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Green Consumption Awareness and Repurchase Intention on E-Commerce Platforms: The Mediating Role of Green Shipping Packaging

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ABSTRACT

Purpose. This study examines how *Green Consumption Awareness* influences *Repurchase Intention* on e-commerce platforms in Vietnam, focusing on the mediating role of *Green Shipping Packaging*. It aims to identify the behavioral mechanism through which consumers' environmental awareness is converted into platform loyalty. Designs. A cross-sectional survey was administered to Vietnamese online shoppers; after data cleaning, 282 usable responses were analyzed. The study used exploratory factor analysis and confirmatory assessment, then applied partial least squares structural equation modeling (PLS-SEM) with bootstrapping (5,000 resamples) to test direct and indirect effects. Findings. Results show that Green Consumption Awareness is positively associated with Repurchase Intention, and Green Shipping Packaging partially mediates this relationship. Structural results further indicate that Subjective Norm strongly predicts demand for green packaging (β = .653, t = 11.34), while Perception shows a small negative effect on packaging demand (β = −.155, t = −3.12); Attitude was not significant. Demand for green packaging strongly predicts Repurchase Intention (β = .758, t = 32.75). Practical implications. E-commerce platforms and 3PLs should prioritize visible, credible green shipping solutions (e.g., recyclable/reusable parcel systems, transparent labeling) to convert consumer awareness into repeat purchases and support national Net Zero goals. Originality/value. This research isolates *shipping packaging* as a tangible mediating mechanism between environmental awareness and repurchase behavior in e-commerce—an underexplored nexus—providing actionable insights for firms and policy makers in emerging market

***Keywords**:* E-commerce, Green Consumption Awareness, Green Shipping Packaging, Repurchase Intention.

INTRODUCTION

The global economy is experiencing a profound digital transformation that is reshaping consumer behavior and commercial structures. At the forefront of this transformation is electronic commerce (e-commerce), which has evolved from a peripheral channel to a primary driver of global retail growth. This trend is particularly visible in Southeast Asia, where rapid technological adoption and a

growing middle class are fueling strong market expansion. Vietnam is a notable case, where the government has made digital transformation a national priority for modernization and sustainable development, enabling the rise of a vibrant e-commerce ecosystem with platforms such as Shopee, TikTok Shop, Lazada, Tiki, and Sendo.

In 2024, Vietnamese consumers spent an estimated US $16 billion online, placing the country among the leading e-commerce markets in the region (VietnamPlus, 2025). The top five platforms collectively recorded a gross merchandise value of VND 318.9 trillion (≈ US $12.6 billion), marking a 37.4% increase from 2023 (Vietnam Chamber of Commerce and Industry, 2025). Other reports indicated that Vietnamese shoppers spent about US $35 million daily on online platforms during 2024 (VnExpress International, 2024).

While this growth generates economic benefits and convenience, it also poses environmental challenges. Online retail inherently produces more packaging waste compared to traditional retail channels. Studies show that e-commerce generates substantially higher levels of packaging waste per dollar spent than offline shopping, namely, one Korean study has found that online purchases produced 4.8 times more packaging waste than offline ones (Kim et al., 2022). A systematic review also highlighted that e-commerce packaging has become a significant sustainability concern, while effective solutions remain underexplored (Escursell et al., 2021). In Vietnam, forecasts suggest that if current practices continue, e-commerce plastic waste could reach 800,000 tons annually by 2030 (VietnamPlus, 2025b). Public perception also reflects this reality, where surveys indicated that nearly 80% of Vietnamese online shoppers consider e-commerce harmful to the environment (Vietnam News Agency, 2025).

The Vietnamese government has made sustainability a central requirement of e-commerce growth. In line with the national target of achieving Net Zero carbon emissions by 2050, the Ministry of Industry and Trade has emphasized that consumer behavior - such as choosing recycled or minimal packaging-plays a decisive role in achieving environmental objectives (Mulia et al., 2019). A majority of consumers (79%) support regulatory measures on green packaging (Vietnam News Agency, 2025). International studies confirm that adopting greener logistics practices, including optimized delivery routes and recyclable packaging, can reduce emissions by 30 to 40% (Butt et al., 2024).

From a scholarly perspective, extensive literature has examined the link between Green Consumption Awareness and Repurchase Intention. Psychological constructs such as environmental attitudes, subjective norms, perceived behavioral control, and consumer knowledge are widely recognized as determinants of pro-environmental behavior (Ajzen, 1991). A meta-analysis of 54 studies found that factors including green trust, attitude, and perceived consumer effectiveness strongly influence green purchase intention (Cheung & To, 2019). However, consistent evidence also showed a gap between intention and actual behavior, particularly in online contexts (White et al., 2019).

One underexplored dimension is the role of shipping packaging-the outer, often excessive layer used in e-commerce deliveries. While much research focuses on product packaging, shipping packaging is the most visible environmental signal that consumers receive when interacting with an e-commerce platform. Recent studies demonstrated that consumers are attentive to overpackaging and willing to support sustainable alternatives if accessible and convenient (Xie et al., 2021). Reusable packaging models in e-commerce also showed promise in reducing carbon footprints under certain conditions (Romero et al., 2024).

Therefore, this study investigates how Green Consumption Awareness influences Repurchase Intention on e-commerce platforms in Vietnam, with a particular focus on the mediating role of Green Shipping Packaging. By clarifying how sustainable packaging practices shape consumer loyalty, the research aims to generate insights that support both corporate strategies and public policy. Ultimately, the findings are expected to contribute to Vietnam's broader agenda of fostering a circular economy and achieving its Net Zero 2050 commitment.

