship. Academic year was the main source of demographic heterogeneity. Overall, the findings suggest that GPI among Vietnamese university students is associated with perceived value, environmental knowledge, purchasing feasibility, social media context, and green self-identity.

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SUBJECTS

Consumer Psychology; Environmental Psychology; Environmental Communication; Sustainable Development; Environment & Society

1. Introduction

Environmental problems such as pollution, climate change, and resource depletion have increased public and academic interest in more sustainable patterns of consumption. In this context, green consumption has become an important topic in sustainability research (Akehurst et al., 2012; Nekmahmud & Fekete-Farkas, 2020). Recent global evidence reflects this shift: in a survey of more than 20,000 consumers across 31 countries, 85% reported experiencing the effects of climate change in their daily lives and 80% expressed a willingness to pay more for sustainably produced goods (PricewaterhouseCoopers [PwC], 2024). Yet concern does not always coincide with action: in the same survey, only 46% reported buying more sustainable products to reduce their environmental impact (PwC, 2024). Although many consumers express environmental concern and hold favorable attitudes toward green products (AT), these positive views are not consistently reflected in strong purchase intentions or actual green purchasing behavior. This gap between positive environmental attitudes, purchase intention, and behavior suggests that awareness alone may not fully explain green consumption decisions. Therefore, a more comprehensive examination of the factors associated with green purchase intention (GPI) is needed (Ginsberg & Bloom, 2004; Ha & Janda, 2012; Joshi & Rahman, 2015).

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The theory of planned behavior (TPB) has been widely used to explain GPI by focusing on AT, subjective norms (SN), and perceived behavioral control (PBC) (Ajzen, 1991). Although TPB has shown strong explanatory value across different settings, its traditional form may not fully capture the complexity of green consumption decisions in today's context, where consumers are exposed to abundant information and changing product values (Armitage & Conner, 2001). Recent studies have therefore extended TPB by value-based and knowledge-related factors. Perceived green product value (PGPV) refers to consumers' overall evaluation of the functional, emotional, social, and environmental benefits of green products (Biswas & Roy, 2015; Chen & Chang, 2012). Environmental knowledge (EK) refers to consumers' understanding of environmental issues and green product attributes (Fryxell & Lo, 2003; Zsóka et al., 2013). These factors may be associated with AT and PBC, which are themselves associated with GPI (Mostafa, 2007; Yadav & Pathak, 2017). SN may also support this process, especially among consumers whose decisions are responsive to friends, family, peers, or online communities (Cialdini et al., 1991; Goldstein et al., 2008).

Young consumers are an important group in green consumption research. In Vietnam, demand for green products has grown by an average of approximately 15% per year over 2021–2023 (Ministry of Industry & Trade, 2025). A 2024 Green Consumer Survey indicated a clear awareness–action gap: nearly three fifths of consumers intended to increase their green purchasing and more than two fifths were willing to accept a modest price premium, yet only around one in six consumers in major cities such as Hanoi and Ho Chi Minh City sustained green purchasing as a regular habit. High prices, reported by more than three quarters of respondents, and limited product availability were identified as the main barriers (Vietnam High Quality Goods Business Association, 2024). Individuals aged 16 to 30 account for approximately one fifth of the national population and may play a role in household consumption decisions (United Nations Department of Economic and Social Affairs Population Division, 2024). Vietnam is also a highly connected society: at the start of 2025, nearly four fifths of the population used the internet, social media user identities were equivalent to about three quarters of the population, and the median age was in the early thirties (DataReportal, 2025). This study focuses on university students as a relevant young consumer group in Vietnam, who are active users of digital platforms, frequently exposed to peer-generated content, and may rely on perceived value, social influence, and perceived control when forming GPI (Appel et al., 2020; Djafarova & Fouts, 2022). Such immersion in digital-commerce environments, in which platform experiences shape young consumers' purchasing, has been documented among Generation Z both in Vietnam and elsewhere in Southeast Asia (Ngo et al., 2025; Rasyid et al., 2026).

In this digital context, social media influence (SM) and green self-identity (GSI) may also play important roles. SM can support information sharing, peer interaction, and social comparison, which may be associated with how AT and PBC relate to purchase intentions (Mangold & Faulds, 2009; Phua et al., 2017). GSI reflects the extent to which individuals see environmental responsibility as part of their self-concept and are motivated to act in line with that identity (van der Werff et al., 2013; Whitmarsh & O'Neill, 2010).

Despite growing research on green consumption, several gaps remain. First, prior studies have often examined PGPV, EK, SN, SM, and GSI separately, rather than integrating them into a single TPB-based framework (Liobikienė & Bernatoniene, 2017; Yadav & Pathak, 2017). Second, less attention has been paid to the mechanisms through which these factors are associated with GPI, particularly through the mediating roles of AT and PBC. Third, evidence remains limited among young consumers in emerging digital markets such as Vietnam, where rapid urbanization, high social media use, rising environmental awareness, and skepticism toward green claims coexist (OECD, 2025). This wariness is widespread: roughly 70% of consumers report independently researching sustainability claims before purchasing (Simon-Kucher, 2024), underscoring the role of knowledge and trust in green decisions. These conditions provide a relevant context for examining how value perceptions, knowledge, social influence, digital exposure, and identity are associated with GPI.

To address these gaps, this study develops an integrated framework grounded in the TPB, the theory of consumption values (TCV), and identity theory, and tests it among Vietnamese university students. The framework examines whether PGPV, EK, and SN are associated with GPI both directly and indirectly through AT and PBC, and whether SM and GSI moderate the AT-GPI and PBC-GPI relationships. Its

contribution lies not in introducing new constructs, as PGPV, EK, SM, and GSI are each well established, but in reconfiguring their theoretical roles within a single, multi-theory process model. The study advances the literature in three ways. First, rather than adding SM and GSI as further direct predictors, as in most prior TPB extensions, the study repositions them as conditional mechanisms that shape when, and for whom, the core TPB pathways relate to intention. Second, it anchors each extension in a distinct theoretical lens, with PGPV grounded in the TCV, GSI in identity theory, and the core constructs in the TPB, combining them within a mediation-and-moderation framework rather than appending variables to a single framework. Third, by testing moderation on both the AT-GPI and PBC-GPI paths simultaneously, the model distinguishes evaluative from feasibility-based routes to intention and can reveal whether digital and identity-based conditions operate uniformly or selectively across these routes. Thus, the study advances TPB extension research by shifting from an additive predictor-based model to a role-differentiated conditional process model, in which value, knowledge, social influence, digital exposure, and identity are positioned at distinct stages of GPI formation. In doing so, it provides context-specific evidence from an emerging green market in which feasibility-based control may matter as much as, or more than, attitude.

2. Literature review

TPB provides the core explanation of intention formation, while the TCV (Sheth et al., 1991) and identity theory (Burke, 1991; Stryker, 2001) justify the inclusion of PGPV and GSI. These perspectives provide the basis for examining how cognitive, value-based, social, digital, and identity-related factors are associated with GPI.

2.1. Theory of planned behavior

TPB suggests that behavioral intention is the most immediate predictor of actual behavior and is associated with attitudes, SN, and PBC (Ajzen, 1991). In green consumption, AT reflect consumers' evaluations of the environmental and moral benefits of green products. SN refer to perceived social pressure from important others, while PBC reflects consumers' perceived ability to perform green purchasing behavior (Paul et al., 2016; Yadav & Pathak, 2017). Prior evidence shows that TPB is useful for explaining GPI, especially among young consumers (Armitage & Conner, 2001). In this study, AT and PBC are treated as central psychological mechanisms through which upstream factors are associated with GPI.

2.2. Theory of consumption values

TCV, proposed by Sheth et al. (1991), explains consumer choice behavior by arguing that purchasing decisions are associated with multiple value dimensions rather than a single utilitarian consideration. Specifically, the TCV identifies five core consumption values, namely, functional value, social value, emotional value, conditional value, and epistemic value, each representing a distinct source of utility relevant to consumer decision-making. A fundamental premise of the TCV is that a product or service may simultaneously embody several consumption values, and consumers' choices reflect the combined relevance of these values rather than reliance on any single dimension (Sheth et al., 1991). This perspective is particularly relevant in the context of green consumption, where consumers often face trade-offs between functional performance, price, and nonutilitarian benefits such as moral satisfaction, social approval, and environmental responsibility. Prior empirical studies grounded in the TCV demonstrate that consumers may exhibit strong purchase intentions toward green products even when such products are perceived as more expensive or functionally inferior, provided that they deliver greater emotional, social, or epistemic value (Biswas & Roy, 2015; Lin & Huang, 2012; Sweeney & Soutar, 2001). Accordingly, the TCV provides the theoretical basis for conceptualizing PGPV as a multidimensional evaluation of the benefits associated with green products.

2.3. Identity theory

Identity theory suggests that people tend to act in ways that are consistent with how they see themselves (Burke, 1991; Stryker, 2001). In consumer behavior, this means that individuals may choose

products or behaviors that align with identities they consider important (Reed et al., 2012). In the context of green consumption, GSI reflects the extent to which individuals see themselves as environmentally responsible consumers. When this identity is strong, positive evaluations of green products may be more closely associated with GPI because such intentions are consistent with the individual's self-concept. Prior research suggests that GSI is associated with pro-environmental intentions and may also be associated with how cognitive evaluations relate to intention (van der Werff et al., 2013; Whitmarsh & O'Neill, 2010). Therefore, identity theory provides the basis for examining the role of GSI in intention formation.

2.4. Green purchase intention

GPI refers to an individual's willingness to choose environmentally friendly products over conventional alternatives (Chen & Chang, 2012; Yadav & Pathak, 2017). Early studies viewed GPI as an intention associated mainly with environmental beliefs and attitudes (Mostafa, 2007). Later research emphasized that GPI also has social and ethical dimensions because green purchasing may reflect social expectations and moral responsibility (Chan & Lau, 2000). To provide a more systematic explanation, many studies have adopted the TPB, conceptualizing GPI as a function of AT, SN, and PBC (Paul et al., 2016; Yadav & Pathak, 2017). Evidence also suggests that TPB becomes more useful when it is extended with value-related and environmental factors (Chen & Chang, 2012; Wijekoon & Sabri, 2021). Based on these perspectives, this study conceptualizes GPI as an intention associated with personal evaluation, social influence, perceived control, and perceived value.

2.5. Theoretical integration of theory of planned behavior, consumption values, and identity theory

This study integrates the TPB, the TCV, and identity theory to explain GPI as a role-differentiated process. TPB provides the core psychological structure by positioning attitude, subjective norms, and perceived behavioral control as proximal correlates of intention (Ajzen, 1991). However, TPB does not fully specify how value-based, cognitive, digital, and identity-related conditions are associated with these mechanisms.

The TCV explains why consumers evaluate green products favorably when they perceive functional, emotional, social, epistemic, or environmental benefits (Sheth et al., 1991). Accordingly, perceived green product value is positioned as an upstream value-based antecedent that may be associated with attitude and perceived behavioral control. Environmental knowledge is treated as a cognitive resource that helps consumers evaluate green claims, reduce uncertainty, and perceive green purchasing as more feasible (Fryxell & Lo, 2003; Zsóka et al., 2013). Subjective norms capture the social dimension of TPB by reflecting perceived expectations from peers, family, and relevant social groups (Cialdini et al., 1991).

Identity theory further extends TPB by explaining why green consumption may become self-relevant. When environmental responsibility is part of one's self-concept, favorable AT may be more strongly associated with intention (Stryker, 2001; van der Werff et al., 2013; Whitmarsh & O'Neill, 2010). Therefore, green self-identity is conceptualized as an identity-based moderator rather than only as a direct predictor. Similarly, social media is positioned as a digital-contextual moderator because it may be related to greater visibility, credibility, and social reinforcement of green purchasing.

Overall, this integrated framework moves beyond simply adding variables to TPB. It specifies PGPV, EK, and SN as upstream antecedents, AT and PBC as central psychological mechanisms, and SM and GSI as boundary conditions. This role-differentiated specification clarifies how value, knowledge, social influence, digital exposure, and identity operate at different stages of GPI formation.

2.6. Analyzing research keywords

A bibliometric analysis was conducted using VOSviewer 1.6.20, with Scopus as the primary database. After screening 423 initially retrieved documents according to PRISMA-based procedures, 249 eligible articles published between 2020 and 2025 were retained for keyword co-occurrence analysis. Data were cleaned and standardized using OpenRefine before network mapping. With a minimum occurrence threshold of five, 19 key terms were identified and grouped into five thematic clusters. These clusters

focused on GPI and TPB-related factors, environmental knowledge and greenwashing skepticism, green perceived value and trust, social media and green product influences, and environmental concerns. The results showed rapid growth in this research area after 2023, while evidence from developing countries remained limited. These findings support the selection of TPB-related constructs, environmental knowledge, green perceived value, social media, and green self-identity for further empirical analysis. Detailed results are provided in [Supplementary Document S1](#).

3. Research model and hypotheses

Building on the theoretical integration outlined above, the proposed research model specifies how value-based, cognitive, social, digital, and identity-related factors are positioned at different stages of GPI formation. The model is grounded in the TPB (Ajzen, 1991), which suggests that behavioral intention is jointly associated with AT, SN, and PBC. In the context of green consumption, this study adopts an extended TPB framework to capture the complexity of university students' GPI by integrating value-based and informational antecedents, social influences, and digital and identity-related moderating factors.

Specifically, PGPV and EK are incorporated as antecedents that may be associated with both AT and PBC. Drawing on the TCV (Sheth et al., 1991), PGPV reflects consumers' evaluations of the functional, emotional, social, and environmental benefits of green products (Chen & Chang, 2012; Zeithaml, 1988). Higher perceived value is expected to be associated with more favorable AT and with stronger perceived ability to engage in green purchasing. Similarly, EK represents individuals' understanding of environmental issues and green product attributes, which may be associated with more favorable attitudes and stronger PBC, potentially reflecting reduced informational uncertainty and perceived risk (Fryxell & Lo, 2003; Zsóka et al., 2013). In addition, SN are included as a social factor that may be associated with AT and PBC, reflecting the extent to which young consumers perceive green purchasing as socially expected or approved behavior (Cialdini et al., 1991; Goldstein et al., 2008). Consistent with the TPB, AT and PBC are proposed as key immediate correlates of GPI.

To capture the digital context of green consumption, this study incorporates SM as a moderating variable. SM involves green information sharing, peer interaction, electronic word-of-mouth, and social validation, which may be associated with stronger relationships between AT, PBC, and GPI (Mangold & Faulds, 2009; Phua et al., 2017). Accordingly, SM is conceptualized as a contextual moderator rather than a direct antecedent of GPI. Furthermore, GSI is introduced based on identity theory (Stryker, 2001). GSI reflects the extent to which individuals view environmental responsibility as part of their self-concept (Whitmarsh & O'Neill, 2010). In this study, GSI is conceptualized as an identity-based moderator that may condition the strength of the relationships between AT, PBC, and GPI. This conditional specification departs from prior TPB extensions, which have predominantly modeled SM (Pop et al., 2022; Sun & Xing, 2022) and GSI (van der Werff et al., 2013; Whitmarsh & O'Neill, 2010) as direct antecedents of GPI, and instead positions them as boundary conditions of the core psychological mechanism.

Figure 1 presents the proposed research model, including direct, mediating, and moderating relationships. Detailed theoretical rationales and supporting references are provided in [Supplementary Document S2](#). In this framework, PGPV, SN, and EK are considered key antecedents, whereas attitudes and PBC are positioned as central psychological mechanisms linking these antecedents to GPI. Specifically, PGPV is hypothesized to be positively associated with GPI (H1), attitudes (H1.1), and PBC (H1.2), while attitudes (H1a) and PBC (H1b) are expected to mediate the relationship between PGPV and GPI. Similarly, SN is expected to be positively associated with GPI (H2), attitudes (H2.1), and PBC (H2.2), with attitudes (H2a) and PBC (H2b) mediating the relationship between SN and GPI. EK is also expected to be positively associated with GPI (H3), attitudes (H3.1), and PBC (H3.2), while attitudes (H3a) and PBC (H3b) are expected to mediate the relationship between EK and GPI. Consistent with the TPB, attitudes (H4) and PBC (H5) are expected to be positively associated with GPI. In addition, SM is proposed to moderate the relationships between attitudes and GPI (H6.1) and between PBC and GPI (H6.2). Finally, GSI is proposed to moderate the relationships between attitudes and GPI (H7.1) and between PBC and GPI (H7.2).