LITERATURE REVIEW

E-Commerce and the Sustainability Challenge

E-commerce has expanded rapidly, reshaping consumer behavior and supply chains while intensifying concerns over packaging waste, emissions, and energy use (Gong et al., 2024); (Prasertwit et al., 2024). Scholars emphasize the tension between fast, convenient deliveries and sustainability imperatives, with consumer expectations and regulatory contexts playing key roles (Arora et al., 2023); (Kitukutha, Nicodemus & Oláh, 2023).

Packaging innovation is often viewed as critical. AI-driven optimization, bio-based polymers, and reusable logistics systems are proposed solutions, yet lifecycle studies highlight trade-offs: plastics emit more during production, while paper creates heavier disposal burdens (Guo et al., 2025); (Luo, Zi-Han & Zhu, Chang-Zheng, 2025); (Zghair, Hayder & Konathala, Rushi Ganesh, 2025). Logistics research shows similar tensions. Electrified fleets and decentralized networks offer emission reductions, but high return rates-particularly in fashion-keep reverse logistics costly, demanding predictive analytics and stronger infrastructure (Long & Liu, 2025); (Rafael et al., 2023).

Sustainability challenges extend to social and economic dimensions. Informal last-mile delivery raises fairness and labor protection concerns (Okeke, Francis O et al., 2023); (Siragusa et al., 2021). While consumers' willingness to pay for greener delivery remains limited, shaped by demographics such as gender and education (Tim Gruchmann et al., 2025). Technology and policy appear as dual levers: AI, blockchain, and IoT enhance transparency and efficiency (Bansal et al., 2025); (Kolomiyets et al., 2024), while EU and Chinese frameworks illustrate regulatory drivers of green logistics adoption (Wang et al., 2023). Still, costs, interoperability, and workforce readiness remain obstacles.

Important gaps persist. Integrated IT frameworks balancing sustainability, cybersecurity, and equity are underdeveloped (Mabangue & Fatahi Valilai, 2025; Rabbi et al., 2025). Circular economy models remain more conceptual than practical, and innovations such as drones and AI-based routing require more empirical testing and regulatory support (Tengkuo Zhu et al., 2025); (Ferreira & Esperança, 2025).

Overall, the literature depicts e-commerce sustainability as a domain of unresolved tensions: technological optimism coexists with socio-environmental trade-offs. Moving forward, sustainable transformation will depend not on isolated fixes but on aligning consumer engagement, technological solutions, and policy intervention. This sets the stage for examining micro-level drivers of green consumption, particularly the roles of social influence, perception, and attitudes.

Green Consumption Drivers: Subject Norm, Perception, and Attitude

Understanding the drivers of green consumption is central to the sustainability literature. Scholars emphasize that social influence, perception, and attitudes jointly shape environmentally friendly behavior, but these factors are interdependent and embedded in cultural contexts (Kour, 2024); (Andreica Mihuț et al., 2025). Examining them together clarifies how individuals move from environmental awareness to actual purchasing decisions.

Subjective norms highlight the role of social pressure and expectations. Research shows that willingness to buy green products depends heavily on perceived expectations from peers, family, or society (Kour, 2024); (Ogiemwonyi & Jan, 2023). Among younger generations, sustainable purchasing is often tied to self-expression and group belonging (Elgammal, I et al., 2024). Social media amplifies these effects by normalizing eco-conscious lifestyles, embedding green consumption in collective identity (Sethuraman et al., 2023). Norms thus extend beyond external pressure; they form part of the consumer's self-concept, making them powerful and durable motivators.

Perception operates across awareness, control, and credibility. High environmental awareness consistently predicts conservation behavior, reinforcing both norms and attitudes (Zhou et al., 2025). Perceived behavioral control, a cornerstone of the Theory of Planned Behavior, determines whether intentions become action: individuals who feel capable and resourced are more likely to act sustainably (Bhutto et al., 2019); (Sanny et al., 2022). Yet perceptions also constrain action. Green products judged as costly or inauthentic weaken the link between concern and behavior, reflecting the influence of skepticism and affordability barriers (Aydın et al., 2024). Perception, therefore, is both an enabler and inhibitor depending on how consumers assess agency and product credibility.

Attitudes serve as direct psychological determinants. Favorable evaluations strongly predict adoption of sustainable alternatives and mediate the effect of environmental concern on purchase decisions (Biswas & Roy, 2015). Attitudes also connect ethical values with consumption choices: for example, altruistic values

often shape green apparel consumption by framing it as ethically desirable (Armutcu et al., 2025). In this sense, attitudes are more than product judgments; they reflect moral commitments linking environmental values to consumer practice.

Taken together, subjective norms, perception, and attitudes form a mutually reinforcing triad. Norms provide external and identity-based motivation, perceptions influence feasibility and authenticity, and attitudes consolidate these influences into behavioral intention. Empirical evidence suggests that norms and environmental concern are often the strongest predictors of purchase behavior, while attitudes transform them into action (Sanjay et al., 2025); (Bandojo & Etrata Jr, 2025).

This body of research indicates that interventions promoting green consumption must operate on multiple fronts: leveraging social networks to reinforce norms, reducing perceived barriers through affordability and transparency, and cultivating positive attitudes grounded in trust and ethics. Green consumption, therefore, cannot be reduced to individual choice; it is a socially embedded practice shaped by collective expectations, perceived agency, and moral evaluations. These consumer-level drivers provide the foundation for analyzing how demand for specific sustainable practices-such as green shipping packaging-emerges in e-commerce markets.