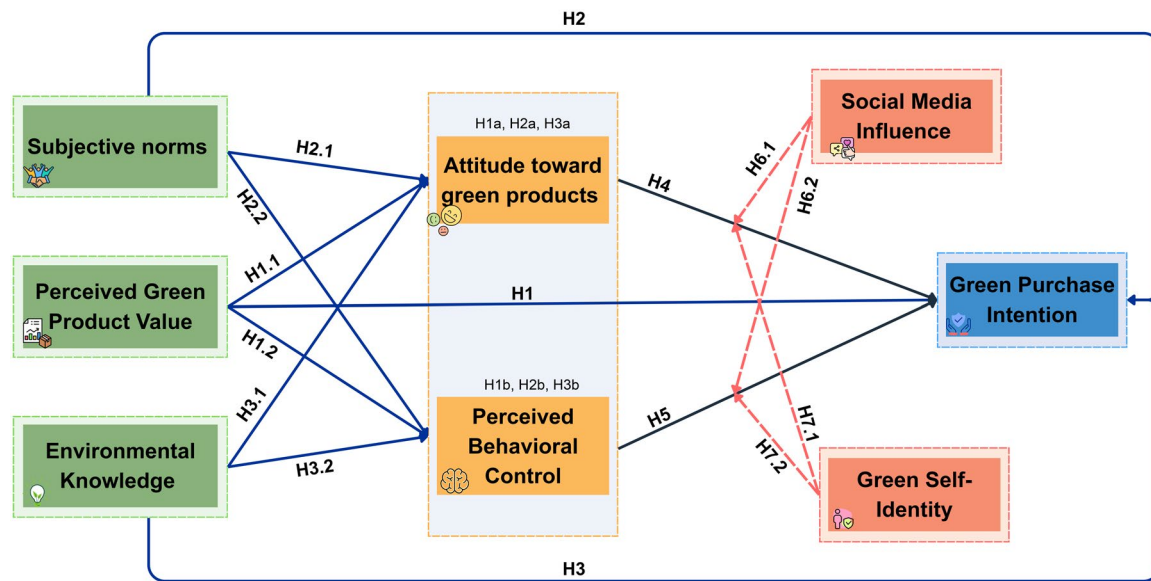


Figure 1. Proposed extended theory of planned behavior model for green purchase intention. Solid arrows represent hypothesized direct and mediated associations, while dashed arrows represent hypothesized moderating effects. Path labels correspond to the hypotheses examined in the study.

4. Materials and methods

4.1. Data collection process

This study adopts a purposive sampling approach to examine GPI among university students, which was considered appropriate for theory-testing research in a relatively homogeneous population (Saunders et al., 2019). Eligible participants were undergraduate students currently enrolled at universities in Da Nang who voluntarily provided informed consent. Da Nang was selected as a major urban and educational center in central Vietnam whose student population is young, digitally connected, and increasingly exposed to green consumption, making it well suited to testing the proposed mechanisms. Consistent with this theory-testing orientation, the study seeks analytic generalization to the conceptual model rather than statistical generalization to the entire population of young Vietnamese consumers. In line with the TPB (Ajzen, 1991), behavioral intention reflects an individual's readiness to perform a behavior in the future and does not require prior behavioral experience. Accordingly, the sample included both individuals with and without prior green product purchase or usage experience. The study protocol was reviewed and approved by the Institutional Review Board of Duy Tan University (No. DTU/REC2025/NHH05, approved on 30 March 2025). Written informed consent was obtained from all participants before data collection.

Data were collected from university students in Da Nang, Vietnam between May and September 2025 via a structured questionnaire with a five-point Likert scale. The questionnaire was administered online via Google Forms and distributed through university course groups and class representatives across multiple faculties and academic years, so as to reach students from a range of disciplines rather than a single cohort. Participation was voluntary and anonymous, and respondents could withdraw at any time without consequence. A total of 1,030 responses were initially obtained. After 81 responses with straight-lining behavior or missing data were excluded, multivariate outliers were identified using the Mahalanobis distance in RStudio with a significance threshold of $p < 0.001$, resulting in the removal of 58 additional cases. The final sample comprised 891 valid responses. Because participation was voluntary, potential self-selection and non-response bias cannot be fully excluded. To reduce this risk, the questionnaire was distributed across multiple faculties and academic years rather than a single class or program. However, because the survey was shared through open course channels, the exact number of invited students was not recorded, making formal non-response analysis infeasible. This limitation should be addressed in future studies using probability-based sampling.

The final sample consisted of 460 males (51.63%) and 431 females (48.37%). Regarding academic year, first- and fourth-year students represented the largest proportions. In terms of monthly income, the

majority reported earning less than 3 million VND (56.23%), followed by those earning between 3 and 7 million VND (29.40%). The detailed demographic characteristics are presented in [Supplementary Table S1](#).

4.2. Sample size

Sample adequacy was evaluated using G*Power (Faul et al., 2009) following the guidelines of Kock and Hadaya (2018). A G*Power-based sample-size calculation using a two-tailed point-biserial correlation model, a small-to-medium effect size of $|p| = 0.15$, $\alpha = 0.05$, and power = 0.95 indicated a minimum required sample size of 567 cases. After data screening, 891 valid responses were retained. A post hoc analysis confirmed a power value of 1.0 (Fink, 2013), indicating adequate statistical power for the proposed analysis.

4.3. Measurement procedure

All measurement items were derived from established and previously validated scales to support content validity. The survey instrument used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Collectively, the questionnaire included 46 items assessing eight latent constructs. [Supplementary Table S2](#) provides an overview of the measurement constructs, the number of items associated with each construct, and their respective original sources.

A pretest with 20 respondents was used to refine item clarity and wording, followed by a pilot study with 80 participants (approximately 10% of the final sample; Hertzog, 2008), which confirmed that the items were clearly understood with no notable ambiguity (Hulland, 1999). The measurement items and their sources are provided in [Supplementary Table S3](#).

5. Results

A multianalytic approach was employed to evaluate the proposed model. First, descriptive statistics were examined for all measurement items, including mean, standard deviation, excess kurtosis, and skewness. As shown in [Supplementary Table S4](#), the mean values ranged from 3.625 to 3.996, while the standard deviations ranged from 1.013 to 1.300, indicating generally favorable responses with acceptable dispersion. Substantively, the consistently above-midpoint means together with the negative skewness suggest that students held moderately positive rather than strongly polarized orientations toward the green constructs, whereas the moderate standard deviations indicate meaningful between-student variation that is consistent with an emerging green market in which favorable dispositions coexist with reservations about product feasibility and credibility. The excess kurtosis values ranged from -0.827 to 1.560 , and the skewness values ranged from -1.270 to -0.553 , both of which were within commonly accepted thresholds, suggesting no severe univariate normality issues. However, Mardia's multivariate skewness and kurtosis tests indicated significant multivariate nonnormality ($p < 0.001$) (Mardia, 1970), supporting the use of partial least squares structural equation modeling (PLS-SEM), which is appropriate for complex models and data that deviate from multivariate normality (Hulland, 1999). The measurement and structural models were subsequently evaluated using SmartPLS 4.1.0.9. After estimating the structural relationships, multigroup analysis (MGA) was conducted to examine whether the proposed relationships differed across respondent groups. Subsequently, importance-performance map analysis (IPMA) was performed with GPI as the target construct to enhance the interpretability of the findings (Hair et al., 2021). IPMA assesses both the importance, represented by total effects, and performance, represented by latent variable scores, of the key constructs in the proposed model, including PGPV, SN, EK, attitudes, PBC, SM, and GSI. This analysis helps identify priority areas associated with Vietnamese university students' GPI.

5.1. Common method variance

To mitigate potential common method variance (CMV), procedural remedies were applied, including clear questionnaire wording, avoidance of sensitive items, and assurance of respondent anonymity. Two

post hoc diagnostic tests were also conducted. As shown in [Supplementary Table S5](#), the inner model variance inflation factor (VIF) values ranged from 2.251 to 4.773, below the 5.00 threshold. Second, a random dependent variable approach was used, with all latent constructs modeled as predictors of the random criterion variable. The resulting VIF values ranged from 2.268 to 4.623. Although all values were below 5.00, several exceeded the conservative 3.30 criterion, suggesting that CMV cannot be completely ruled out. Overall, severe CMV is unlikely, but the findings should be interpreted with appropriate caution (Kock, 2015).

5.2. Structural model evaluation

The measurement model was evaluated to ensure adequate reliability and validity prior to the structural model assessment. During the initial assessment, six indicators with outer loadings below 0.70 were removed (SN5, SN6, PGPV2, EK6, PBC1, and GSI5). Because the constructs were modeled reflectively, these low-loading items represented peripheral or redundant facets, and their removal improved construct homogeneity while the retained items preserved each construct's conceptual core and content validity (Hair et al., 2021). All retained loadings then ranged from 0.822 to 0.904, and VIF values remained below 5.00. Internal consistency was satisfactory (Cronbach's α = 0.877–0.942; composite reliability = 0.916–0.953), and convergent validity was confirmed (AVE = 0.731–0.813), with all indices exceeding standard thresholds (Fornell & Larcker, 1981; Hair et al., 2021). Item loadings and reliability statistics are reported in [Table 1](#) and [Supplementary Table S6](#).

Discriminant validity was assessed using the Fornell-Larcker criterion and the Heterotrait-monotrait (HTMT) ratio. As shown in [Table 2](#), the square roots of AVE for all constructs exceeded their corresponding inter-construct correlations, supporting the Fornell-Larcker criterion (Fornell & Larcker, 1981). In addition, all HTMT values ranged from 0.132 to 0.889, remaining below the recommended threshold of 0.90. Although several values approached the threshold, none exceeded it, indicating acceptable discriminant validity. The bootstrapped 95% confidence intervals also did not include 1.00, providing additional support for discriminant validity. Detailed HTMT confidence intervals are reported in [Supplementary Table S7](#).

Model fit was assessed using fit indices commonly reported in PLS-SEM. As shown in [Table 3](#), the estimated model achieved an SRMR value of 0.039, which is below the recommended threshold of 0.08, indicating acceptable approximate model fit. The NFI value was 0.913, exceeding the recommended threshold of 0.90 and further supporting the adequacy of the proposed model (Henseler et al., 2015; Hu & Bentler, 1999). The d_{ULS} , d_G , and chi-square values are reported for completeness, while the bootstrap-based exact model fit results are provided in [Supplementary Table S8](#). Overall, the results suggest that the proposed model demonstrates an acceptable level of fit to the observed data.

[Table 4](#) reports the coefficients of determination (R^2), adjusted R^2 , out-of-sample predictive relevance ($Q^2_{predict}$), and prediction error metrics, including root mean square error (RMSE) and mean absolute error (MAE), for the endogenous constructs. The R^2 values ranged from 0.700 to 0.842, indicating that the model explains a substantial proportion of the variance in AT, PBC, and GPI. In particular, the model exhibits strong explanatory power for GPI ($R^2 = 0.842$), suggesting that 84.2% of the variance in green purchase intention is explained by its predictors. This value should therefore be interpreted cautiously as an upper-bound estimate. Although the model showed acceptable discriminant validity and collinearity, several values approached recommended thresholds, and the CMV diagnostics indicated that common method variance could not be fully excluded. Part of the explained variance may therefore reflect shared method

Table 1. Assessment of reliability and convergent validity.

Assessment measure	Criterion	Threshold	Result
Indicator reliability	Factor loadings	>0.70	0.822 - 0.904
Internal consistency reliability	Cronbach's alpha	>0.70	0.877 - 0.942
Multicollinearity	Variance inflation	<5.00	Below 5.00
Composite reliability	Internal consistency	>0.70	0.916 - 0.953
Average variance extracted	Convergent validity	>0.50	0.731 - 0.813

Table 2. Assessment of discriminant validity.

Fornell-Larcker	At	EK	GPI	PGPV	GSI	PBC	SM	SN
AT	0.873							
EK	0.769	0.855						
GPI	0.791	0.790	0.862					
PGPV	0.800	0.804	0.821	0.872				
GSI	0.242	0.201	0.181	0.172	0.902			
PBC	0.786	0.745	0.821	0.794	0.245	0.881		
SM	0.204	0.155	0.124	0.138	0.742	0.213	0.869	
SN	0.738	0.719	0.744	0.797	0.208	0.774	0.194	0.855
HTMT	AT	EK	GPI	PGPV	GSI	PBC	SM	SN
AT								
EK	0.833							
GPI	0.841	0.854						
PGPV	0.860	0.879	0.881					
GSI	0.261	0.220	0.194	0.186				
PBC	0.852	0.822	0.889	0.869	0.267			
SM	0.220	0.169	0.132	0.148	0.807	0.233		
SN	0.814	0.806	0.819	0.886	0.231	0.869	0.214	

Abbreviations: AT, attitude toward green products; EK, environmental knowledge; GPI, green purchase intention; GSI, green self-identity; HTMT, heterotrait-monotrait ratio; PBC, perceived behavioral control; PGPV, perceived green product value; SM, social media influence; SN, subjective norms. Note. The diagonal elements in the Fornell-Larcker matrix are the square roots of AVE for each construct. AVE, average variance extracted.

Table 3. Goodness-of-fit results for the research model.

Index	Saturated model	Estimated model
SRMR	0.032	0.039
d_ULS	0.849	1.235
d_G	0.528	0.55
Chi-square	2785.535	2855.429
NFI	0.915	0.913

Abbreviations: SRMR, standardized root mean square residual; d_ULS, squared Euclidean distance; d_G, geodesic distance; NFI, normed fit index.

Table 4. Explanatory power and predictive relevance of endogenous constructs.

	R-square	R-square adjusted	Q ² predict	RMSE	MAE
AT	0.700	0.699	0.696	0.554	0.363
GPI	0.842	0.840	0.766	0.485	0.358
PBC	0.702	0.701	0.698	0.551	0.389

Abbreviations: AT, attitude toward green products; GPI, green purchase intention; PBC, perceived behavioral control; Q²predict, predictive relevance; RMSE, root mean square error; MAE, mean absolute error.

effects or partial conceptual overlap among PGPV, SN, PBC, and GPI. The adjusted R² values closely mirror the corresponding R² values, ranging from 0.699 to 0.840, which indicates model stability and a limited risk of overfitting, consistent with Chin's (1998) guidelines. Moreover, the construct-level Q²predict values were positive and ranged from 0.696 to 0.766, suggesting predictive relevance for the endogenous constructs. To further assess out-of-sample predictive performance, an indicator-level PLSpredict analysis was conducted and compared with a linear model benchmark. As shown in [Supplementary Table S9](#), all indicator-level Q²predict values were positive. For the main target construct, GPI, the PLS-SEM prediction errors were lower than the linear model benchmark across all GPI indicators, indicating strong predictive performance for green purchase intention. For AT and PBC, most indicators showed comparable or lower prediction errors than the linear benchmark, although a few indicators performed slightly weaker. Overall, the model shows strong predictive power for GPI but only moderate predictive power for AT and PBC, so the predictive claims apply mainly to GPI and the AT and PBC results should be interpreted with caution.

5.3. Hypothesis testing

The significance of the path coefficients was evaluated using a bias-corrected and accelerated 95% confidence interval (BCaCI) bootstrap procedure with 5,000 subsamples (Aguirre-Urreta & Rönkkö, 2018; Hair et al., 2021). The full structural model is illustrated in [Figure 2](#).

As shown in Table 5, PGPV was positively and significantly associated with GPI ($\beta=0.184$, $t=4.690$), AT ($\beta=0.384$, $t=7.717$), and PBC ($\beta=0.342$, $t=6.170$), supporting H1, H1.1, and H1.2. SN was also positively associated with GPI ($\beta=0.058$, $t=2.039$), AT ($\beta=0.210$, $t=4.444$), and PBC ($\beta=0.337$, $t=6.981$), supporting H2, H2.1, and H2.2. In addition, EK was positively related to GPI ($\beta=0.091$, $t=2.794$), AT ($\beta=0.309$, $t=6.635$), and PBC ($\beta=0.228$, $t=4.863$), supporting H3, H3.1, and H3.2. Consistent with the TPB, both AT ($\beta=0.196$, $t=5.156$) and PBC ($\beta=0.289$, $t=8.071$) were significantly associated with GPI, supporting H4 and H5. Overall, all direct-effect hypotheses were supported, and all BCaCI 95% confidence intervals excluded zero.