Demand for Green Shipping Packaging

The rising demand for green shipping packaging has become a focal point in debates on sustainable logistics and e-commerce. Rather than stemming from a single source, this demand reflects the interplay of environmental concerns, regulatory pressures, and consumer preferences. Collectively, these forces demonstrate how packaging has shifted from a functional necessity to a symbol of environmental and social responsibility (Ji et al., 2021).

Environmental concerns represent the earliest and most visible driver. Packaging waste is now one of the largest components of e-commerce's ecological footprint, intensifying pollution and carbon emissions as online retail expands (B. Liu, 2015); (Nath et al., 2023). Sustainable packaging is therefore assessed not only for durability but also for its ability to conserve resources and reduce landfill contributions (Pfoser et al., 2021). This evidence highlights that growing awareness-among both institutions and consumers-is indispensable for advancing eco-friendly packaging.

Regulatory frameworks further shape the trajectory of adoption. Many governments have introduced restrictions on plastics and incentives for biodegradable alternatives, pushing firms toward greener solutions (Roy, 2022). Yet outcomes vary. In China, for example, weak legislation and insufficient financial support have slowed widespread implementation, despite heightened environmental urgency (J. Liu et al., 2017). Such contrasts underscore that regulation can accelerate or impede adoption depending on enforcement and its integration with broader logistics policy.

Consumer preferences form the third critical pillar. Across markets, surveys reveal strong concern for sustainability and stated willingness to pay more for eco-friendly packaging (Wang et al., 2023); (Singh et al., 2018). Still, the attitude-behavior gap remains pronounced: expressed preferences do not always translate into purchase behavior (Hao et al., 2019). Nevertheless, evidence suggests that brand positioning and social influence can bridge this gap, as green packaging increasingly serves as a marker of corporate responsibility and competitive advantage (Afif et al., 2022).

Despite these positive signals, adoption faces persistent barriers. Higher costs of sustainable materials, redesign complexity in supply chains, and limited availability of eco-materials hinder large-scale transitions (Kudrenko & Hall, 2025); (Gaur et al., 2025). Consumer knowledge and technical expertise also remain constrained, creating additional bottlenecks (J. Liu et al., 2017). Addressing these challenges requires both innovation and systemic collaboration among stakeholders.

The literature points to strategies that blend governance, technology, and consumer engagement. Collaborative initiatives between governments, firms, and consumers can expand markets for green packaging (Ji et al., 2021); (Wang et al., 2023). Advances in biodegradable materials and reusable systems show promise for reducing waste and closing resource loops (Pfoser et al., 2021). Meanwhile, consumer education campaigns are essential to narrow the gap between pro-environmental attitudes and actual purchasing practices (Singh et al., 2018).

In sum, demand for green shipping packaging is driven by environmental awareness, regulation, and consumer preferences, yet constrained by costs, limited knowledge, and infrastructural barriers. Adoption cannot depend on any single force but instead requires coordinated policy, technological innovation, and active consumer participation(Karima Afif et al., 2021);(Gaur et al., 2025). Building on these insights, a key emerging question concerns how sustainable packaging practices not only reduce environmental burdens but also shape consumer loyalty, particularly their repurchase intentions within e-commerce.

Repurchase Intention for Goods with Green Shipping Packaging

(Wu et al., 2022, p. 202)Repurchase intention has become a central construct in sustainability research, reflecting not only consumer satisfaction but also the depth of trust and loyalty cultivated through environmentally responsible practices. Within e-commerce, shipping packaging now functions as both a logistical tool and a visible indicator of corporate sustainability. The environmental burden of conventional packaging, particularly plastics, has heightened consumer awareness and expectations for greener alternatives (Caner et al., 2025); (Herbes et al., 2018). In this sense, green shipping packaging operates simultaneously as a functional response to environmental concerns and a symbolic cue influencing brand evaluation and repeat purchases (Kaur & Siddhey, 2024); (Jayanti et al., 2022).

Consumer perceptions and attitudes represent the first layer of influence. Preferences for eco-friendly packaging vary across cultural contexts: Western consumers emphasize recyclability and biodegradability, while Eastern consumers focus on conformity with social expectations (Bravo & Vieira, 2024). Yet skepticism remains a barrier. When green claims are vague or exaggerated, perceived credibility declines, reducing the likelihood of repeat purchases (Ahmed et al., 2022). Attitudes toward sustainable packaging are therefore shaped less by abstract environmental concern and more by transparent, trustworthy communication that resonates with cultural values.

Perceived value is the second mechanism linking awareness to behavior. Consumers repurchase when packaging delivers both functional benefits, such as durability and waste reduction and psychological rewards, such as ethical satisfaction (Abubakari et al., 2025). However, perceived expensiveness can diminish this effect, discouraging repeat purchasing even when attitudes are favorable (Duarte et al., 2024). Balancing ecological performance with affordability is thus key to sustaining repurchase.

Trust, particularly green trust, plays a decisive role. Authentic CSR initiatives embedded in packaging strategies strengthen consumer confidence and encourage loyalty (Wu et al., 2022, p. 202), (Duong, 2024). By contrast, greenwashing erodes trust, making it one of the strongest inhibitors of repurchase intention (Hassan et al., 2023). Younger, educated consumers often the most environmentally aware are also the most skeptical, highlighting the importance of credibility (Perinparajah et al., 2020); (Kesgin et al., 2025). Emerging technologies such as blockchain and AI offer solutions by improving transparency and reducing the risk of deceptive claims (H. Liu et al., 2025); (Byeon et al., 2025).

In conclusion, repurchase intention for goods with green shipping packaging arises from the interplay of perception, perceived value, and trust, all of which are conditioned by cultural and contextual factors. Attitudes and awareness may provide the foundation, but credible CSR and technological transparency are essential to sustain loyalty.