The mediation analysis reported in Table 6 indicates that AT and PBC served as significant statistical mediators in the associations between PGPV, SN, EK, and GPI. Specifically, PGPV was indirectly associated with GPI through AT ($\beta=0.075$, $t=4.134$) and PBC ($\beta=0.099$, $t=4.716$), supporting H1a and H1b. SN also showed significant indirect associations with GPI through AT ($\beta=0.041$, $t=3.374$) and PBC ($\beta=0.097$, $t=5.321$), supporting H2a and H2b. Similarly, EK was indirectly associated with GPI through AT ($\beta=0.061$, $t=4.190$) and PBC ($\beta=0.066$, $t=4.160$), supporting H3a and H3b. Overall, all BCaCI 95% confidence intervals excluded zero, supporting the statistical significance of the proposed indirect associations. Because the data are cross-sectional, these indirect paths should be interpreted as statistical mediation patterns rather than evidence of temporal or causal mediation.

The moderating effects were examined using a two-stage approach with mean-centered latent variable scores. As reported in Table 6 and illustrated in Supplementary Figures S1-S4, SM and GSI exhibit selective moderating roles in the relationships between AT, PBC, and GPI. Specifically, SM positively and

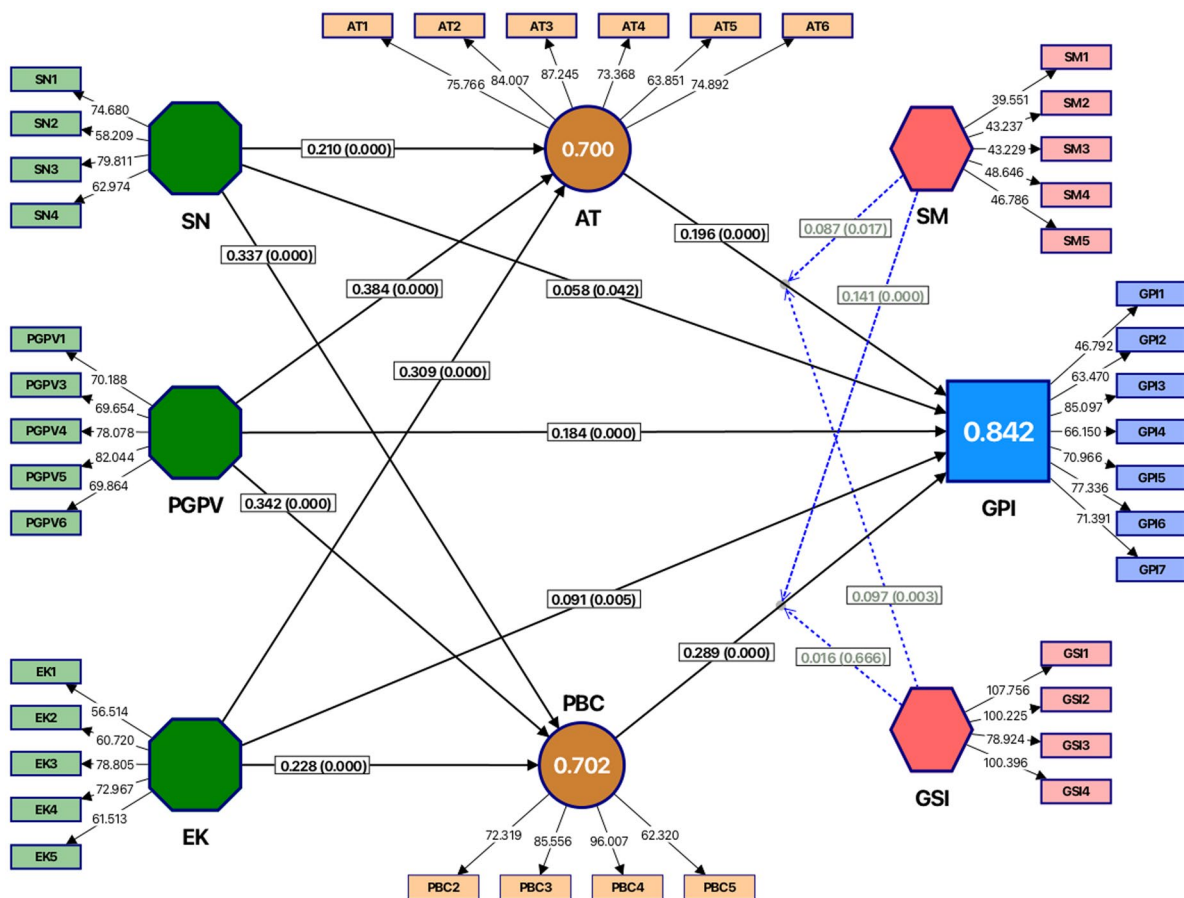


Figure 2. Structural model results of the extended theory of planned behavior framework. Solid arrows indicate direct structural paths among the constructs, and dashed arrows indicate moderating effects. Values on the structural paths are standardized path coefficients with p-values in parentheses. Values inside the endogenous constructs represent R^2 values. Indicator-level values are shown for the retained measurement items. Abbreviations: AT, attitude toward green products; EK, environmental knowledge; GPI, green purchase intention; GSI, green self-identity; PBC, perceived behavioral control; PGPV, perceived green product value; SM, social media influence; SN, subjective norms.

Table 5. Direct-effect hypothesis testing results.

Hypotheses		Original sample (O)	t-statistics	BCaCI	VIF	f ²	Decisions
H1	PGPV -> GPI	0.184***	4.690	[0.111; 0.263]	4.770	0.045	Supported
H1.1	PGPV -> AT	0.384***	7.717	[0.285; 0.480]	3.924	0.125	Supported
H1.2	PGPV-> PBC	0.342***	6.170	[0.232; 0.451]	3.924	0.100	Supported
H2	SN -> GPI	0.058*	2.039	[0.003; 0.114]	3.345	0.006	Supported
H2.1	SN -> AT	0.210***	4.444	[0.121; 0.303]	2.878	0.051	Supported
H2.2	SN -> PBC	0.337***	6.981	[0.244; 0.431]	2.878	0.133	Supported
H3	EK -> GPI	0.091**	2.794	[0.029; 0.157]	3.606	0.015	Supported
H3.1	EK -> AT	0.309***	6.635	[0.219; 0.400]	2.969	0.107	Supported
H3.2	EK -> PBC	0.228***	4.863	[0.138; 0.322]	2.968	0.059	Supported
H4	AT -> GPI	0.196***	5.156	[0.120; 0.269]	4.773	0.049	Supported
H5	PBC -> GPI	0.289***	8.071	[0.219; 0.359]	4.401	0.120	Supported

Abbreviations: AT, attitude toward green products; EK, environmental knowledge; GPI, green purchase intention; PBC, perceived behavioral control; PGPV, perceived green product value; SN, subjective norms; BCaCI, bias-corrected and accelerated 95% confidence interval; VIF, variance inflation factor. Note. *** $p < 0.001$, ** $p < 0.01$, * $p < .05$. All VIF values are < 5 .

Table 6. Indirect and moderating effect hypothesis testing results.