Despite advances, important gaps remain. Much of the literature continues to emphasize environmental and operational aspects, such as waste or emissions while paying less attention to behavioral mechanisms linking awareness to loyalty (Gong et al., 2024); (Prasertwit et al., 2024). Constructs like subjective norms, perception, and attitude are often examined separately, leaving unclear how they interact in packaging-specific contexts (Hao et al., 2019). The mediating role of green shipping packaging itself is underexplored, despite its dual function as both necessity and symbolic signal (Abubakari et al., 2025). Furthermore, the moderating influence of culture, demographics, and technology remains insufficiently addressed, though evidence suggests these factors critically shape trust and repurchase (Byeon et al., 2025).

Taken together, these gaps underscore the need for an integrated framework positioning green shipping packaging as the bridge between awareness and loyalty, mediated by value and trust, and moderated by cultural and technological factors. This rationale grounds the present study, which empirically tests these dynamics in Vietnam's e-commerce market.

Hypotheses Development and Research Model

Green consumption in e-commerce is shaped by a combination of social norms, individual perceptions, and personal attitudes that guide sustainable decision-making (Kour, 2024); (Andreica Mihuț et al., 2025). Packaging has become a salient symbol of sustainability, making consumers' demand for green shipping solutions a key mechanism that translates predispositions into concrete purchasing behavior (Ji et al., 2021).

Subjective norms capture perceived social pressure and peer expectations. In digital marketplaces, social identity cues and the visibility of eco-conscious choices strengthen these influences, suggesting that subjective norms will increase demand for green shipping packaging (Elgammal, I et al., 2024)

H1a. Subjective norm positively influences demand for green shipping packaging.

Perceptions of environmental issues and behavioral control influence consumers' willingness to act sustainably. Stronger ecological perceptions are expected to raise demand for eco-friendly packaging, though concerns about cost may weaken this link (Bhutto et al., 2019); (Aydın et al., 2024).

H1b. Perception positively influences demand for green shipping packaging.

Attitudes toward sustainability represent evaluative judgments and moral orientations. Favorable attitudes are consistently linked to the adoption of green practices, including packaging (Biswas & Roy, 2015).

H1c. Attitude positively influences demand for green shipping packaging.

Demand for green shipping packaging, once established, operates as a mediator that channels these dispositions into consumer loyalty. By signaling ecological responsibility, green packaging fosters trust and satisfaction, thereby strengthening repurchase intention (Duarte et al., 2024).

H2. Demand for green shipping packaging positively influences repurchase intention.

Demographic variables such as age and gender are included as control variables, since prior studies suggest they can influence sustainable consumption (D. Ofori et al., 2025), though without advancing formal hypotheses.

Finally, demographic variables such as age and gender are incorporated as control variables. Prior empirical research indicates that younger consumers often display stronger environmental awareness and are more willing to adopt green products, while gender differences can also shape pro-environmental attitudes and

purchasing patterns (Moser, 2016); (Yadav & Pathak, 2017); (D. Ofori et al., 2025). Including these controls helps isolate the effects of social norms, perceptions, and attitudes on green packaging demand and repurchase intention, ensuring that observed relationships are not confounded by demographic influences.

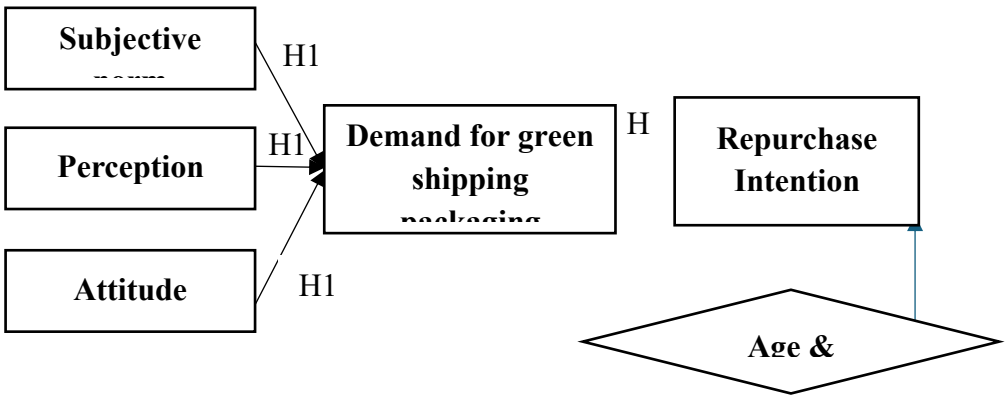

Figure 1. Proposed Research Model

METHODOLOGY AND RESULTS

This study adopted a quantitative, cross-sectional survey to examine how green consumption drivers influence demand for green shipping packaging and subsequent repurchase intention on e-commerce platforms. Eligible respondents had purchased a physical product with home delivery within the preceding three months. A total of 293 questionnaires were collected, of which 282 valid cases remained after data cleaning. This sample size was considered sufficient for exploration factor analysis (EFA) and partial least squares structural equation modeling (PLS-SEM), both appropriate for complex models with modest samples and non-normal distributions (Sarstedt & Cheah, 2019); (Sarstedt et al., 2022). All participants provided informed consent prior to participation. The study ensured anonymity and confidentiality of responses, in line with institutional ethical standards.

Most respondents were female, aligning with evidence that women often show stronger pro-environmental attitudes and greater sustainable consumption than men (Moser, 2016; Yadav & Pathak, 2017). Age distribution was skewed toward younger cohorts (20-29), typical of e-commerce shoppers who are more digitally active and environmentally aware (Joshi & Rahman, 2019). Younger consumers also tend to adopt eco-friendly options more readily (S. A. Ofori et al., 2025). Including these controls ensures that the effects of subjective norm, perception, and attitude on demand for green packaging and repurchase intention are not confounded by demographic variation.

Constructs were measured with multi-item, five-point Likert scales adapted from validated instruments, refined through expert consultation and pilot testing (Mansour et al., 2024); (Ayoun & Schmitz, 2024). The latent variables included subjective norm, perception, and attitude toward green consumption; demand for

green shipping packaging (mediator); and repurchase intention (dependent variable).

Descriptive statistics were then computed for survey items. Item-level means, standard deviations, skewness, and kurtosis were inspected to verify approximate normality. Internal consistency was evaluated with Cronbach's alpha, and all constructs exceeded the 0.70 threshold, demonstrating satisfactory reliability (Hair et al., 2019; Mansour et al., 2024).

An EFA was subsequently conducted to examine dimensionality. Maximum-likelihood extraction with oblique rotation was applied, retaining items with loadings ≥ 0.50 on their intended construct and < 0.30 on cross-loadings. Sampling adequacy was confirmed with the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity. Subsequently, a confirmatory factor analysis (CFA) was conducted to validate the measurement model. This step is essential to establish convergent and discriminant validity before proceeding to the structural model (Hair et al., 2019; Brown, 2015).

PLS-SEM was then employed to test the hypothesized relationships. Construct validity was assessed using composite reliability, average variance extracted, heterotrait-monotrait ratios, and the Fornell-Larcker criterion. Model evaluation included path coefficients, R^2, and predictive relevance (Q^2). Mediation was tested through bootstrapping with 5,000 resamples, generating bias-corrected confidence intervals.

To reduce potential bias, anonymity and counter-balanced blocks were applied during data collection, while ex-post checks included Harman's single-factor and latent factor tests (Zhang, H. et al., 2022); (Andika et al., 2023). Multigroup robustness tests were also conducted across age and gender to assess the stability of the results.

Reliability analysis (Cronbach's alpha)

Table 1. Reliability Analysis of Measurement Scales

Construct	Items	Cronbach's Alpha	95% CI	Mean	SD	Corrected Item-Total Correlation	α if Item Deleted
Subjective Norm (SN)	sn1-sn3	0.87	0.84-0.90	4.3-4.4	0.71-0.75	0.69-0.80	0.77-0.88
Attitude (ATT)	a1-a3	0.93	0.92-0.95	4.4-4.5	0.54-0.67	0.86-0.88	0.89-0.92
Perception (PER)	p1-p3	0.71	0.64-0.76	4.4-4.5	0.54-0.68	0.34-0.68	0.39-0.81
Demand for Green Shipping Packaging (DGP)	d1-d3	0.86	0.83-0.89	3.9-4.0	0.80-0.86	0.69-0.78	0.76-0.84

Repurchase Intention (RI)	ri1-ri3	0.7	0.63-0.76	3.4-4.0	0.94-1.26	0.47-0.58	0.54-0.70

The internal consistency of all measurement scales was evaluated using Cronbach's alpha. Results in Table 1 show that Subjective Norm (α = 0.87, 95% CI = 0.84-0.90) and Attitude (α = 0.93, 95% CI = 0.92-0.95) demonstrated excellent reliability, well above the recommended 0.70 threshold (Nunnally, 1994). Demand for Green Shipping Packaging also exhibited strong internal consistency (α = 0.86), with corrected item-total correlations ranging from 0.69 to 0.78. Perception (α = 0.71) and Repurchase Intention (α = 0.70) were at the minimum acceptable level, consistent with exploratory research standards (Hair, 2009), suggesting that while the constructs are reliable, future refinement of these scales may further improve measurement quality. Overall, the findings support the internal consistency and unidimensionality of the measurement model.

Exploratory Factor Analysis (EFA)

Figure 1 presents the results of the Parallel Analysis Scree Plot. Parallel analysis indicated that only the first three factors had eigenvalues exceeding those generated from random data, suggesting that a three-factor solution is appropriate and should be retained for subsequent exploratory factor analysis.

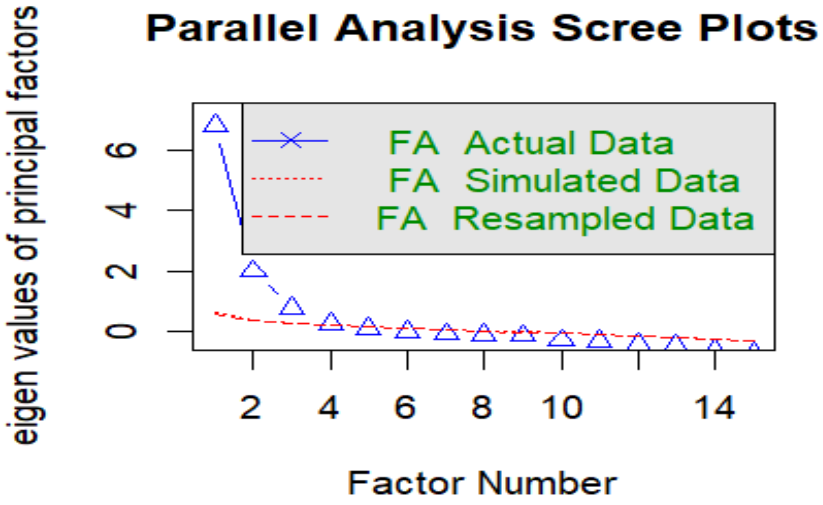

Figure 2. Parallel Analysis Scree Plot

Table 2 presents the rotated factor loadings from the exploratory factor analysis. Several items displayed strong primary loadings, yet issues of cross-loading and communality emerged. For instance, sn1, sn3, and ri2 loaded on multiple factors, indicating content overlap and potential method effects. Item a1 showed an unusually high communality, suggesting the possibility of a Heywood case, while ri3 loaded solely on a single factor, raising concerns about reliability. Moreover, the mixing of Demand (d1-d3) with Repurchase Intention (ri1-ri2) and the overlap between Perception (p1-p2) and Subjective Norms (sn items) highlight structural

instability. These results suggest that item refinement and scale purification are required prior to confirmatory analysis.