Hypothesis and path	Coefficient	t-stat	BCaCI	Remarks
Indirect effect				
H1a: PGPV -> AT -> GPI	0.075***	4.134	[0.043; 0.116]	Supported
H1b: PGPV -> PBC -> GPI	0.099***	4.716	[0.063; 0.145]	Supported
H2a: SN -> AT -> GPI	0.041***	3.374	[0.021; 0.070]	Supported
H2b: SN -> PBC -> GPI	0.097***	5.321	[0.065; 0.137]	Supported
H3a: EK -> AT -> GPI	0.061***	4.190	[0.037; 0.094]	Supported
H3b: EK -> PBC -> GPI	0.066***	4.160	[0.039; 0.102]	Supported
Moderating effect				
H6.1: SM x AT -> GPI	0.087*	2.387	[0.011; 0.154]	Supported
H6.2: SM x PBC -> GPI	0.141***	3.769	[0.069; 0.214]	Supported
H7.1: GSI x AT -> GPI	0.097**	3.025	[0.037; 0.160]	Supported
H7.2: GSI x PBC -> GPI	0.016	0.432	[-0.053; 0.089]	Not Supported

Abbreviations: AT, attitude toward green products; EK, environmental knowledge; GPI, green purchase intention; PBC, perceived behavioral control; PGPV, perceived green product value; SN, subjective norms; GSI, green self-identity; SM, social media influence. Note. *** $p < 0.001$, ** $p < 0.01$, * $p < .05$. BCaCI=bias-corrected and accelerated 95% confidence interval.

significantly moderates the relationship between AT and GPI ($\beta=0.087$, $t=2.387$), supporting H6.1. SM also positively moderates the relationship between PBC and GPI ($\beta=0.141$, $t=3.769$), supporting H6.2. Regarding GSI, the GSI x AT interaction was positively and significantly associated with GPI ($\beta=0.097$, $t=3.025$), supporting H7.1. However, the moderating effect of GSI on the relationship between PBC and GPI is not statistically significant ($\beta=0.016$, $t=0.432$), indicating that H7.2 is not supported. Simple-slope analysis further clarified the practical meaning of these moderating effects. The positive association between AT and GPI became stronger at higher levels of SM. Similarly, PBC was more strongly associated with GPI when SM was high. For GSI, the moderating effect was evident only for the AT-GPI relationship, indicating that identity-based motivation is associated with stronger value-consistent evaluations but not with the feasibility constraints captured by PBC. The Johnson-Neyman analysis further substantiates these conditional effects by identifying the regions of significance across different levels of the moderators. Overall, the findings suggest that SM is associated with stronger AT-GPI and PBC-GPI relationships, whereas GSI is associated only with a stronger AT-GPI relationship.

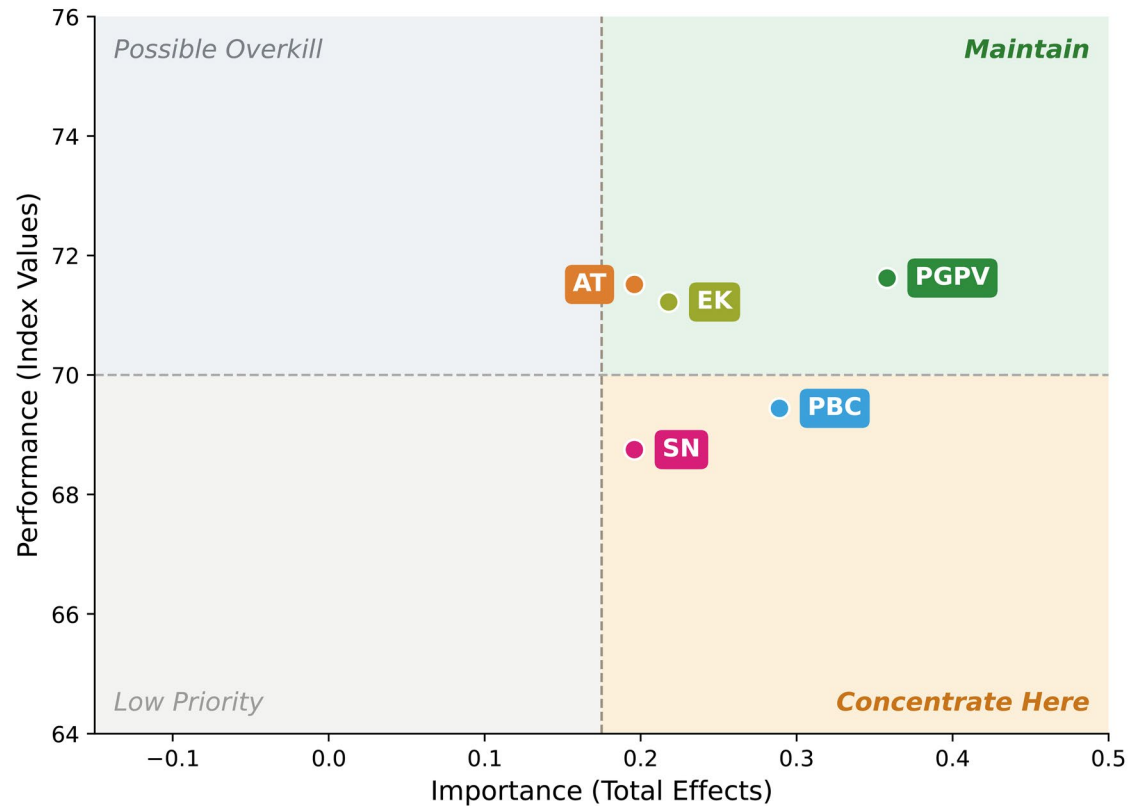
5.4. Importance-performance map analysis

The IPMA results in Figure 3 show that PGPV is the most important construct for GPI, with the highest importance value (0.358) and a high performance score (71.622). PBC also shows substantial importance (0.289) but a comparatively lower performance score (69.441), indicating that PBC represents a priority area for improvement. EK demonstrates relatively high importance (0.218) and strong performance (71.221), suggesting that environmental knowledge is an important correlate of consumers' green purchase intention. AT also recorded a relatively high performance score (71.515), although its importance value is lower than those of PGPV, PBC, and EK. In contrast, SN shows a lower importance value, indicating that subjective norms may play a less central role in improving GPI compared with perceived value,

perceived behavioral control, and environmental knowledge. Overall, the IPMA findings suggest that managerial attention should be directed primarily toward PGPV, PBC, and EK, which are the priority constructs most strongly associated with GPI.

5.5. Results of multigroup analysis

To examine whether the proposed structural relationships differed across demographic groups, this study combined the MICOM procedure with MGA across gender, academic year, and income level. The MICOM procedure confirmed configural invariance across all groups and compositional invariance for most constructs, providing a sufficient basis for MGA in line with the requirements of Henseler et al. (2015). Full



Construct	Importance	Performance
AT	0.196	71.515
EK	0.218	71.221
PBC	0.289	69.441
PGPV	0.358	71.622
SN	0.196	68.750

Figure 3. Importance-performance map analysis for green purchase intention. The horizontal axis represents construct importance, measured by total effects on GPI, and the vertical axis represents construct performance, measured by index values. The dashed lines divide the plot into four interpretive areas. Constructs in the upper-right area have relatively high importance and high performance, whereas constructs in the lower-right area have relatively high importance but lower performance and may require greater practical attention. The table below the plot reports the corresponding importance and performance values for each construct. Abbreviations: AT, attitude toward green products; EK, environmental knowledge; GPI, green purchase intention; PBC, perceived behavioral control; PGPV, perceived green product value; SN, subjective norms.

measurement invariance (equal means and variances across groups) was not consistently achieved for all constructs; however, this represents a higher-order condition beyond the minimum requirement for MGA in PLS-SEM. Accordingly, the MGA results are interpreted as indicative of structural differences across groups rather than absolute comparisons, and findings pertaining to constructs with partial invariance should be interpreted with appropriate caution. For gender, most paths were not significantly different. Only the PBC-GPI relationship was stronger among female students, while the GSI x PBC interaction showed a marginal difference. Across academic years, more heterogeneity was observed, mainly in EK-, PGPV-, PBC-, and SN-related paths, indicating that academic progression may be associated with differences in how students form GPI. Income-based differences were relatively limited and mainly appeared in selected EK-, PGPV-, and PBC-related paths. No significant group differences were found for SM-related moderation paths. Overall, academic year appears to be the most notable source of heterogeneity in the model. Detailed results are reported in [Supplementary Table S10](#).