Table 2. Rotated Factor Loadings (ML; varimax, ML extraction)

(Only loadings ≥ .40 shown; primary loading in bold; h² = communality)

Item	ML1	ML4	ML5	ML2	ML3	h²	Notes
sn1	0.53		0.58			0.78	Cross-loading (Δ=0.05) between ML1 & ML5
sn2	0.43				0.41	0.54	Weak/borderline loadings on ML1 & ML3
sn3	0.55		0.64		0.46	0.94	Cross-loading (dominant on ML5)
a1	**0.92**					1	Very high communality (watch for Heywood)
a2	**0.82**					0.87	
a3	**0.8**					0.81	
p1			**0.87**			0.86	
p2			**0.7**			0.57	
p3	**0.79**					0.68	Loads with Attitude, not PER (content overlap)
d1		**0.7**				0.58	
d2		**0.82**				0.83	
d3		**0.88**				0.8	
ri1		**0.78**				0.79	
ri2	0.4	**0.55**				0.64	Cross-loading ML1 vs ML4 (Δ=0.15)
ri3				**0.86**		1	Single-item factor; Heywood risk

Interpretive mapping (provisional):

ML1 ≈ Attitude (a1-a3) but also pulls p3 and parts of SN → content overlap/method effects.

ML4 ≈ Demand (d1-d3), but also absorbs RI1-RI2 → Demand/Intention mixing.

ML5 ≈ Perception (p1-p2) and SN (sn1, sn3) → overlap PER/SN.

ML2 ≈ RI3 only → single-indicator factor (problematic).

ML3 carries a weak share of sn2 (0.41).

Table 3. Factor Contributions & Global Fit

Metric	ML1	ML4	ML5	ML2	ML3	Overall
SS loadings	4.15	3.3	2.52	0.98	0.74	-
Proportion variance	0.28	0.22	0.17	0.07	0.05	0.78 (cumulative)
RMSR						**0.03**
TLI						**0.729**

RMSEA [90% CI]						**0.19** [0.174, 0.206]
χ^2 (Likelihood), p						**445.5**, p < 6.7e-70
χ^2 (empirical), p						**59.88**, p < .022
BIC						219.82

The exploratory factor analysis presented in Table 3 accounted for 78% of the variance, but several items displayed misalignment. Item p3, originally designed to capture Perception, loaded more strongly on the Attitude factor, suggesting that its wording reflected evaluative judgments rather than perceptual assessments. Item sn2 from the Subjective Norm scale exhibited weak and borderline loadings (≈.41-.43) and was removed to improve construct validity. Repurchase Intention items also showed fragmentation, with one item diverging from the others; refinement is therefore required to ensure all indicators consistently measure the same latent construct. These adjustments enhanced the clarity and unidimensionality of the scales, providing a more reliable foundation for subsequent CFA and SEM analyses (Brown, 2015; Hair et al., 2019). Figure 2 illustrates the Parallel Analysis Scree Plot after removing sn2. The revised analysis confirmed that only the first three factors retained eigenvalues greater than simulated data, supporting a three-factor solution and clarifying the measurement structure.

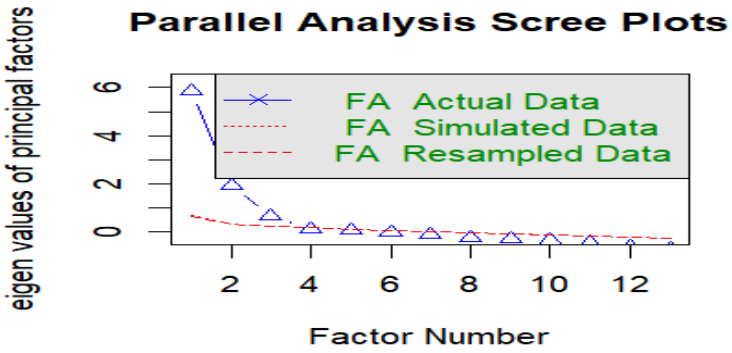

Figure 3. Parallel Analysis Scree Plot (after edit)

Table 4. Exploratory Factor Analysis Results (Refined, 4-factor oblimin solution)

Item	ML2 (Attitude)	ML3 (Demand)	ML4 (Perception / SN)	ML1 (Repurchase Intention)	h^2	u^2
sn1			0.54		0.77	0.23
sn3	0.48		0.59		0.85	0.15
a1	0.76				0.8	0.2
a2	0.84				0.91	0.09
a3	0.75				0.78	0.22
p1			0.93		0.87	0.13
p2			0.69		0.55	0.45

d1		0.6			0.55	0.45
d2		0.88			0.79	0.21
d3		0.86			0.81	0.19
ri1	-0.52	0.67			0.79	0.21
ri2		0.49			0.6	0.4
ri3				0.98	1	0.01

Factor correlations: ML2-ML3 = 0.15, ML2-ML4 = 0.44, ML2-ML1 = 0.18, ML3-ML4 = 0.28, ML3-ML1 = 0.44, ML4-ML1 = 0.35

Table 4 reports the refined four-factor oblimin solution, which explained 78% of the variance. Attitude items (a1-a3) defined ML2 with strong and consistent loadings (0.75-0.84). Demand items (d1-d3) clustered on ML3 (0.60-0.88), while Perception items (p1-p2) loaded clearly on ML4 (0.69-0.93). Repurchase Intention was represented by ML1, though dominated by ri3 (0.98), with ri1-ri2 showing weaker and partly cross-loaded contributions. Subjective Norm items (sn1, sn3) split across ML2 and ML4, reflecting their reduced coherence after the removal of sn2.

Communalities were generally acceptable, and the RMSR remained low (0.03). However, global fit indices indicated residual misfit, with RMSEA = 0.193 and TLI = 0.75, both below recommended thresholds (Fabrigar et al., 1999; Hair et al., 2019). Despite these limitations, the refined solution produced clearer construct clustering than the initial model and provides a more stable measurement foundation for subsequent CFA and PLS-SEM analyses.

CFA analysis

Table 5. CFA Results for the Measurement Model (n = 282)

Construct	Items	Std. Loadings	Reliability Notes
Subjective Norm (SN)	sn1, sn3	0.90 - 0.98	Strong loadings, high consistency
Attitude (ATT)	a1, a2, a3	0.98 - 1.01	Very strong, possible near-Heywood case on a2
Perception (PER)	p1, p2	0.87 - 1.00	Acceptable with only two indicators
Demand (DGP)	d1-d3	0.82 - 0.95	Strong and balanced
Repurchase Intention (RI)	ri1-ri3	0.62 - 0.90	Moderate for ri1, strong for ri2-ri3

Model fit indices:

χ^2 (55) = 610.97, $p < .001$

CFI = 0.977, TLI = 0.968

RMSEA = 0.190 (90% CI [.176, .203])

SRMR = 0.117

Table 5 presents the CFA results for the refined measurement model (n = 282). Most constructs exhibited strong factor loadings above 0.70, supporting convergent validity (Hair, 2009). Subjective Norm, Attitude, and Demand demonstrated excellent reliability, while Perception was adequately measured but limited to two indicators (Worthington & Whittaker, 2006). Repurchase Intention was generally consistent, although ri1 loaded moderately (λ = 0.62), suggesting potential refinement.

Model fit indices revealed mixed results. Comparative fit indices were strong (CFI = 0.977; TLI = 0.968), exceeding recommended cutoffs (Hu & Bentler, 1999). However, absolute fit indices remained unsatisfactory (RMSEA = 0.190; SRMR = 0.117), indicating residual model misfit (Brown, 2015). Overall, the CFA provided evidence of construct validity but highlighted the need for further adjustments to improve model specification and fit.

PLS-SEM analysis

Table 6. Measurement Model Results (n = 282, Bootstrapping 5000)

Construct	Indicators	Std. Loadings	Assessment
Subjective Norm (SN)	sn1 = 0.925; sn2 = 0.900	>0.70	Reliable
Attitude (ATT)	a1 = 0.935; a2 = 0.949; a3 = 0.944	>0.70	Reliable
Perception (PER)	p1 = 0.909; p2 = 0.920	>0.70	Reliable, two-item
Demand for Green Packaging (DGP)	d1 = 0.850; d2 = 0.907; d3 = 0.892	>0.70	Reliable
Repurchase Intention (RI)	ri1 = 0.788; ri2 = 0.809; ri3 = 0.791	>0.70	Reliable

Table 6 reports the measurement model results (n = 282, bootstrapping = 5,000). All standardized loadings exceeded the recommended threshold of 0.70 (Hair et al., 2019), confirming strong convergent validity. Reliability and internal consistency were established for all constructions. Discriminant validity was also supported, as HTMT ratios remained below 0.90, except for the relationship between Demand for Green Packaging (DGP) and Repurchase Intention (RI), which reached 0.95. This elevated value suggests conceptual overlap between the two constructs but remains interpretable within the theoretical framework (Henseler et al., 2015). Overall, the measurement model demonstrated adequate psychometric properties and provided a robust basis for testing the structural relationships.

Table 7. Structural Model Results (Bootstrapping 5000 resamples)

Path	Estimate	t-value	95% CI	Supported?
SN → DGP	0.653	11.34	[0.541, 0.768]	Yes
ATT → DGP	-0.063	-0.85	[-0.212, 0.081]	No

PER → DGP	-0.155	-3.12	[-0.253, -0.057]	Yes (negative)
DGP → RI	0.758	32.75	[0.713, 0.803]	Yes

Table 7 presents the structural model results. Subjective Norm exerted a strong positive influence on Demand for Green Packaging (β = 0.653, t = 11.34, CI [0.541, 0.768]), while Perception had a significant but negative effect (β = -0.155, t = -3.12, CI [-0.253, -0.057]), indicating potential consumer skepticism. Attitude showed no significant effect on Demand (β = -0.063, t = -0.85, CI [-0.212, 0.081]). Demand for Green Packaging, in turn, strongly predicted Repurchase Intention (β = 0.758, t = 32.75, CI [0.713, 0.803]).

These findings suggest that social influence is a key driver of sustainable behavior, while individual attitudes alone may not suffice to motivate action in the presence of perceptual barriers. The strong predictive power of green packaging demand underscores its central mediating role between awareness factors and repurchase behavior, consistent with prior evidence on pro-environmental consumer decision-making (Ajzen, 1991); (Joshi & Rahman, 2019).