6. Discussion

This study contributes to the understanding of GPI among Vietnamese university students by testing an extended TPB framework that integrates value-based, knowledge-related, social, digital, and identity-related factors. The model accounts for 84.2% of the variance in GPI, which supports the usefulness of the TPB while suggesting that its explanatory capacity may be enhanced by context-relevant extensions. In Vietnam's emerging green market, where consumers often face uncertainty regarding product credibility, GPI appears to be associated not only with AT and PBC but also with PGPV, EK, SN, and digital and identity-related moderating mechanisms. Beyond its marketing relevance, the present findings can be read through a broader social science lens. Green purchasing among young Vietnamese consumers is embedded in an ongoing sustainability transition, in which individual environmental dispositions interact with the maturity of markets, the credibility of institutions, and the social settings in which young people form their identities (Geels, 2011; Markard et al., 2012; Nguyen & Dekhili, 2024). Interpreting the results in this way helps clarify why feasibility- and trust-related factors, rather than environmental attitudes alone, appear central to GPI in this context.

The strong role of PGPV suggests that Vietnamese university students evaluate green products through a practical value perspective. In this context, GPI appears to be associated not only with environmental appeal but also with whether green products are perceived as credible, useful, fairly priced, and capable of delivering tangible benefits. This interpretation is consistent with the TCV, which emphasizes the multidimensional nature of consumer value (Sheth et al., 1991), and with prior green consumption research highlighting the role of perceived green value in relation to GPI (Biswas & Roy, 2015; Chen & Chang, 2012).

Beyond value perceptions, EK may function as a cognitive resource for evaluating green claims and reducing uncertainty in green purchasing. In an emerging market where greenwashing and information asymmetry remain concerns, students with stronger EK may be more confident in distinguishing credible green products from symbolic or misleading claims. This interpretation is consistent with prior research linking EK to environmental attitudes and pro-environmental behavior (Fryxell & Lo, 2003; Zsóka et al., 2013), as well as extended TPB studies emphasizing the role of knowledge-related factors in GPI (Yadav & Pathak, 2017). From a social science perspective, this points to the role of social and institutional trust in green markets. Where eco-labels and corporate environmental claims are inconsistently verified, consumers face a trust deficit, and greenwashing operates as a form of information manipulation that erodes confidence in the market as a whole (Delmas & Burbano, 2011), a dynamic recently observed among young Vietnamese consumers, for whom greenwash perceptions are associated with green purchase decisions (Do et al., 2025). Environmental knowledge can thus be understood not merely as a cognitive input but as a resource that young consumers mobilize to navigate low-trust market environments, partially substituting for the institutional trust that more mature green markets provide.

In addition to value- and knowledge-based factors, SN are significantly related to GPI, both directly and indirectly through AT and PBC. This is consistent with the TPB assumption that SN are relevant to intention formation (Ajzen, 1991) and is consistent with studies on normative influence in environmentally responsible behavior (Cialdini et al., 1991; Goldstein et al., 2008). However, the relatively small direct

association of SN suggests that social influence may operate more through cognitive internalization than direct normative pressure, in which approval from friends, classmates, family, or online communities is associated with more favorable attitudes and stronger perceived feasibility. This pattern is also meaningful in the Vietnamese sociocultural context, where collectivist and Confucian-influenced norms make family and peer expectations important, while rapid socioeconomic transition is reshaping consumption values among young people (Nguyen & Dekhili, 2024). The finding that subjective norms relate to GPI more through internalized attitudes and perceived control than through direct normative pressure may reflect a gradual shift among young, digitally connected Vietnamese consumers from externally imposed expectations toward more internalized, self-referential bases for environmental decisions. This weak direct role of subjective norms can be interpreted in relation to evidence from other Southeast Asian and broader Asian contexts. In a TPB-based study of green skincare purchase intention, Hsu et al. (2017) found that attitude, subjective norms, and perceived behavioral control were significantly associated with purchase intention, while price sensitivity and country of origin further conditioned these relationships. In an extended TPB study including Thai consumers, Kamalanon et al. (2022) similarly reported that subjective norms did not exert a significant direct effect on green purchase intention, whereas attitudes and perceived consumer effectiveness were more salient. Taken together, these findings suggest that the role of subjective norms in Asian green consumption contexts may be contingent rather than uniform. Social expectations may matter, but their direct relevance appears to depend on product category, perceived effectiveness, price sensitivity, and market conditions. In the Vietnamese university student context, this helps explain why subjective norms are more strongly associated with GPI through internalized attitudes and perceived control than through direct normative pressure alone.

Consistent with the TPB, both AT and PBC are significantly associated with GPI, with PBC showing the stronger relationship. This suggests that, among university students, favorable attitudes may not be sufficient unless green purchasing is also perceived as affordable, accessible, and within their control. In an emerging economy context, where green products may involve higher prices, limited availability, and information asymmetry, PBC appears to be a particularly salient correlate of GPI.

The mediation results further clarify the statistical pathways through which PGPV, SN, and EK are related to GPI. Both AT and PBC show significant indirect associations linking these antecedents to GPI. Given the cross-sectional nature of the data, these mediation findings should be interpreted as evidence of statistically supported indirect associations rather than definitive causal mechanisms. The results suggest that value, knowledge, and social factors are linked to GPI partly through favorable evaluations and perceived ability to engage in green purchasing. Among the indirect associations, the pathways through PBC are particularly notable, especially for PGPV and SN. This reinforces the argument that students' GPI is closely associated with whether they perceive such behavior as practical and achievable.

The moderation findings provide additional insight into the conditional nature of GPI. SM is associated with stronger AT-GPI and PBC-GPI relationships. This suggests that higher SM is associated with stronger links between favorable AT, PBC, and GPI. Rather than being conceptualized as a direct antecedent of GPI, SM appears to function as a contextual condition under which AT and PBC are more strongly associated with GPI. Green-related social media content, peer discussions, electronic word-of-mouth, and online validation may be associated with greater visibility, credibility, and social reinforcement of green purchasing, thereby helping explain the stronger association between students' psychological readiness and intention. This finding is particularly relevant for Vietnamese university students, who are highly exposed to digital information and peer-generated content. More broadly, these results situate green consumption within a digital society in which social media platforms serve not merely as information channels but as everyday environments where young people encounter peers, compare lifestyles, and perform identity (van Dijck et al., 2018). This is especially salient in Vietnam, where young people are among the region's most intensive social media users and increasingly encounter sustainability content and social endorsement of green choices online (Ngo et al., 2024). For them, the online visibility and social approval of green consumption may be as consequential as the products' intrinsic attributes. This pattern is also consistent with evidence from other Southeast Asian contexts. For example, recent PLS-SEM findings from Indonesia show that digital-commerce platform conditions are associated with how young consumers' purchase tendencies are expressed among Generation Z (Rasyid et al., 2026). Taken together with the present findings, this regional evidence reinforces the view that, for digitally immersed youth, the online environment itself functions as

an important decision-making context in which favorable attitudes and perceived behavioral control are more strongly translated into green purchase intention.

GSI plays a selective moderating role, being associated with a stronger AT-GPI relationship but not with a stronger PBC-GPI relationship. This suggests that identity-based motivation is more strongly associated with value-consistent evaluations than with feasibility-based judgments. Even students with strong GSI may still require favorable external conditions, such as affordability, availability, and product credibility, before perceived control is associated with stronger purchase intention. The asymmetry is also consistent with a youth identity-formation perspective. As emerging adults, university students are still exploring and consolidating their values and identities (Arnett, 2000), so a still-forming green self-identity may be associated with the expression of favorable attitudes in intention without being robust enough to override the material constraints captured by PBC. This interpretation is plausible for young Vietnamese consumers, for whom green choices increasingly serve as a form of self-image expression even as affordability and product availability remain binding (Do et al., 2025). Green identity at this stage thus appears more aspirational and expressive than fully enacted, conditioning the evaluative but not the feasibility-based route to intention.

The IPMA results suggest that the most practical priority areas are perceived value, EK, and PBC. Although favorable AT are important, improving students' perceptions of product value, environmental knowledge, and purchasing feasibility may be associated with more meaningful gains in GPI.

The MGA results indicate that the proposed model is largely stable across demographic groups, although some differences emerge by gender, academic year, and income. These findings suggest that the associations underlying GPI are generally robust within the university student sample, but not entirely homogeneous. Differences across academic years are particularly meaningful, implying that academic progression may be associated with differences in how students process green product information and form purchase intentions. Gender and income differences also suggest that identity-related and feasibility-related factors may vary across student segments. These results highlight the importance of considering demographic differences when interpreting GPI among university students.