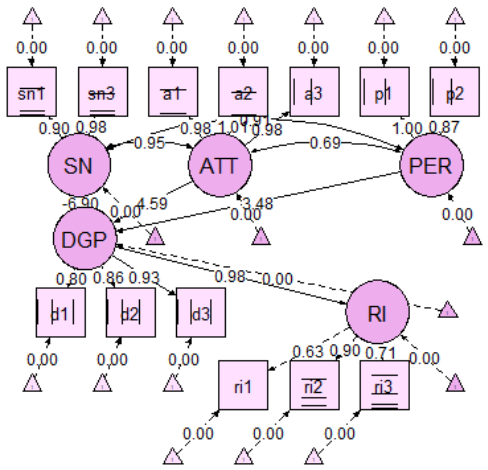

Figure 4. Path diagram of the structural equation model (SEM)

Figure 4 confirms the structural relationships reported in Table 7. The path diagram highlights the strong positive effect of Demand for Green Packaging on Repurchase Intention, while also showing the influence of Subjective Norms and the negative contribution of Perception. Together, these results reinforce the mediating role of green packaging demand in linking consumer awareness to sustainable purchasing behavior.

DISCUSSION

The findings can be interpreted within the frameworks of the Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA). In line with these models, subjective norms emerged as a strong predictor of demand for green packaging, confirming that social pressure and perceived expectations shape pro-

environmental decisions in digital commerce (Ajzen, 1991). This aligns with prior evidence emphasizing the role of normative influence in driving sustainable consumption (Joshi & Rahman, 2015).

By contrast, the non-significant effect of attitude on demand diverges from classical TPB predictions, suggesting that positive evaluations of sustainability do not necessarily translate into behavioral intentions in online shopping contexts. This outcome resonates with recent studies highlighting the attitude-behavior gap in green consumption, where favorable attitudes coexist with weak behavioral commitment due to barriers of cost, convenience, or trust (Nguyen et al., 2016); (Biswas & Roy, 2015).

Similarly, the negative influence of environmental perception on demand indicates a more complex dynamic: consumers who perceive greater ecological risks may develop skepticism toward packaging claims. This “skepticism effect” extends the literature by showing that heightened awareness can sometimes reduce, rather than enhance, pro-environmental intentions.

Beyond theoretical alignment, these results offer significant implications for emerging markets such as Vietnam and Southeast Asia, where e-commerce has grown at double-digit rates and generated billions in online sales (Tran Hung Nguyen, 2021). In such rapidly expanding digital economies, packaging decisions carry amplified significance: they influence not only sustainability outcomes but also consumer trust in online retail systems. By clarifying that demand for green packaging directly fosters repurchase intention, this study highlights a pathway for sustainable growth in regions balancing modernization with environmental responsibility.

Overall, the results advance the field by positioning green shipping packaging as a mediating mechanism that connects social and perceptual antecedents with repurchase intention. Unlike earlier studies focused on general green product attitudes or eco-labeling, this research specifies how packaging in e-commerce operates both as a functional safeguard and a symbolic signal. The strong predictive role of demand for green packaging underscores its dual importance for sustainability and customer loyalty. This study therefore contributes to the green consumption literature by demonstrating that packaging is not merely a peripheral cue but a central driver of repeat purchasing in digital platforms, with heightened relevance for emerging market contexts.

CONCLUSION

Theoretical Value. This study contributes to the green consumption literature by clarifying the mediating role of green shipping packaging in e-commerce contexts. While prior research has focused primarily on product-level eco-labeling or general environmental attitudes, our findings demonstrate that packaging operates as a salient mechanism linking social norms and perceptions to repurchase intention. The results extend the Theory of Planned Behavior (Ajzen, 1991) by showing that subjective norms exert a stronger influence than attitudes in shaping pro-environmental demand within online retail. Moreover, the identification of a skepticism effect from environmental perception adds nuance to existing models,

indicating that heightened ecological awareness may constrain, rather than amplify, sustainable behavior. These insights refine the theoretical understanding of how situational factors interact with consumer psychology in digital commerce.

Managerial Implications. The findings offer practical guidance for e-commerce platforms, logistics providers, and policymakers. First, platforms should prioritize green packaging initiatives, as consumer demand for sustainable delivery strongly predicts repurchase intention. This implies that investments in recyclable, minimal, or certified packaging can serve as both environmental and loyalty strategies. Second, firms should leverage social influence by incorporating sustainability messages into marketing campaigns and encouraging peer-to-peer advocacy, given the strong role of subjective norms. Third, addressing consumer skepticism is crucial: transparent communication, third-party certifications, and clear labeling of packaging materials can mitigate doubts about ecological claims. Collectively, these actions not only enhance consumer trust but also align corporate practices with Vietnam's Net Zero 2050 commitments.

Limitations and Future Research. This study has several limitations that open pathways for further research. The sample size (n = 282) was sufficient for SEM analysis but limits the generalizability of findings beyond the studied population. Future studies could expand to larger, more diverse samples across different regions and demographics. Second, the reliance on self-reported survey data may introduce bias, suggesting the value of complementing this design with behavioral or experimental approaches. Third, the constructs of perception and repurchase intention included relatively few indicators, which may restrict reliability; future research should refine these measures or explore multi-dimensional scales. Finally, cross-country comparisons would enrich theoretical insights by revealing cultural variations in how social norms and packaging perceptions influence sustainable behavior in e-commerce.

This study demonstrates that green shipping packaging plays a pivotal mediating role in linking consumer awareness to sustainable purchasing behavior on e-commerce platforms. By highlighting the influence of subjective norms, the limited role of attitudes, and the skepticism effect of perceptions, the research advances theoretical models of green consumption. Practically, the findings suggest that investing in sustainable packaging and transparent communication can strengthen both environmental outcomes and customer loyalty. These insights provide a timely contribution to academic discourse and practical strategies for aligning digital commerce with long-term sustainability goals.

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