Taken together, GPI among Vietnamese university students emerges as a value- and feasibility-oriented process: while attitudes remain relevant, PGPV, EK, and PBC offer more actionable explanations in an emerging green market. Read through a social science lens, green consumption here is a socially and structurally conditioned practice rather than a purely individual attitudinal choice – one in which pro-environmental dispositions are associated with intention only in the presence of perceived feasibility, the trustworthiness of green claims, and the digital and identity-related settings in which young consumers act. This reframes the attitude-behavior gap not as an individual shortcoming but as a structurally and culturally situated phenomenon, contributing to debates on how environmental agency is enabled or constrained during market transitions in emerging economies.

7. Implications

7.1. Theoretical implications

This study offers four theoretical implications for green consumption research. First, it supports the TPB as a useful framework for examining GPI among Vietnamese university students. By integrating PGPV, EK, SM, and GSI, the study suggests that the explanatory capacity of the TPB may be strengthened through context-relevant extensions. PGPV and EK are associated with GPI both directly and indirectly through AT and PBC, suggesting their role as key antecedent factors. Second, the findings point to the central role of PBC. Its stronger association with GPI, relative to attitudes, recalibrates the attitude-primacy assumption embedded in much TPB-based green research conducted in mature markets, suggesting that the relative ordering of TPB mechanisms is itself context-contingent in emerging green markets. Third, the study refines the role of SN. SN are related to GPI both directly and indirectly through AT and PBC, but their small direct association suggests that social influence may operate more through cognitive internalization than direct normative pressure. Fourth, the findings clarify the moderating roles of SM and GSI. The AT-GPI and PBC-GPI relationships are stronger at higher levels of SM, whereas only the AT-GPI relationship is stronger at higher levels of GSI. Thus, digital and identity-related factors appear to condition,

rather than universally explain, how AT and PBC are linked to GPI. This differential moderation pattern offers a conceptual refinement rather than a confirmatory replication. Specifically, GSI is associated with a stronger AT-GPI relationship but not with a stronger PBC-GPI relationship, whereas SM is associated with stronger relationships on both paths. This suggests that identity-based motivation is associated with stronger value-consistent evaluation but not with externally constrained feasibility, such as price, availability, and access. This boundary condition is undetectable in studies that model GSI as a uniform direct driver, and it qualifies identity theory by specifying that self-identity conditions evaluative, but not resource-dependent, routes to intention.

7.2. *Implications for practice and policy*

The findings suggest that, in Vietnam's emerging green market, GPI among university students is associated less with symbolic environmental appeal alone and more with perceived value, credibility, affordability, and feasibility. Drawing on the importance-performance map analysis, the findings point to a clear order of priority for intervention. Perceived behavioral control should be addressed first, because it combines high importance with the lowest performance score and therefore offers the greatest room for improvement; firms and policymakers can strengthen it by improving affordability, expanding availability, and providing student-oriented access. Perceived green product value warrants the next priority, because it carries the greatest importance while already performing well, so the goal is to sustain and credibly communicate this value through transparent claims and trusted certification. Environmental knowledge follows as a third priority, supported through green literacy and clearer eco-labeling. For firms, this means that green marketing strategies should move beyond general environmental claims and focus on tangible product value. Green products should be positioned not only as environmentally responsible choices but also as credible, useful, fairly priced, and practically accessible alternatives. Firms should therefore emphasize reliable product performance, transparent information, credible certifications, and clear evidence of environmental benefits.

Because PBC shows a particularly strong association with GPI, firms should also reduce practical barriers that may prevent students from considering green products. Improving price accessibility, expanding distribution coverage, offering student-oriented promotions, and making green products easier to find in both online and offline channels may strengthen students' perceived ability to engage in green purchasing. In this context, affordability and availability are not merely operational issues but important conditions associated with the formation of green purchase intention.

The moderating role of social media further suggests that digital platforms should be used as credibility-building and feasibility-enhancing channels rather than only promotional tools. Firms can use social media to share verifiable green claims, third-party certifications, user experiences, product comparisons, and practical guidance on how to identify credible green products. Peer-generated content, reviews, and transparent communication may also help reduce uncertainty and strengthen the links between students' favorable attitudes, perceived control, and GPI.

For policymakers and educational institutions, the findings highlight the need to strengthen green literacy and improve the institutional credibility of green markets. Clearer eco-labeling standards, stronger monitoring of misleading green claims, and greater oversight of greenwashing practices, especially on digital platforms, may help reduce information asymmetry and build consumer trust. Universities can also support sustainable consumption by integrating green literacy into educational activities, campus campaigns, and student engagement programs. Such efforts may help students translate environmental concern into more informed, feasible, and credible green purchase intentions.

8. **Limitations**

This research is subject to several limitations that also point to directions for future inquiry. First, the cross-sectional design limits strong causal conclusions. Since the data were collected at one point in time, the study cannot verify the temporal order among variables. Therefore, the direct, indirect, and moderating relationships should be interpreted as statistical associations, not causal effects. Future studies should use longitudinal, time-lagged, or experimental designs for stronger causal evidence. Second, the use of self-reported, single-survey measures may introduce social desirability and common method bias, despite

procedural remedies and collinearity-based checks. Future work may use multisource or time-lagged designs and incorporate behavioral traces. Third, some construct correlations and HTMT values were close to the recommended threshold, suggesting potential conceptual overlap among PGPV, SN, PBC, and GPI. Future studies should examine alternative measurement specifications, including higher-order modeling of PGPV and more fine-grained operationalization of value, feasibility, and intention constructs. Fourth, although GPI is a theoretically meaningful outcome in the TPB, it does not necessarily translate into actual purchasing behavior. Therefore, the findings should be interpreted as explaining intention formation rather than confirmed green purchasing behavior. Future studies should link intention to behavioral outcomes, such as actual purchase records, choice experiments, willingness-to-pay tasks, or follow-up measures. Finally, the sample is restricted to university students in one city, Da Nang. Because university students tend to have higher education, greater digital access, and stronger environmental awareness than the general population, the findings should be generalized analytically to comparable young, educated, and digitally connected segments rather than to all young Vietnamese consumers. Future studies should therefore replicate the model using probability-based or stratified samples across multiple Vietnamese regions including non-student consumers, working adults, and consumers with different levels of purchasing power and should also pursue cross-cultural and cross-national validation to test the generalizability of the proposed framework beyond the Vietnamese setting.

9. Conclusions

This study advances understanding of GPI among Vietnamese university students by showing that intention formation is statistically associated not only with favorable AT but also with perceived value, EK, and perceived purchasing feasibility. The findings suggest that GPI in this sample is a pragmatic and context-dependent decision process, in which consumers need to perceive green products as valuable, credible, accessible, and feasible. SM and GSI are associated with stronger selected psychological pathways, indicating that digital and identity-related factors operate as moderating conditions rather than universal drivers. Overall, the importance-performance analysis indicates that interventions should be prioritized in the order of perceived behavioral control, which combines high importance with the lowest performance and thus the greatest room for improvement, followed by perceived green product value as the most influential lever to sustain, and environmental knowledge as a supporting cognitive resource.

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Ethics approval and consent to participate

This study was reviewed and approved by the Institutional Review Board of Duy Tan University (No. DTU/REC2025/NHH05). Written informed consent was obtained from all participants before data collection. Participation was voluntary, anonymous, and restricted to research purposes.

Author contribution

CRedit: **Dang Thien Tam**: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft; **Bui Vu Gia Han**: Data curation, Investigation, Writing – original draft, Writing – review & editing; **Le Tan Anh Huy**: Data curation, Investigation, Writing – original draft, Writing – review & editing; **Dang Thanh Dung**: Data curation, Investigation, Writing – original draft, Writing – review & editing; **To Thi Bao Thoa**: Data curation, Investigation, Writing – original draft, Writing – review & editing; **Hai Nguyen Ngoc Dang**: Conceptualization, Formal analysis, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Declaration of generative AI use

During the preparation of this manuscript, the authors used AI tools only to check spelling and grammar. All AI-assisted spelling and grammar suggestions were reviewed and accepted only after human verification. The authors take full responsibility for the content of the manuscript.

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Data availability statement

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

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